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Demolition of Kwai Chung Incineration Plant

Environmental Permit No.

EP-121/2002/A

Waste Management Plan (WMP) for Demolition Works

May 2009

(Version 3.3)

Waste Management Policy

We are committed to reduce/minimise the generation of construction and demolition (C&D) material and to undertake construction activities in an environmental friendly manner.

We are committed to:

- Ensure construction works complied with specified standards and statutory requirements.
- Achieve the objectives we have established in this Waste Management Plan (WMP).
- Provide adequate resources and facilities to facilitate the implementation of this WMP.
- Ensure that all staff members in relevant departments perform their duties according to this WMP.
- Conduct regular review and audit to monitor the implementation of this WMP.

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Project Director
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March 2009

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1 INTRODUCTION

1.1 Background

1.1.1 This Waste Management Plan (WMP) has been prepared to fulfil Condition 2.8 of the Environmental Permit (EP No. EP-121/2002/A) with respect to the demolition works of the Project – "Demolition of Kwai Chung Incineration Plant". The major scope of the demolition works of the Project is to remove all ACM/DCM in chimney and superstructures before commencement of the demolition works. The decontamination works of the Project will be carried out after completion of the demolition works of the Project.

1.1.2 This WMP does not cover the decontamination works to be carried out for the Kwai Chung Incineration Plant (KCIP). The corresponding WMP for the decontamination works will be submitted under a separate cover for ground decontamination works. This WMP has therefore focused on and finalized the rest of waste management aspects with respect to waste generation, treatment and disposal for this Project.

1.1.3 WMP version 2.3 (C&D Materials, Asbestos, & Dioxin/ Furan containing materials in Ash Bunker) was submitted to EPD and approved on 25 July 2008. The wastes generated from the chimney are included in this WMP together with the content of version 2.3 to facilitate further approval.

1.2 Scope of Demolition Works of the Project

1.2.1 The demolition works of the Project with boundary as shown in Figure 1-1 is summarised in Table 1.1.

Table 1-1 Structures to be Demolished at KCIP

Building	Brief Description
KCIP Chimney	Reinforced concrete construction of diameter 6m – 12m and 150m high. Internal metal flues and platforms
KCIP Buildings	High, single storey steel frame, with weather cladding, pre-cast concrete slab, reinforced concrete partitions, corrugated metal sheet external wall and roof. The overall size is approximately 83m x 92m on plan.
Weigh Bridge Office No. 2	Single Storey. Approximately 4m x 13m on plan.
Site Office/ Storage Buildings	Two storey high prefabricated building. Approximately 40m x 7.5m on plan.

1.2.2 The demolition works of the Project also includes the removal of asbestos containing materials ("ACM") and dioxin/ furan contaminated materials ("DCM") prior to demolition of the relevant structures.

1.3 Construction Programme

1.3.1 The Contract for the Project was awarded on 26 October 2007 and contractually

commenced on 31 October 2007. The main contract will last for 45 months excluding 12 months for landscape establishment works. In accordance with Condition 1.11 of the Environmental Permit EP-121/2002/A, the Director of Environmental Protection (DEP) was notified that the commencement date for the decommissioning of the Project was 24 January 2008 within the context of the Environmental Permit. The master construction programme and demolition method is included in Appendix B.

1.4 Obligations under the EP

1.4.1 Condition 2.8 of the Environmental Permit EP-121/2002/A requires that a WMP shall be submitted to the DEP 8 weeks before the commencement of the decommissioning of the Project. WMP versions 1.1 and 2.2 were certified by ET and verified by IEC and submitted to EPD on 29 November 2007 and 9 April 2008 respectively for approval.

1.4.2 This WMP includes details on the types, quantities, disposal methods, timings and locations for treatment and disposal of wastes, responsibilities for implementation and possible recycling and reuse of materials and is written with reference to the requirements set out in the ETWB TCW No. 19/2005.

1.4.3 This WMP has taken into account in devising any findings and recommendations in the waste management section of the EIA Report (Register No. AEIAR-049/2002), and relevant findings of the Reassurance and Confirmatory Testing Report ("RCT"). Before submission to the Director, the WMP will have to be certified by the ET Leader and verified by the IEC as conforming to the information and recommendations contained in the EIA Report, and any relevant findings of the RCT.

1.4.4 This WMP has included, but not limited to, the following information for each type of the wastes relevant to the specific Project part that it is intended to cover. The types of wastes covered include general refuse, asbestos containing materials ("ACM") (other than those within Chimney), DCM in Ash Bunker and construction and demolition ("C&D") materials.

- summary of the locational sources, quantity, level of contamination (if applicable), remediation required prior to disposal (if applicable), and on-site and off-site disposal methods for different type of wastes;
- timings for generation, remediation (if applicable), temporary on-site stockpiling or storage, and final on-site or off-site disposal of different type of wastes;
- method statements on the remediation works to be carried out on ACM and DCM (ash bunker only), and the confirmatory and parallel independent testing to be conducted;
- on-site waste management measures to control nuisances during the generation, handling, remediation (if applicable), and temporary stockpiling of the different types of wastes, in particular for ACM/ DCM,;
- possible recycling and reuse of materials;
- location of the disposal site(s) for various types of wastes;
- confirmation on whether or not barges would be used for removal of wastes;
- transportation routing(s) of the removal of various types of wastes from the project site to the disposal site(s);

- measures to control nuisances due to transportation of different type of wastes, in particular to avoid loss of asbestos containing materials; to remove possible soil left on the first several hundred meters of roads by vehicles leaving the site, such as the option of using specially design road cleansing vehicle; and to reduce dust nuisance from trucks carrying wastes, such as the option of installing mechanical covers to trucks;
- trip-ticket system for waste transfer/disposal operations, including a certification system to confirm to the disposal site's operator that the contaminated wastes have been remediated to meet the specific disposal criteria; and
- responsibilities for implementation.

1.5 Environmental Legislation and Guidelines

Regulatory Requirements

1.5.1 During the Contract, the Contractor will comply with the following Ordinances and Regulations, which cover, or have some bearing upon, the handling, treatment and disposal of wastes in the Hong Kong SAR.

Waste Disposal Ordinance (Cap 354)

1.5.2 The Waste Disposal Ordinance (WDO) prohibits any person from using any land or premises for the disposal of wastes unless one has been authorised by or has obtained a license from the Waste Disposal Authority, the Environmental Protection Department (EPD).

Waste Disposal (Chemical Waste) (General) Regulation (CWR), Enacted under the WDO

1.5.3 The Regulation has provisions to require any person who produces chemical waste to register with the EPD as well as to control the processing, storage, collection, transport and disposal of chemical waste. In additional, the CWR also provides for the licensing of waste collection, transport and disposal activities.

1.5.4 For chemical waste registration, Contractor is required to provide particulars on the location of waste generating activities, the nature of operation and waste types to be generated. A registration form shall be prepared and submitted to the EPD for approval prior to the waste generating activities. Upon successful completion of the registration procedure, the EPD will then issue a confirmation note and assign a waste producer number. Any disposal of chemical waste registered shall give prior notification to EPD and the disposal has to follow directions of the EPD. If certain types of chemical wastes are classifiable as Dangerous Goods under the Dangerous Goods Ordinance (Cap. 295) (DGO), handling of these wastes shall also comply with the requirements of the DGO and its regulations.

Waste Disposal (Charges for Disposal of Construction Waste) Regulation

1.5.5 The Charging Scheme has come into operation on 1 December 2005. Processing of account applications by the Environmental Protection Department has started on the same day.

1.5.6 Starting from 1 December 2005, main contractor who undertakes construction work

under a contract with value of $1 million or above is required to open a billing account solely for the contract. Application shall be made within 21 days after the contract is awarded. Failing this will be an offence under the law.

1.5.7 For construction work under a contract with value less than $1 million, such as minor construction or renovation work, any person such as the owner of the premises where the construction work takes place or his/her contractor can open a billing account; the account can also be used for contracts each with value less than $1 million. The premises owner concerned may also engage a contractor with a valid billing account to make arrangement for disposal of construction waste.

1.5.8 Charging for disposal of construction waste has started on 20 January 2006 and from this day, any person before using waste disposal facilities for disposal of construction waste needs to open an account.

Land (Miscellaneous Provisions) Ordinance (Cap 28)

1.5.9 Public fill construction wastes may be taken to public dumps. The Land (Miscellaneous Provisions) Ordinance (LO) requires that dumping licences be obtained by individuals or companies who deliver suitable construction wastes to public dumps. The licences are issued by the CEDD. In the case that public dumping of public fill construction waste is desired, the contractor shall apply for the licence prior to disposal of the construction wastes.

Public Health and Municipal Services Ordinance (Cap 132) - Public Cleansing and Prevention of Nuisances Regulation

1.5.10 The Public Health and Municipal Services Ordinance (PHMSO), Water Pollution Control Ordinance Cap. 358, and Waste Disposal Ordinance Cap. 354 have provisions on the control of the discharge of hazardous materials to sewers and for the control of littering. The ordinances prohibit placing or throwing any solid matter, mud or waste into public sewers or drains and also placing these substances in a location where they may fall into these public sewers/drains.

1.5.11 It also has provisions to require the owner or occupier of the land adjoining any street or place in which is situated near a public sewer to exercise measures to prevent obstruction of sewers and drains caused by soil and waste.

Additional Guidelines

1.5.12 This WMP has been prepared with reference to the following 'guideline' documents:

- Waste Disposal Plan for Hong Kong (December 1989), Planning, Environment and Lands Branch Government Secretariat;
- Chapter 9 Environment of Hong Kong Planning Standards and Guidelines, Hong Kong Government;
- Works Branch Technical Circular No. 2/93, Public Dumps, Works Branch, Hong Kong Government;
- Works Branch Technical Circular No. 2/93B, Public Filling Facilities; Works Branch, Hong Kong Government;

- Works Branch Technical Circular No. 16/96, Wet Soil in Public Dumps; Works Branch, Hong Kong Government;
- Works Bureau Technical Circular No. 4/98 & 4/98A, Use of Public Fill in Reclamation and Earth Filling Projects; Works Bureau, Hong Kong SAR Government;
- Waste Reduction Framework Plan, 1998 to 2007, Planning, Environment and Lands Bureau, Government Secretariat, 5 November 1998;
- Works Bureau Technical Circular No 19/2001, Metallic Site Hoardings and Signboards; Works Bureau, Hong Kong SAR Government;
- Works Bureau Technical Circular No. 12/2000, Fill Management; Works Bureau, Hong Kong SAR Government;
- Works Bureau Technical Circular No 12/2002, Specifications Facilitating the Use of Recycled Aggregates. Works Bureau, Hong Kong SAR Government;
- Environment, Transport and Works Bureau Technical Circular (Works) No 33/2002, Management of Construction and Demolition Material Including Rock, Environment, Transport and Works Bureau, Hong Kong SAR;
- Works Bureau Technical Circular No 31/2004, Trip-ticket System for Disposal of Construction and Demolition Material; Works Bureau, Hong Kong SAR Government;
- A Guide to Chemical Waste Control Scheme and A Guide to the Registration of Chemical Waste Producer, Environmental Protection Department, Hong Kong SAR; and
- Code of Practice on the Packaging, Labelling and Storage of Chemical

1.5.13 Practices for asbestos handling and disposal are in accordance with the followings:

- Air Pollution Control (asbestos) Administration Regulation
- ProPECC PN2/97 Handling of Asbestos Containing Materials in Buildings.
- Code of Practice on the Handling , Transportation and Disposal of Asbestos Waste,
- Code of Practice on Asbestos Control, Preparation Work Using Full Containment or Mini Containment Method,
- Code of Practices on Asbestos Control; Asbestos Work Using Glove Bag Method,
- Code of Practice on Asbestos Control; Safe Handling of Low Risk Asbestos Containing Material, and
- Code of Practice on Asbestos Control; Preparation management Plan and Asbestos Abatement Plan.

1.6 Application for Licenses, Permit and Approvals

1.6.1 The Contractor will apply for, where appropriate, and maintain all the following permits and licenses required under the legislation for the handling and disposal of waste arising from the Contract.

- Public Dumping Licence under the Land (Miscellaneous Provisions) Ordinance (Cap 28);

- Chemical Waste Producer Licence under the Waste Disposal (Chemical Waste) (General) Regulation (Cap 354);
- Chemical Waste Collection Licence under the Waste Disposal (Chemical Waste) (General) Regulation (Cap 354);
- Land (Miscellaneous Provisions) Ordinance
  - Dumping licences are issued free of charge by the Port Works Division, Civil Engineering Department to lorry owners for delivering public fill to public filling facilities. The licences are valid to the end of each calendar year and the licensee need to apply for a new licence for the new calendar year. Dumping labels are also issued together with the licences for display on the wind-screen of the lorry.
- Waste Disposal (Chemical Waste) (General) Regulation
  - Chemical waste, as defined under the *Waste Disposal (Chemical Waste) (General) Regulation*, includes any substance or thing being scrap material, effluent, or an unwanted substances or by-product arising from the application of or in the course of any process or trade activity, and which is or contains any substance or chemical specified in the prescribed schedule (i.e. *Schedule 1 of the Waste Disposal Regulations*) if such substance or chemical occurs in such form, quantity or concentration so as to cause pollution, constitute a danger to health or risk of pollution to the environment.

2 WASTE MANAGEMENT POLICY

2.1 General Principles

2.1.1 The principles of waste management to be adopted in this Project will be in line with the latest Government policy on environmental management.

2.2 Hierarchy of Waste Management

2.2.1 The various waste management options will be categorised in terms of preference from an environmental viewpoint. The options considered to be more preferable have the least impacts and are more sustainable in the longer term. Hence, the hierarchy of waste management is as follows in descending order:

Table 2-1 Hierarchy of Waste Management

Avoidance and Minimization	Avoid and minimize generation of C&D materials through careful planning and design of works
Reuse	Reuse inert portion of the C&D materials generated.
Recovery and Recycle	Undertake on-site and off-site waste recycling
Treatment and Disposal	Properly treat and dispose of waste in accordance with legislative requirements, guidelines and good practices.

2.2.2 This hierarchy will be used to evaluate waste management options, thus allowing maximum waste reduction. Waste reduction measures will be introduced at the planning and detailed design stage and carried through the demolition and decontamination works, whenever possible, by careful purchasing control, reuse of formworks and good site management.

3 ORGANIZATIONAL STRUCTURE FOR WASTE MANAGEMENT

3.1 General

3.1.1 The organisation of the waste management team is described under this section, the personnel responsible for waste management shall:

- Work within the scope of the demolition contract;
- Participate in the waste management site inspections undertaken by the Environmental Team (ET) and the Independent Environmental Checker (IEC) as required and undertake any corrective actions instructed by the ER; and
- Take responsibility and strictly adhere to the provisions of the WMP and the contract specifications.

3.2 Roles and Responsibilities of Key Waste Management Personnel for KCIP

3.2.1 The major scope of the demolition works is to remove all ACM/DCM in structures and demolish all structures above ground level within the KCIP site. All underground structural components shall remain undisturbed before the land decontamination works.

3.2.2 A Project Organization Chart is shown in Appendix C. The roles and responsibilities of the key waste management personnel shall include, but not be limited to the following:-

The Employer and EP Holder

3.2.3 The Project Proponent shall be responsible for providing full support on the implementation of the approved WMP.

The Engineer's Representative (ER)

3.2.4 The ER shall:

- Ensuring that the WMP is fully implemented throughout the Project;
- Review the waste monitoring and audit report submitted by the ET;
- Follow up and ensure the proposed corrective actions to be in accordance with the WMP;
- Investigate and audit the equipment and work methodologies with respect to waste management; and
- Monitor and report any exceedance or non-compliance under the environmental permit and pollution control ordinances.

The Contractor's Representative

3.2.5 The CR is responsible for overall planning, site operations, appointment of committee members for waste management, staff supervision control, co-ordination and external liaison. The CR shall:

- Oversee the waste management within the Project, which they achieve by implementation of the WMP;

- Participate and provide necessary support to the ET for the preparation and review of WMP;
- Ensure that staff attends environmental training with regard to waste management organized by the Waste Manager;
- Implement environmental controls and mitigation as set out in this WMP as well as any additional measures necessary for compliance with environmental control measures;
- Ensure the recommendations and instructions of the ER or ET are implemented to improve the waste management practice and carry out immediate action to rectify the non-compliance of waste management and environmental protection requirements;
- Providing leadership in the efficient management of the Project and in meeting the Work's waste management objectives; and
- Anticipate waste generation impacts that may require mitigation before the problem arises.

Site Agent

3.2.6 The Site Agent shall:

- Arrange routine joint site inspection with ET and review environmental inspection report submitted by the ET;
- Ensure works are undertaken in accordance with the recommendations made and instructions given by the ER and ET;
- Monitor and control the works including those of subcontractors to ensure compliance with specified requirements;
- Ensure appropriate waste management mitigation measures are properly implemented;
- Ensure follow up actions are properly undertaken in the event of non-compliance of the WMP;
- Review method statement to ensure appropriate mitigation measures are implemented prior to execution of work;
- Liaise with ER, and ET on waste management and environmental protection issues;
- Monitor records of all trained personnel in the site offices;
- Monitor the following documents:
  - Any statutory required waste management permits/licenses including dumping license, chemical waste producer, admission ticket and etc.;
  - C&D material disposal delivery record; and
  - Waste reuse / recycle / disposal summary.
- Keep abreast of the statutory requirements and regulations about waste management; and
- Supervise and arrange the maintenance of waste management facilities.

Waste Manager

3.2.7 The Waste Manager shall:

- Ensure all relevant legislation and the Contractor's duty of care is complied with throughout the duration of the Project;
- Initiate waste reduction scheme on site;
- Ensure that all the Contractor's employees and nominated subcontractors' employees are aware of their responsibilities regarding the content of the WMP; and
- Co-ordinate waste management on site, gather data on waste and keep accurate records on waste movement both on and off site.

Registered Asbestos Consultant

3.2.8 The Registered Asbestos Consultant shall:

- Verify the extent of the ACM identified prior to commencement of the asbestos abatement works;
- Supervise ACM removal works of the Registered Asbestos Contractor;
- Certification and acceptance of the site preparation or completion of asbestos abatement works by the Registered Asbestos Contractor for each work zone; and
- Prepare Asbestos Investigation Report (AIR) and Asbestos Abatement Plan (AAP) and submit to the EPD of any ACM that was previously not found or reported.

Registered Asbestos Contractor

3.2.9 The Registered Asbestos Contractor shall:

- Be responsible for the asbestos abatement works including the removal of all ACM identified in the Asbestos Study Report (ASR) including the AIR and AAP, and any unsurveyed ACM found during the demolition works;
- Establish containment and associated ventilation and filtration equipment as required for asbestos abatement works;
- Provide three-chamber decontamination unit for each of the containment for asbestos abatement works;
- Carry out air monitoring requirements for the containments for asbestos abatement works;
- Be responsible for the appropriate removal, packaging and storage for different types of ACM;
- Transport properly packaged ACM to designated facilities for disposal;
- Comply with emergency procedures under various emergency cases; and
- Provide experienced full-time Registered Asbestos Supervisor(s) on site every day during the course of the asbestos abatement works.

Registered Asbestos Supervisor

3.2.10 The Registered Asbestos Supervisor shall:

- Oversee all safety procedures and monitor the Controlled Works Area(s) for asbestos abatement works and ensure that the Contaminated Works Area(s) for asbestos abatement works is continuously cleaned of asbestos fibres;
- Verify that all workers for asbestos abatement works wear suitable close fitting respirators every day, and shall maintain a register to verify correct procedures and movement of all persons who enter the Contaminated Works Area(s); and
- Undertake all duties as required by the Factories and Industrial Undertakings (Safety Officers and Safety Supervisor) Regulations as necessary for asbestos abatement works.

Site Engineer (Demolition)

3.2.11 The Site Engineer shall:

- Assist the Site Agent in the implementation of WMP;
- Monitor and control works including those of subcontractors to ensure compliance of WMP;
- Report to the Site Agent regarding non-compliance of waste management issues; and
- Ensure the remedial actions or mitigation measures are carried out as planned.

General Foremen

3.2.12 General Foremen shall:

- Assist the Site Engineer in the implementation of WMP;
- Control works, including those of subcontractors, to fulfil the requirement of waste management issues;
- Report to the Site Engineer any non-compliance of waste management issues;
- Maintain the on-site waste management facilities including sorting area, temporary storage area, general refuse bins and recycling bins etc;
- Carry out remedial actions or mitigation measures to rectify non-compliance;
- Carry out routine maintenance of waste management facilities and proper maintenance records shall be kept in site office; and
- Report non-compliance of environmental protection issues.

Subcontractor and other employees

3.2.13 Every employee and subcontractor has the duty to carry out the waste management practices instructed by the Site Engineers and General Foreman. Copies of WMP are to be issued to all subcontractors.

3.2.14 Every employee and subcontractor shall report promptly to foreman any non-compliance of waste management and environmental protection issues.

The Environmental Team (ET) and ET Leader

3.2.15 The ET, including the ETL, shall:

- Be responsible for the duties defined in the EM&A Manual of the EIA Report;
- Conduct site inspections and investigate and inspect the Contractor's equipment and work methodologies with respect to waste management and environmental mitigation measures. They shall review the works for anticipating potential waste management and environmental pollution implications;
- Review the programme of works to anticipate potential waste management implications;
- Report the implementation status of waste management mitigation measures from site inspections; and
- Follow the procedures stipulated in the agreed Event and Action Plans in the event of non-compliance or complaint.
- Be responsible for the implementation of the EM&A programme in accordance with the EM&A requirements as contained in the EM&A Manual; and
- Keep a contemporaneous log-book of each and every instance or circumstance or change of circumstances which may affect the environmental impact assessment and for each and every non-compliance of the EIA Report or the EP.

The IEC

3.2.16 The IEC shall:

- Be responsible for the duties defined in the EM&A Manual of the EIA Report, and shall audit the overall EM&A programme described in the EIA Report, including the implementation of all environmental mitigation measures, submissions required in the EM&A Manual, and any other submissions required under the EP;
- Be responsible for verifying the environmental acceptability of permanent and temporary works, relevant design plans and submissions under the EP;
- Verify the log-book(s) kept by the ETL;
- Notify EPD of each and every occurrence, change of circumstances or non-compliance with the EIA Report or the EP, which might affect the monitoring or control of adverse environmental impact;
- Conduct monthly site audit to ensure the Environmental Management System (EMS) is in place and recommend any changes as appropriate;
- Review and audit all aspects of the EM&A programme, including the WMP;
- Assist the ET on complaint investigation and recommend and/or instruct mitigation measures as appropriate; and
- Liaise with the ET on all environmental performance matters.

4 WASTE GENERATION AND DISPOSAL

4.1 Waste Overview

4.1.1 The following types of waste would be generated from the demolition activities under this contract:

- General refuse
- Inert Construction and Demolition (C&D) Material
- Non-inert C&D Material
- Recyclables
- Asbestos Containing Materials (ACM)
- Dioxin/Furan Contaminated Materials (DCM)
- Chemical waste

4.1.2 The estimated quantity of waste arising from different activity & work areas, and the disposal sites for the wastes generated from the project are provides in the following sections. The estimated period of waste generation to landfill site is from December 2007 to August 2009 excluded the period of land decontamination works. The waste disposal schedule to landfill site is shown in Appendix G1.

Table 4-1 Summary of Waste Disposal

Waste Type	Examples / Classification	Disposal Site
General Refuse	• Packaging waste • Office waste • Putrescible wastes • Vegetation	• SENT Landfill by vehicles
Inert C&D material	• Broken concrete • Brick • Aggregate	• Public Fill at Tuen Mun Area 38 Fill Bank; or • Recycling Facility upon approval of the Engineer
Non-inert C&D material	• Wood • Bamboo	• SENT Landfill
Recyclables	• Metal • Paper • Plastic	• Recycling collectors
Asbestos Containing Material (ACM)	• Type 1 • Type 2 • Type 3 •	• Disposal of at SENT Landfill by licensed collector
Dioxin/Furan Contaminated Material (DCM)	• Ash bunker • Chimney flues	• Disposal of at SENT / WENT Landfill by licensed collector (disposal to CWTC will only be a fallback solution as per EP No. 121/2002/A)
Chemical Waste	• Spent lubricant oil • Surplus paint • Spent diesel	• To be collected by licensed waste collector

4.2 General Refuse & Non-Inert C&D Material

Source of Wastes

4.2.1 General refuse will be generated largely by food service activities for on-site staff, from office work and certain aspects of the construction works, and will include food wastes, unrecyclable waste etc.

Estimated Quantities and Timing for Generation

4.2.2 It is estimated that the general refuse and non-inert C&D material arising will be about $50m^3$ per month exclude the period of land decontamination works. Although the size of the site office establishment will vary at different stages of the demolition works, thus be observed that the relative contribution to the general wastes from site staff, which will be generated throughout the whole contract period, will be small in terms of the overall wastes arising. The tentative programme of the non-inert C&D material generation would be from December 2007 to August 2009 exclude the period of land decontamination works.

Control Measures

4.2.3 Office waste will be reduced through reduce use of paper and minimize the waste generation.

4.2.4 General refuse including food wastes, such as lunch boxes, and domestic wastes generated on-site will be stored in enclosed bins or compaction units separated from construction and chemical wastes.

On-Site Handling or Storage

4.2.5 Putrescible wastes, such as lunch box, and domestic wastes generated on-site will be stored in enclosed bins or compaction units separate from C&D and chemical wastes. Location of temporary storage of general refuse is indication in Figure 4-1.

Disposal Arrangement

4.2.6 A reputable waste collector will be employed by the Contractor to remove general refuse and to be disposed of at landfill site, separately from C&D material and chemical wastes, preferably daily to minimise odour, pest and litter impacts. The burning of refuse on construction sites is prohibited by law.

4.2.7 Waste disposal records will be obtained from the appropriate authorities and collection of general refuse and general site housekeeping will be carried out in accordance with the Waste Disposal Ordinance (Cap. 354), Waste Disposal (Chemical Waste) (General) Regulation (Cap. 354), the Government Land (Miscellaneous Provisions) Ordinance (Cap. 28) and the recommendation given in Section 9 of KCIP EIA Final Report – September 2001.

4.3 Inert C&D Materials & Recyclables

Source of Wastes

4.3.1 Due to the nature of the works, C&D materials, other than material mentioned at paragraph 4.2, will also be generated under the contract. The types of C&D materials include the following:

- Inert C&D materials (including rock, broken concrete, etc); and
- Recyclables non-inert materials such as metal components, plastic & paper.

4.3.2 C&D material comprises materials broken up during demolition, including concrete and structural steel. Alternatively there are materials which are surplus to requirements for the demolition process and materials which have been used and discarded. The bulk of the C&D material will come from the buildings and other related structures (e.g. chimney) which are to be demolished. C&D material may comprise different types of materials.

4.3.3 C&D materials are typically generated simultaneously in mixed form and the individual waste materials may be altered (e.g. painted). The final actual volume and composition of C&D waste requiring disposal to public filling area following the demolition at KCIP will be dependent on the demolition procedure and material recovery practices employed.

Estimated Quantities and Timing for Generation

4.3.4 It is estimated that the total C&D material arising will be about 9,400m^3 which mainly consist of broken concrete. Meanwhile, a small portion of recyclables (approx. 180m^3) which would be collected by the recycling collectors would also be generated from the demolition works. The estimated quantities of recyclables would be:

- Scrap metal: total 1,920 tonne; (including 20 tonne of metal flue where below 1ppb TEQ dioxin concentration when feasible for recycling and reuse)
- Plastic: 100kg per month; and
- Paper: 100kg per month.

4.3.5 The tentative programme of C&D materials generation would be from the 12th month to the 25th month covering the period from the commencement of the contract works to the completion of the demolition works.

Control Measures

4.3.6 To reduce / minimize the generation of C&D materials, materials resulted from the demolition works will be sorted properly to recover the inert portions for reuse on site or disposal to designated outlets or other facility approved by the Engineer.

4.3.7 Sorting of inert and non-inert portions of demolition materials will be carried out at the source site to avoid double handling and loss of materials due to transportation. In case the site condition is inapplicable for sorting, it will be carried out at the designated storage area. Reusable / recycling materials of both the inert and non-inert portion will be

further recovered for on-site reuse or collection by the recycling contractors.

4.3.8 Demolition materials will be segregated from other wastes to avoid contamination thereby ensuring acceptability at public filling areas and avoiding the need for disposal at landfill.

On-Site Handling or Storage

4.3.9 Due to the large volumes of (non-contaminated) C&D material generated from the demolition works, it is important that selective demolition and on-site sorting as described below will be incorporated into the tender documents for implementation by the Contractor.

Selective Demolition

4.3.10 "Selective Demolition" involves demolition and removal of wastes of the same category one at a time. In general, domestic wastes such as furniture, household appliances; metal components such as window frames, pipes; timber components such as doors, wooden floors; and other wastes such as tiles, asphalt materials, ceramic products will be removed first. The building demolition will begin after all the above non-structural materials have been stripped and removed. To avoid mixing the non-recyclable bricks with the broken concrete, the demolition sequence will be planned in such a way that brick walls are demolished first and stockpiled separately before the demolition of structural members.

On-site Sorting

4.3.11 C&D material will be removed from site as soon as practicable to avoid adverse environmental impacts due to on-site storage of the material. It will be sorted/separated at the construction site as far as practicable into two main types: inert (including soil, rock, concrete, brick, aggregates and asphalt) and non-inert (wood, paper, general garbage and other inorganic).

4.3.12 All inert C&D materials from demolition such as the rock and broken concrete will be either reuse on site or disposed off site to the designated Public fill reception Facilities (PFRF) / appropriate disposal ground where approved by the Engineer. The non-inert portion excluding all reusable / recyclables material is classified as C&D waste which will require to be disposed of at the WENT/ SENT Landfill Site or other areas as designated by EPD. For inert C&D materials to be disposed of at designated PFRF, the Contractor will ensure that the C&D materials be broken down on site to less than 250mm so as to facilitate its reuse in reclamation or earth filling projects.

4.3.13 C&D material will be transported by barge or dump truck where applicable. When transported by barge, the C&D material generated from the demolition works will be loaded on barge immediately and be transported offsite as soon as it fills the capacity. It is estimated that less than 40 trips per day when transport the C&D material by dump truck. Location of temporary storage of C&D material is indicated in Figure 4-1.

4.3.14 Designated areas for segregation and temporary storage of reusable and recyclable materials are identified. The Contractor will recycle as much of the C&D material as

possible on-site. Different areas of the work site will be designated for such segregation and storage wherever site conditions permit.

Recyclables

4.3.15 To encourage environmental awareness and to reduce waste by reducing the number of photocopies to a minimum and by copying on both sides of paper for internal documents and external documents where appropriate. Recycling bins for paper and plastic bottle will be provided in site office to facilitate the recycling. Waste paper and plastic bottle will be stored in containers clearly marked as recyclable or waste. Location of temporary storage of recyclable is indicated in Figure 4-1 of Appendix A.

Disposal Arrangement

4.3.16 *Environment, Transport and Works Bureau Technical Circular (Works) No. 31/2004 – Trip-ticket System for Disposal of Construction and Demolition Materials* promulgates the policy to implement a trip-ticket system in Public Works Programme (PWP) contracts for the proper disposal of C&D material at public filling facilities or landfills. A trip-ticket system should be implemented for this Project in accordance with *ETWB TC(W) No. 31/2004* as per the recommendation of the approved EIA Report and the conditions of the Environmental Permit therefore overrule the exemption quantity of 50,000 m^3 specified in *ETWB TC(W) No. 31/2004*.

4.3.17 When disposal of inert C&D material to be transported by barge to the public fill area or other areas as designated by EPD, vessel chits forms should be used for C&D material disposal of at public fill area by barge.

4.3.18 As the Public Fill Site has the limited space, the Contractor would consider the recycling facility for the C&D material. Upon the approval of the Engineer, the C&D material would be delivered to the recycling facility, e.g. Tailor Recycled Aggregates Limited or others. The Contractor would follow the trip-ticket system for disposal.

4.3.19 The transportation route for disposal of C&D material is indication in Figure 4-2 of Appendix A.

4.4 Asbestos Containing Materials (ACM)

Source of Wastes

4.4.1 ACM is classified as Part A waste under the Waste Disposal (Chemical Waste) (General) Regulation. An Asbestos Investigation Report (AIR) and Asbestos Abatement Plan (AAP) have been prepared by Registered Asbestos Consultants (EPD register 1014 and 1019) based on thorough site investigations under the Air Pollution Control Ordinance (APCO).

Estimated Quantities and Timing for Generation

4.4.2 There will be up to 1,500m^3 of asbestos waste mainly in the form of "Galbestos" (galvanised metal sheeting which forms the outer cladding on the main building). The galvanised metal cladding is coated with asbestos containing material paint and will be

disposed of in line with the requirements of the APCO. Three types of ACM were identified at the EIA stage. The quantities of each type of ACM identified are summarized in Table 4-2.

Table 4-2 Estimated Quantity of ACM

ACM Type	Location of ACM	Estimated Quantity in EIA	Estimated Volume, m^3
Type 1	Flue guide plates (flue guides on platforms 1 to 7, chimney) (< $3m^3$)	$3m^3$	3
	Floor tile (Thickness = 2mm) - Conference Room, Office Block (6m x 6m) - Plant Manager Offices, Office Block (18m x 6m) - Kitchen Office, Main Building Offices (3m x 6m) - Laboratory, Main Building Offices (10m x 11m) - Corridor, Main Building Offices (2m x 20m) - Workshop Office, Main Building Offices (4m x 5m) - Day Supervisors Office, Main Building Offices (6m x 12m)	 $36m^2$ $108m^2$ $18m^2$ $110m^2$ $40m^2$ $20m^2$ $72m^2$	
	Sub-total	$404m^2$	4.95^
	Weather cladding (Main Building) (Package method#: Dimension of cladding sheet: 5.6m x 0.74m = $4.144m^2$, 3 sheets per pack per meter depth. Each pack volume = 5.6m x 0.74m x 0.1m (thickness) = $0.4144m^3$ No. of packs = $13,000m^2/4.144m^2$/3 sheets = 1,046 packs Volume of cladding: 1,046 packs x $0.4144m^3$ = $433m^3$)	$13,000\ m^{2\,\#}$	433
	Ventilation louvres at Chimney	NA*	1
	ACM waste (from cleaning, containment materials, etc.) (Type 1)	NA	50
		Type 1 Total	***491.95***
Type 2	Gasket (gas door seal on flues at ground level, base of chimney)	Total < $2m^3$	2
	Gasket (duct seal on ventilation above ground level, outside Kitchen)	Total < $0.2m^3$	1.372^
	Ribbon (Fuse box at the office block)	Total <$0.1m^3$	0.08^
	ACM waste (from cleaning, containment materials, wastewater, etc.) (Type 2)	NA	15
		Type 2 Total	***18.452***
Type 3	Gaskets (flues on platforms 1 and 2, chimney)	Total < $3m^3$	3
	Water pipe (fire water supply, ash bunker)	Total < $20m^3$	1.22^
	ACM waste (from cleaning, containment materials, wastewater, etc.) (Type 3)	NA	10
		Type 3 Total	***14.22***
	Total Volume = Type 1 + Type 2 + Type 3	**Grand Total**	**524.622**

 # There are the same estimation of surface area of cladding between onsite survey and estimated in the EIA stage and approved AAP. The packing method is according to the existing asbestos abatement works.

** Abatement method was proposed in the EIA Report & AAP, but the volume has not been estimated in the aforesaid reports.*

^ Actual volume generated after the completion of abatement works.

4.4.3 The tentative programme of the ACM generation would be from June 2008 to September 2009. In accordance with Code of Practices, EPD and LD were notified for asbestos removal works on 4 February 2008.

On-site Handling and Storage

4.4.4 Details on the method statements, work sequence and procedure with regard to removal of ACM are included in Appendix D2.

Package of Asbestos Wastes:

- Type 1 asbestos wastes (approximately $3m^3$ of bulk material and $1m^3$ of ventilation louvers plus $13,404m^2$ of floor tile and claddings. It is estimated that the thickness of floor tiles is 2mm and removal of weather cladding, i.e. a total of $491.95m^3$ of type 1 asbestos waste including ACM waste generated during decontamination. Refers to Table 4-2 for details) (bonded asbestos wastes, other than blue or brown asbestos in good condition) will be packed with 2 individual layers of strong transparent plastic sheets of not less than 0.15 mm thickness and completely sealed with adhesive tapes. Type 1 waste will be packed in suitable sizes for easy handling. The height of each package will be around 1m.
- Type 2 asbestos wastes (approximately $18.452m^3$ of bulk material including ACM waste generated during decontamination, refers to Table 4-2 for details) (any waste containing loose asbestos fibres (other than blue or brown asbestos)) must be contained, as soon as it is produced, in strong bags made from plastic or other containers approved by EPD. The bags should be goose-neck sealed by means of adhesive tapes. A bag filled with asbestos waste should be placed inside another plastic bag to provide additional protection. The colour of the inner bag should be white while the outer bag should be transparent to facilitate visual inspection.
- The handling of Type 3 asbestos wastes (approximately $14.22m^3$ of bulk material including ACM waste generated during decontamination, refers to Table 4-2 for details) (all blue asbestos (crocidolite) and brown asbestos (amosite), whether in good condition or not, or any articles contaminated by blue or brown asbestos) should be similar to that of Type 2 except that the colour of the inner bags should be orange.

Storage of Asbestos Wastes

4.4.5 All asbestos waste will be stored properly in a secure place isolated from other substances so as to prevent any possible release of asbestos fibres into the atmosphere and contamination of other substances. Type 1 asbestos waste will not be stored together with Types 2 and 3 asbestos wastes so as to avoid damage to the plastic bags of Type 2 or 3 asbestos waste, unless the bags are packed in boxes or drums for additional protection. Bagged asbestos waste will not be stacked more than 3 bags high in order to avoid damage to the bottom bag. The storage area will be isolated from other working areas and bear warning panels to alert people of the presence of asbestos waste.

4.4.6 Location of temporary storage area of asbestos wastes is indicated in Figure 4-1.

Disposal Arrangement

4.4.7 Disposal of asbestos wastes will not commence before a designated notification has been given to EPD and confirmed. Before being transported for disposal, all the asbestos waste produced will be stored in a temporary storage area which complies with the requirements of Section 7 of the *Code of Practice on the Handling, Transportation and Disposal of Asbestos Waste*. The disposal of ACM generated in the Chimney will be approved separately under APCO.

4.4.8 All asbestos wastes for disposal shall be transported by an asbestos waste collector - General Central Engineering Limited, licensed by EPD and in a designated barge equipped as stated in the Code of Practice and to be disposed of at the SENT Landfill Site or other areas as designated by EPD. For waste transportation arrangement for the delivery to and deposition at SENT Landfill Site, the Contractor will use CEDD's pier at TKO Area 137 for unloading the materials to truck and then deliver to EPD's landfill site. The self-explanatory letter of CEDD is shown in Appendix E. The asbestos wastes would be temporarily stored in 39 containers to be transported to the barge. It is estimated that each barge could accommodate 4 nos. containers and therefore totally 10 barge trips for the disposal of the waste to the landfill from September 2008 to September 2009 would be required.

4.4.9 Pursuant to S74(3) of the APCO, the proposed amendment to use marine vessel for transportation of asbestos waste was approved by EPD [Ref.: (10) in EPAC/A/15/000/918 Pt.VI dated 29 August 2007] on the condition that the marine vessels will be the approved ones listed in the list of licensed chemical waste collectors issued by EPD. Transportation route for disposal of ACM waste is indicated in Figure 4-2 and the generic method statement of ACM removal is attached in Appendix D2.

4.5 Dioxin / Furan Contaminated Wastes

Source of Wastes

4.5.1 According to Section 4.7.26 of the approved EIA Report (AEIAR-049/2002), ash waste containing a considerable amount of dioxin and in its untreated state would be classified as a chemical waste under the Waste Disposal (Chemical Waste) (General) Regulation.

4.5.2 Dioxin contaminated ash on the walls and floor near the ash bunker will be collected and stabilized with cement to meet landfill disposal criteria of EPD, e.g. TCLP tests as per Section 4.7.32 of the approved EIA Report (AEIAR-049/2002). The stabilized ash/ sediment will then be sealed in polythene-lined steel drums for landfill disposal.

4.5.3 Dioxin contaminated ash on the inner walls and base of flues will be collected and stabilized with cement to meet landfill disposal criteria of EPD, e.g. TCLP tests as per Section 4.7.32 of the approved EIA Report (AEIAR-049/2002). The stabilized ash/ sediment will then be sealed in polythene-lined steel drums for landfill disposal.

4.5.4 Regarding the quantities and level of contamination of DCM in ash bunker and the KCIP

chimney, please refer to the following section.

Estimated Quantities

4.5.5 The estimated quantity of dioxin/furans contaminated waste after detailed site investigation works carried out subsequent to the EIA stage and on-site measurement is as follows: [To be disposed of at landfill (disposal to CWTC will only be a fallback solution as per EP No. 121/2002/A)]

- Ash and sediment in the area of the Ash bunker: 117m^3
- Ash in the chimney flue: 7m^3
- Chimney flue sections: 140m^3
- ACM flexible joint contaminated with DCM: 6.5m^3

Level of Contamination

Ash Bunker

4.5.6 The laboratory analysis results presented Table 4-3 below has verified the findings of the EIA Report with respect to dioxin contamination around the ash bunker. Amongst the 12 samples collected around the ash bunker, PCDDs/PCDFs were detected in 11 samples, and 4 samples were found to have TEQ exceeding the USEPA criterion and EP no. EP-121/2002/A Clause 2.13 requirements of 1ppb TEQ. The sampling location is given Figure 4-3 of Appendix A.

Table 4-3 PCDDs/ PCDFs Analysis Results for Samples Collected at the Ash Bunker

Sample ID	Type of Sample	Location	Total TEQ (ppb)*
D1	Ash	Surface sample from wall of ash bunker at 5m above ground level	**4.6184**
D2	Ash	Surface sample from wall of ash bunker at 7m above ground level	0.32281
D3	Ash	Surface sample from wall of ash bunker at 5m above ground level	**3.06332**
D4	Ash	Surface sample from wall of ash bunker at 7m above ground level	**2.77459**
D5	Ash	Surface sample from floor at 5m away from the ash bunker	0.02491
D6	Ash	Surface sample from floor at 5m away from the ash bunker	0.00301
D7	Sediment	Sediment sample from bottom of ash bunker	0.20995
D8	Sediment	Sediment sample from bottom of ash bunker	0.41922
D9	Water	Water sample taken from ash bunker	0
D10	Water	Water sample taken from ash bunker	0.00017
D11	Ash	Surface sample from floor at 5m away from the ash bunker	**2.73043**
D12	Ash	Surface sample from floor at 5m away from the ash bunker	0.01233

* Limited level = 1 part per billion (ppb)

4.5.7 Dioxin was found in ash deposits in the ash/sediment of the Ash Bunkers, the Main Hall Ash Bunker and wall above Ash Bunker of the KCIP site. As indicated in the approved EIA Report, remedial action is required to clean up these materials prior to demolition. The decontaminated structures, including the ash bunker, wall and floor would be dismantled as part of the overall demolition programme. The dismantled structures should be disposed of as Construction and Demolition (C&D) Material.

4.5.8 Based on the laboratory testing results, it is considered that the ash material retained on the surface of the wall (D1, D3 & D4) and north side of upper floor beside the ash bunker (D11) are dioxin-contaminated (i.e. >1ppb TEQ with the range of 2.7 – 4.6 ppb TEQ). Furthermore, the surface of the wall (D2), the ground floor nearby the ash bunker (D5, D6 & D12), accumulated water (D9 & D10) and sediment (D7 & D8) inside the ash bunker were found below 1ppb TEQ. The total quantity of ash and sediment material to be handled is estimated to be in the order of 117m^3 (i.e., 110m^3 of sediment at the bottom of the ash bunker and 7m^3 of ash on surface of wall and floor around the bunker).

Chimney Flues

4.5.9 The laboratory analysis results presented in Table 4-4 revealed that dioxin-contaminated ash are present within the interior surface of the chimney flues. Amongst the 36 ash samples collected from the four chimney flues, PCDDs/PCDFs were detected in all samples, and 11 samples collected were found to have a TEQ exceeding the USEPA criterion of 1ppb TEQ. The sampling location is given Figure 4-4 of Appendix A.

Table 4-4 PCDDs/PCDFs Analysis Results for Samples Collected at the Chimney Flues

Sample ID	Type of Sample	Location	Total TEQ (ppb)**
BA	Ash	1m from bottom of chimney	**5.8543**
BB	Ash		**3.53702**
BC	Ash		**1.93188**
BD	Ash		0.95623
GA	Ash	3m from bottom of chimney	0.01506
GD	Ash		0.18114
GB	Ash		0.01364
GC	Ash		0.01638
1A	Ash	1st platform (~10m from bottom of chimney)	0.00940
1B	Ash		0.05317
1C	Ash		0.05071
1D	Ash		0.00579
2A	Ash	2nd platform (~30m from bottom of chimney)	**23.8796**
2B	Ash		**7.505**
2C	Ash		**1.80762**
2D	Ash		**17.6589**

Sample ID	Type of Sample	Location	Total TEQ (ppb)**
3A	Ash	3rd platform (~60m from bottom of chimney)	0.00127
3B	Ash		0.00057
3C	Ash		0.00116
3D	Ash		0.00035
4A	Ash	4th platform (~80m from bottom of chimney)	0.00325
4B	Ash		0.00114
4C	Ash		0.00035
4D	Ash		0.00010
5A	Ash	5th platform (~100m from bottom of chimney)	0.00015
5B	Ash		0.00385
5C	Ash		0.00015
5D	Ash		0.00068
6A	Ash	6th platform (~125m from bottom of chimney)	0.00354
6B	Ash		0.00071
6C	Ash		0.00276
6D	Ash		0.00380
7A	Ash	7th platform (~150m from bottom of chimney)	**8.3833**
7B	Ash		**150.9539**
7C	Ash		**66.262**
7D	Ash		**119.093**

** Limited Level = 1 part per billion (ppb)

4.5.10 Although significant concentrations of dioxins/furans were detected at three height levels only, large quantity of rusty material was recovered in some scrap samples in the sampling, which may have affected the mass to mass concentration of PCDDs/PCDFs in these samples. As a prudent approach, all ash collected from the chimney flues will be regarded as dioxin-contaminated. The total quantity of ash material to be handled is estimated to be in the order of $7m^3$ (i.e., $3m^3$ on the interior surface of the chimney flues and $4m^3$ of ash residue identified at the bottom section of the flues).

4.5.11 Prior to the demolition of the chimney flues, the interior surface of the flues should be scrabbled and HEPA vacuumed to thoroughly remove the contaminated ash wastes attached. The collected ash will then be stablised onsite with cement before disposal to a designated landfill following the requirements specified in Condition 2.13, Part C of the Environmental Permit.

4.5.12 Additional bulk sampling was carried out between 14 April 2008 and 28 April 2008 for material inside the metal flues of the chimney, asbestos fibres though in small quantities (not greater 1% by weight) were detected at certain sampling points of chimney flues. In this regard, DCM adhered to the internal surface of the whole metal flues should be treated by means of cement stabilization rather than taking the risk of causing asbestos fibre release to the atmosphere and endangering the public during the incineration process at Tsing Yi Chemical Waste Treatment Centre. The laboratory results are given

in Appendix D1.

Timing for Removal

4.5.13 The tentative programme for DCM generation around the ash bunker and chimney would be tentatively from March 2009 to September 2009.

On-Site Remediation Works

Ash Bunker (117 m^3 of ash and sediment in the area of the ash bunker)

4.5.14 To prevent cross-contamination with the low concentration DCM, the treatment sequence is firstly for accumulated water in ash bunker; secondly for sediment and wall ash to be treated at the last.

4.5.15 There is about 2,000m^3 water accumulated inside the ash bunker. From the laboratory results of the water samples (D9 & D10), it was found that the dioxin concentration is much lower than the criteria. To prevent extract the sediment prior to discharge, water will be treated by wastewater treatment system, reassurance test will be carried out prior to discharge.

4.5.16 As the dioxin level of sediment (D7 & D8) and ground floor (D5, D6 & D12) were below 1ppb TEQ, sediment will be excavated and ground floor will be HEPA vacuumed cleaned. The collected sediment and ash will be mixed with 10% cement for solidification within the full containment. The treated sediment floor ash shall meet the TCLP test before be sealed into steel drums lined with plastic sheeting prior to disposal at designated area in landfill. In case of failure in the reassurance TCLP test, the mixing percentage will be increased to ensure passing the TCLP requirement. After the on-site measurement, it is estimated that 110m^3 ash and sediment to be collected and 121m^3 treated ash and sediment to be disposed of.

4.5.17 The remediation strategies for contaminated material will be adopted where the level of dioxin contaminants exceeded the USEPA criterion of 1ppb. D2 is located on the wall of the ash bunker which closed to D1, as prudent approach to prevent cross-contamination during decontamination works, D2 will be treated together with D1, D3, D4 and D11. For the sampling locations vicinity to D1, D2, D3, D4 and D11, ash/rubble will be HEPA vacuumed and scrabbled. Cement stabilization/solidification will be carried out for the ash/rubble to meet landfill disposal criteria (TCLP test) of EPD, 1ppb TEQ and specified in Condition 2.13, Part C of the EP. Pilot test will be carried out first to obtain the reasonable cement ratio for the ash/rubble. The confirmation test will be carried out. The flow diagram of cement solidification is given Appendix F1. It is estimated that 7m^3 ash will be collected and estimated that 14m^3 treated wall ash will be disposed of subjected to cement ratio obtained from pilot test.

Chimney Flues (7m^3 of ash in chimney flue; 6.5m^3 of flexible joints and 140 m^3 of chimney flue sections)

4.5.18 From the laboratory results, most of the results are below the criteria of 1ppb TEQ except 11 samples found at the chimney base, platforms 2 & 7. To reduce the volume of contaminated material from temporary works, a mechanical machine will be utilized to

wipe the internal surface of the metal flues. All collected ash will be treated by cement solidification. Prior to the demolition of the chimney flues, the interior surface of the flues will be scrabbled, wiped by mechanical machine and HEPA vacuumed to thoroughly remove the contaminated ash wastes attached. The Dioxin Removal Specialist will inspect the flues to reassure that the flues are free from DCM. The collected ash will then be stablised onsite with cement before disposal to a designated landfill following the requirements specified in Condition 2.13, Part C of the Environmental Permit.

4.5.19 The collected ash will be treated as high concentration of dioxin as a prudent approach. Cement stabilization/solidification will be carried out for the ash/rusty material to meet landfill disposal criteria (TCLP test) of EPD, 1ppb TEQ and specified in Condition 2.13, Part C of the EP. The required pilot test was carried out in August 2008, and the test results have demonstrated a mixing ratio of 1:1 (ash to cement) can adequately treat DCM to meet the landfill disposal criteria. Pilot test results are given in Appendix F3. In view of safety constraint of ash collection at platform 7 for the aforesaid pilot test, the second highest concentration of dioxin at platform 2 was selected. Nevertheless, a prudent approach was adopted as to mix the ash collected from platform 7 with 300% cement. The solidified ash will be disposed of accordingly after confirmation of satisfactorily passing TCLP testing. It is estimated that $7m^3$ ash/rusty material will be collected and $14m^3$ treated ash will be generated and disposed of to the landfill.

4.5.20 The metal flues will be demolished after the DCM and ACM removal in accordance with the methodology separately agreed with the Engineer and EPD. During the demolition, the Contractor shall ensure structural safety, Independent Checking Engineer will be employed to certify structural safety of the design and erection of scaffolding etc. After the DCM/ACM removal works, by adopting a prudent approach, the metal flue where the contaminated level greater than 1ppb TEQ (i.e. chimney base to platform 1; platforms 2 to 3; and platform 7 to the top,) will be cut into manageable size to be agreed by the landfill operator for disposal and then packed with 2 individual layers of strong transparent plastic sheets of not less than 0.15 mm thickness and completely sealed with adhesive tapes with proper label. The estimated volume of the metal flues is about $140m^3$. The remaining section of metal flue where below 1ppb TEQ will generally be treated as recyclable and disposal at landfill will be the last resort after all options of recycling and reuse have been proved infeasible. The generic method statement for ACM & DCM Removal at Chimney is given Appendix D2. The dismantled metal flue will generally be handled as proposed above subject to further discussion and agreement with EPD.

4.5.21 It is due to ACM flexible joints of the ventilation ducts which are connected to metal flues of chimney, these are suspected materials contaminated with DCM. As prudent approach, the ACM flexible joints and waste material / ash collected from the flexible joints will be treated as DCM. The waste material / ash will be mixed with cement ratio of 1:1 followed by sealing in drums and the ACM flexible joints will be wrapped by strong plastic sheets which not less than 0.15mm thickness. The estimated volume of the flexible joints is about $6m^3$ and loosed material is about $0.5m^3$ to be collected and $1m^3$ treated ash will be generated. The estimated sub-total volume generated from ACM flexible joints is about $7m^3$.

Pilot Test for Dioxin/Furan Contaminated Soil/Ash Solidification

4.5.22 The ratio of contaminants / cement mixture must be predetermined as the effectiveness of the solidification process depends upon a number of factors including the concentration of contaminants, contaminants quality, moisture content, and quality of cement.

4.5.23 Given the time factor and as a conservative approach, the pilot test for the dioxin contaminated ash/rubble (i.e. ash collected near D1, D2, D3, D4, D11 at ash bunker and metal flues at platform 7B, 7C & 7D or platform 2A and 2D of the chimney, subjected to collected ash quantity) will commence with cement ratio of 50% to ensure passing the TCLP requirement of 1ppb TEQ. The ratio of cement will be increased in case of failed in the test to achieve the landfill disposal criteria (TCLP test) of 1ppb TEQ. The flow diagram of cement solidification is given Appendix F1. In accordance with the EP Condition 2.14, disposal at the Chemical Waste Treatment Centre, Tsing Yi, will be considered as a fall back option if the pilot test criteria cannot be met.

4.5.24 It is estimated that the cement mixing ratio of 300% could be achieved the disposal criteria, otherwise fall back option as stated in EP Condition 2.14 will be considered. If the TCLP test result of the sample fails to satisfy the 1ppb TEQ criteria, all collected ash near D1, D2, D3, D4 and D11 at ash bunker and collected at platforms 2, 7 and base of chimney will be sealed into appropriate drums lined with plastic sheeting prior to disposal at the Tsing Yi Chemical Waste Treatment Centre (CWTC). The size and material of the drums will be advised by the CWTC's operation contractor. Designated barge will deliver to the Chemical Waste Treatment Centre.

4.5.25 The Contractor will carry out TCLP test in every $50m^3$ of ash / soil contaminated with DCM prior to grant the disposal license. The ratio of cement to soil/ash will then be selected based on the results of the TCLP tests. The methodology of TCLP is given in Appendix F2.

On-site Handling and Storage

4.5.26 DCM decontamination works will be conducted within a full containment. Ash contaminated with dioxin will be treated by solidification / stabilisation with cement, and the treated ash shall meet the TCLP test before it is sealed into steel drums lined with plastic sheeting prior to disposal at designated areas in landfill. According to "A Guide to the Registration of Chemical Waste Producers" issued by the EPD, ash generated from incineration of wastes is classified as chemical waste.

4.5.27 As a prudent approach, all wastes generated from the decontamination and removal works will be considered as contaminated waste and will be properly handled and disposed of. Other waste such as polythene wrapping sheets, waste generated from the dismantlement of the containment and decontamination units, and cloth used in wet wrapping, temporary works, HEPA filter, tools, etc. will also be classified as contaminated waste. It is estimated that $40m^3$ used materials will be generated from Ash Bunker ($15m^3$) and Chimney ($25m^3$) and disposed of at landfill. The used material will be packed with 2 individual layers of strong transparent plastic sheets of not less than 0.15 mm thickness and completely sealed with adhesive tapes with proper label.

4.5.28 The storage, handling, transport and disposal of chemical waste will be in accordance

with the *Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes* issued by EPD.

4.5.29 A total of 336m^3 of treated DCM and contaminated materials, subjected to cement ratio obtained from pilot test, will be generated from the DCM decontamination works and will be remediated followed by sealing in drums or be double wrapped by strong transparent plastic sheets. The summary of estimated quantity of DCM is shown in Table 4-5. These drums and wrapped material will be temporarily stored within the enclosed material storage building, prior to landfill disposal. Location of the temporary storage area is shown in Figure 4-1.

Table 4-5 Estimated Quantity of DCM

Locations of DCM	Volume, m^3 (Before treatment)	Ash to Cement Ratio	Volume, m^3 (After treatment)	Weight, tonnage
Ash Bunker				
Wall & Floor Ash	7	1 : 1	14	24.5
Sediment	110	1 : 0.1	121	211.75
Waste Material	NA	NA	15	3.75
		Sub-total:	***150***	***240.0***
Chimney				
Flue Ash	7	1 : 1*	14	24.5
Flexible Joint Ash	0.5	1 : 1	1	1.75
Flexible Joint	NA	NA	6	1.76
Metal Flues	NA	NA	140	41.17
Waste Material	NA	NA	25	6.25
		Sub-total:	***186***	***75.43***
		TOTAL:	**336**	**315.43**

*Note: * Ash collected from Platform 7 will be mixed with 300% cement as prudent approach.*

Disposal Arrangement

4.5.30 All contaminated residual ash will be solidified with cement and sent to designated landfill site for disposal after passing the TCLP test. The disposal period was scheduled from March 2009 to September 2009.

4.5.31 In accordance with the recommendation given in Section 9 of KCIP EIA Final Report – September 2001, this waste streams will be disposed of at a designated landfill site under the surveillance of trip ticket system. A permit will be obtained from EPD prior to disposal.

4.5.32 All DCM wastes for disposal will be transported by licensed chemical waste collector approved by EPD and in a designated barge equipped as stated in the Code of Practice and to be disposed of. Barge will berth at the barging facilities of CEDD Mines Division at Tsuen Kwan O Area 137 and waste will be delivered to designated landfill by trucks or other disposal outlets as directed by the EPD / Engineer's Representative. Transportation route for disposal of DCM waste is indication in Figure 4-2.

4.6 Chemical Wastes

Source of Wastes

4.6.1 The chemical wastes generated from the demolition works will primarily arise from the maintenance of plant and equipment. These wastes include spent lubricant oil, surplus paint and spent diesel.

4.6.2 For chemical waste produced from a process, as defined by Schedule 1 of the Waste Disposal (Chemical Waste) (General) Regulation, registration will be made with EPD as a Waste Producer.

Estimated Quantity and Timing for generation

4.6.3 The generation of chemical wastes from the maintenance of plant and equipment is anticipated throughout the demolition project based on the utilisation of plant and equipment. The maintenance of plants and equipments will be minimized conducted on site except emergency maintenance. It is estimated that the generation of chemical waste is 75L per month (approx. 64kg/month).

Control Measures

4.6.4 Preventive measures will be implemented for leakage and spillage of fuel and lubricating oil to avoid contamination of the construction site.

4.6.5 All plant and equipment will require regular maintenance. Their maintenance records will be kept in site office for future reference.

4.6.6 Good housekeeping practices will be adopted to deal with chemical waste include:

(i) Generating less chemical waste through:
- Delivering appropriate quantity of chemicals to the construction site.
- Avoiding unnecessary wastage of chemicals by using the chemicals more sensible and in accordance with the manufacturer's instructions.
- Finishing one bottle/container of chemicals before opening the next one for use.
- Collecting the remaining chemicals in suitable containers.
- Removing the unused chemicals out of the construction site after completion of the project.

(ii) Preventing illegal discharge of chemicals or chemical wastes through staff of the project.

(iii) Minimising the volume of unused chemicals to be disposed of through:
- Using the chemicals before the expiry date.
- Ordering appropriate quantity of chemicals and avoiding unnecessary storage of excess chemicals.

On-site Handling and Storage

4.6.7 Chemical waste will be handled in accordance with the *Code of Practice on the Packaging, Handling and Storage of Chemical Waste*. The details are described as follows and the location of temporary storage area of chemical waste is indicated in Figure 4-1.

(i) Containers used for the storage of chemical waste will:
- be suitable for the substance they are holding, resistant to corrosion, maintained in a good condition, and securely closed;
- have a capacity of less than 450 litres unless the specification have been approved by EPD; and
- display a label in English and Chinese in accordance with instruction prescribed in Schedule 2 of the Regulations.

(ii) The storage area for chemical waste will:
- be clearly labelled and used solely for the storage of chemical waste;
- be enclosed on at least three sides;
- have an impermeable floor and bund, 110% capacity of the largest container or 20% of the storage capacity, whichever is the greatest;
- have adequate ventilation;
- be covered to prevent rainfall entering (water collected within the bund must be tested and disposed as chemical waste if necessary); and
- be arranged so that incompatible materials are adequately separated.

Disposal Arrangement

4.6.8 In accordance with the recommendation given in the Section 9 of KCIP EIA Final Report – September 2001, chemical waste will be disposed of:

- via a licensed waste collector;
- to a facility licensed to receive chemical waste, e.g. Chemical Waste Treatment Facility in Tsing Yi; or others
- to a re-user of the waste, under the approval from the EPD.

5 IMPLEMENTATION OF WASTE MANAGEMENT

5.1 Waste Flow Table (WFT)

5.1.1 Waste Flow Tables will be used to record all waste removed off site each month.

5.1.2 The estimated and actual quantities of wastes that will be generated each year from the project will be reported, using the table "Yearly Summary Waste Flow Table", which is attached in Appendix G of this WMP.

5.1.3 The actual quantities of wastes generated in each month will be recorded in a monthly basis, using the table "Monthly Summary Waste Flow Table", which is attached in Appendix G of this WMP.

5.1.4 Site Agent will be responsible to update the Yearly and Monthly Summary Waste Flow Tables.

5.2 Recycling Proposal

5.2.1 As outline in Sections 4, the Contractor will segregate, as far as practical, the recyclable materials (mainly metals), from the C&D waste stream and general waste, so that the recycling contractors can collect the materials on a regular basis for recycling or export. Waste sorting and segregation will be carried out in accordance with the following categories for recycling:

- Plastic (i.e. plastic bag, plastic bottle, plastic packaging, etc.);
- Rubber;
- Paper;
- Wood/ timber;
- Glass;
- Textile; and
- Metal (i.e. aluminium can, steel metal, ferrous metal, and non-ferrous)

5.3 Trip-ticket System

5.3.1 The disposal of C&D Material will be carried out in accordance with the ETWB TC(W) No. 31/2004. The Contractor will produce a Construction and Demolition Material Disposal Delivery Form (the Form) for each and every vehicular trip transporting C&D material off site. The Contractor will complete all relevant details on the Form in quadruplicate except for the Time of Departure. A sample of the Form is attached in Appendix H. All inert C&D material will be disposed of by marine transport to the public fill area or other areas as designated by EPD. Vessel chits forms should be used for C&D material disposal of at public fill area if transported by barge.

5.3.2 Prior to the vehicle leaving the site, the Contractor will present to the ER the completed Form. The ER will insert the Time of Departure and stamp the Form. The ER will retain a copy of the Form and return the original to the Contractor. The Form will be carried on board the vehicle at all times throughout the vehicular trip.

5.3.3 In case marine transportation is employed for disposal of inert C&D material, the

Contractor follow the vessel trip-ticket system arrangement for all barges to deliver to designated public fill area. For disposal of ACM, the Contractor still needs to follow the aforesaid trip ticket arrangement for all trucks when materials are transferred from the barges to the trucks at existing barging point nearby the disposal site before the trucks are allowed to dispose of the collected materials at the designated sites.

5.3.4 The copies of the Form and the receipt will be maintained on site for future references.

5.3.5 For each trip of off-site disposal of chemical waste, trip tickets issued for every chemical waste collection made by the licensed waste collector will be copied to the ER with the original maintained on site for future references.

5.3.6 The Site Management Plan for Trip-Ticket System is attached for reference in Appendix H.

5.4 Inspection Programme and Performance Monitoring

5.4.1 Auditing of each waste stream will be carried out periodically by the EM&A Team to determine if wastes are being managed in accordance with approved procedures. The audits will look at all aspects of waste management including waste generation, storage, recycling, treatment, transport, and disposal. An appropriate audit programme would be to undertake a first audit at the commencement of the demolition works, and then to audit quarterly thereafter.

5.4.2 The Waste Manager and the ET will be responsible for the monitoring and auditing of the waste management practice during his weekly site inspection in order to ensure that appropriate control measures are properly implemented.

5.4.3 If deficiency of the waste control measures were identified during the site inspection and audit, the Waste Manager of the Contractor will discuss with the Site Agent for formulation of remedial measures and the Site Agent will implement the remedial measures promptly to rectify the situation. If deficiency persists, alternative and/or additional control measures will be proposed to the satisfaction of the ER.

5.5 Record Keeping and Reporting

5.5.1 The Contractor will keep adequate and proper records such as trip tickets, photographs and measurement records relating to the implementation of the WMP, and submit such records of each calendar month to the ER within the first week of the following calendar month for their onward submission to the Public Fill Committee for information. The record will include the amount of wastes generated, recycled and disposed of (including the disposal sites). A sample of the Construction and Demolition Material Disposal Delivery Form is included in Appendix H for reference.

5.5.2 After the completion of the Contract, the Contractor will submit a report on the implementation of the WMP in the content to be agreed by the ER. The report will include the following information and any other information as the ER may consider appropriate:

- The quantities of different types of C&D material as estimated at the commencement of

the Contract;

- A statistics on the monthly quantities of different types of C&D material generated and their disposal method; and
- Reasons for any significant differences between the estimated quantities at (a) and the actual quantities at (b).

6 EMERGENCY RESPONSE

6.1 Objective of the Emergency Response Procedure

6.1.1 The plan addresses emergencies related to the demolition, treatment, storage and transportation of contaminated materials. Such emergencies may include:

- Fire in full containment for ACM / DCM decontamination;
- Chemicals & chemical wastes spillages on land and sea;
- Typhoon attack on chimney decontamination containment;
- Overflow of contaminated surface run-off due to heavy rain storm attack;
- On-site traffic accident; and
- Power failure during ACM / DCM decontamination

6.1.2 The Project identifies three general groups of activities that have the potential to affect the public or the environment in the event of an emergency:

- Demolition and decontamination of ACM / DCM; and
- Storage and transportation of ACM / DCM.

6.2 Definition of Emergency

6.2.1 An emergency is an existing or imminent event that presents a danger of major proportions to human health or the environment. An emergency requires prompt co-ordination of actions to protect the health, safety or welfare of people, and/or to limit damage to the environment or property and equipment.

6.3 Emergency Response Team

6.3.1 An Emergency Response Team (ERT) has been formed and consists of the following personnel:

- Safety Officer;
- Safety Supervisor;
- Site Agent;
- General Foreman;
- Site Engineer;
- First Aider;
- Electrician; and
- Public Relation Officer.

6.3.2 The ERT members and the action of each stakeholder for tackling emergency situations are included in Table 6-1.

Table 6-1 ERT Member List

Name	Position	Emergency Team	Contact No.	Action, Roles and Responsibilities in Emergency Situations
Mr. Vincent LEUNG	Safety Officer	ERT Leader	9475 3666	● Manage all resources on-site for the implementation of emergency. ● Inform Project Manager / Site Agent ● Responsible for all emergency arrangement on-site and develop appropriate handling procedures. ● Advice on health and safety related issues.
Mr. Peter TANG	Site Agent	Deputy ERT Leader	9220 1611	● Assist the ERT leader for carrying out his duties in case of emergency event. ● Implement emergency procedures. ● Oversee the emergency management and provide necessary support to ERT Leader. ● Advise on clean-up procedure and co-ordination of resources.
Mr. Sai Ho CHAN	Safety Supervisor	ERT member	6909 6344	● Assist the Safety Officer for carrying out his duties in case of emergency event.
Mr. Fuk Ming LI	General Foreman	ERT member	9150 1566	● Assist in implementing emergency procedures.
Mr. Steven HO	Site Engineer	ERT member	6281 8608	● Notify relevant Government Department and Parties, where necessary.
Mr. Sai Ho CHAN	First Aider	ERT member	6909 6344	● Provide necessary on-site first aid recovery as instructed by ERT Leader under safe environmental condition.
Mr. Tak Man YUNG	Electrician	ERT member	9623 5440	● Ensure electrical safety as instructed by ERT Leader under safe environmental condition.
Mr. Ivan KONG	Public Relation Officer	ERT member	8102 2699	● Answer 24-hr Hotline. ● Provide communication support and service. ● Manage public communications in the event of issues, crisis and complaints.
24-hr Hotline			**8102 2699**	

6.4 Chain of Command

6.4.1 A person within the ERT will be appointed to be the ERT leader - a primary decision-maker in the event of an emergency. In the case that the ERT leader cannot be contacted, an alternative person will be available to conduct the duties of the ERT leader. The responsibilities of the ERT leader are as follows:

- To understand the project emergency plan and rescue procedures.
- To immediately notify the ERT members in the event of an emergency.
- To arrange the whole operation of the emergency rescue and fire fighting.
- To determine the seriousness of the cases and take appropriate actions to handle the emergency / fire;
- To assign personnel in the ERT to assist the ERT leader to carry out the rescue procedures in case of fire / emergency.
- Immediately notify the Site Engineer and Project Manager of the detail of any accident and rescue procedures in case of a serious accident.
- Review and recommend changes if necessary, the emergency procedures periodically with other safety personnel and monitor the system and its implementation.
- To arrange necessary fire fighting / rescue equipment in accordance with legislation requirements.
- To re-organise the ERT members from time to time to ensure the effectiveness of the system and competency of the members.
- To arrange practice drills for assessing the efficiency and effectiveness of the rescue team regularly.

6.4.2 In general, anyone that has discovered chemical leakage and spillage shall immediately report to the ERT leader, ET/ ET Leader, and the Waste Manager. ERT leader shall take into account the safety and environmental advises from Environmental Officer and Safety Officer once the chemical leakage and spillage incident is observed/ reported.

6.5 Internal Communications

6.5.1 Telephones and direct face-to-face communication will form the basis of communications within the site. The site office will be equipped with telephones. Cellular phones will allow for communication among field personnel, truck drivers and the site office.

6.6 Communications with the Public

6.6.1 All community enquiries or complaints in relation to activities described in this emergency section should be directed to the project 24-hr Hotline and the project representatives identified in the ERT member list. A separate Public Relation (PR) Plan has been prepared by the Public Relation Officer detailing the communication channel with the public. (Contract Clause PSA 2.4)

6.6.2 Communication between the public and project personnel will only be required in the event of issues, crisis and complaints where the situation is to be handled within the project site. However, depending on the nature of an emergency, in the event where the situation has been handed to the Police or FSD, Police or FSD will be the overall commander and communication with government agencies, medical service providers, external experts and the public. The ERT leader will maintain close liaison with the Police or FSD representative on site.

6.7 Emergency Call List

6.7.1 An up-to-date emergency call-out list including major ERT members will be displayed on a prominent position in the site office. This list shall be a dynamic document and be continuously updated as necessary. This list is currently based on normal working hours but will be updated if required by an increase in operational hours.

6.7.2 In addition to the above contacts, other organisations that may need to be contacted in the event of an emergency include:

Kwai Chung Fire Station	*2426-5694*
Tsuen Wan Fire Station	*2499-5044*
Water Supplies Department	*2824-5000*
Police Emergency Call	*999*
HKPF – Duty Officer, Kwai Tsing District	*2410 2205*
Drainage Services Department	*2300-1110*
Hong Kong Observatory	*2926-8200*
The Hong Kong and China Gas Company	*2880-6999*
CLP Power Hong Kong Limited	*2678 2678 Customer Service (24-hour)*
(Emergency Reporting)	*2728 8333 (24-hour)*
(Engineering)	*2678 7900*

6.8 Training

6.8.1 An emergency often creates unfamiliar circumstances and a hostile working environment for people required to respond to the emergency. In addition, time is usually a very important factor in determining the most appropriate response to an emergency. Training and experience can significantly improve the effectiveness of the responders and decision-makers. Training is therefore a vital part of the implementation of an Emergency Response Procedure (ERP).

6.8.2 The specialist personnel identified in this procedure will be trained and qualified in their respective roles as identified in this procedure. For example, it will be ensured that all First Aiders hold valid First Aid Certificates.

6.8.3 All workers will be briefed of the emergency response process in the site induction, and all workers identified in this section will be trained in its content in the language that the worker understands.

6.9 The Contractor and Employees

6.9.1 All employees of the Contractor shall be thoroughly familiar with company policies and procedures for responding to emergencies. He/she will be knowledgeable in the contents under this section of the plan, and be actively involved in the training of other personnel identified under this section.

6.9.2 All personnel at the site will be made familiar with the Chain of Command with respect to reporting emergencies and subsequently taking directions from identified personnel. Every person is a potential resource in the early detection of problems, which if not reported and not addressed could lead to emergency situations.

6.9.3 The frequency of the training necessarily depends on the personnel and the circumstances at the site. New personnel should be trained systematically. Changes in the roles of individual personnel would warrant new training.

6.10 Sub-Contractors and Others

6.10.1 Sub-contractors and all other personnel working at the site shall be made familiar with the chain of command with respect to reporting emergencies and subsequently taking directions from site personnel.

6.11 Emergency Response Procedures

Response to General Emergency

6.11.1 Where the ERT leader deems an emergency situation, he will contact the necessary personnel identified in the ERT. The Safety Officer will go to the site of the incident and relay all details to the other ERT members who will gather at the contractor site office. The Safety Office will advise the ERT of all necessary equipment/PPE requirements/first aid treatment needed at the accident site. The ERT and associated team members will then co-ordinate all items require by the Safety Officer.

6.11.2 Upon clearing the accident site, a post-mortem report will be completed which details all occurrences prior to, during and following the incident. Applicable workers will be briefed on the contents of the incident report following its completion.

Fire in Full Containment for ACM / DCM Decontamination

6.11.3 In the event of fire in full containment for ACM / DCM decontamination, the Fire Services Department will be immediately notified and all personnel working within the containment or in the vicinity of the work site area evacuated. All personnel working within the containment shall:

- Stop all work and if necessary remove worker(s) to a safe area;
- If a worker has collapsed remove face mask (in all other cases the face mask should be left in place), carry out normal emergency first aid procedures and arrange to transfer the worker to hospital. Personal decontamination should be carried out if possible;
- Where it is impossible to carry out decontamination procedures on the worker, inform

the medical team to enable them to take the appropriate safety measures;

- Bag all loose ACM / DCM debris present in the ACM / DCM removal work area and remove to a secure store. Wipe clean and vacuum all surfaces and any adjoining area contaminated during the emergency;
- Spray all surfaces and debris within the ACM / DCM removal work area with amended water in a fine mist spray, using airless spray equipment once the fire has been extinguished and the Site is safe for re-entry;
- Prepare the Site for inspection by the Registered Asbestos Consultant; and
- Carry out air testing prior to recommencing removal work.

Chemicals & Chemical Wastes Spillages on Land and Sea

6.11.4 Transportation of chemical waste including ACM / DCM and other chemicals shall be carried out by barge, loss of ACM / DCM and other chemical waste on roads are not anticipated.

6.11.5 Transportation of chemical waste including ACM / DCM and other chemicals shall be carried out by licensed waste collector, and be contained either in steel drums lined with plastic sheeting or by use of safety and suitable labelled containers.

6.11.6 Spillages or dropping into the sea while marine transportation shall be recoverable. Detail of the Works Execution Plan for transportation by vessels is included in Appendix H for reference.

6.11.7 While ACM / DCM are being loaded onto and off between barging point and the barge for marine transport, net carrier shall be used to prevent damages and dropping on land and sea.

Typhoon Attack on Decontamination Containment

6.11.8 In order to prevent water retention on the site (in particular, during decontamination of ACM), all storm and surface water drains, ditches and out-falls will be regularly checked and if necessary cleared of debris, soil and litter. Frequency of checking and clearing will increase during the typically wet months (June to August). Additionally, the drains, ditches and out-falls will be checked when heavy rainfall events are forecasted (including when an Amber Rainstorm Warning is hoisted) to confirm that these surface water management features are not obstructed.

6.11.9 After intense rainfall events such as Red or Black Rainstorm Warning or Typhoons, inspections and necessary actions (such as maintenance or repair of damaged drainage items) will be carried out.

6.11.10 The transportation of ACM / DCM will cease when warnings for a Black rainstorm and/or Typhoon signal No. 8 are given.

6.11.11 When warnings for a Black rainstorm and/or Typhoon signal No. 8 are given, the Contractor shall:

- Stop all processes which may result in the production of ACM / DCM dust;

- Spray all surfaces and debris within the ACM / DCM removal work area with amended water in a fine mist spray, using airless spray equipment;
- Bag all loose ACM / DCM debris present in the ACM / DCM removal work area and remove to a secure store. Wipe clean and vacuum all surfaces;
- Cut off all power and water supplies and secure all loose equipment against typhoon damage;
- Arrange a revised inspection by the Site Agent and Site Engineer before the workers leave Site;
- Recommence the ACM / DCM removal works once the No. 8 typhoon signal has been lowered, the necessary cleaning up work and repairs to containment have been completed and permission has been given by the Site Engineer.

6.11.12 If during the course of abatement work, a worker collapses or some other accidents occur, the victim should follow normal decontamination procedures with assistance from fellow workers before exiting the work area. For life-threatening situation, however, decontamination should take a lower priority and every effort should be made to ensure the victim receives immediate medical treatment. Any area contaminated during the emergency should be thoroughly cleaned by wet wiping and HEPA vacuuming at the earliest opportunity, and verified by the registered asbestos supervisor and approved by the registered asbestos consultant before work is allowed to continue.

6.11.13 In addition, the construction of containment is governed by the *"Code of Practice on Asbestos Control, Asbestos Work Using Full Containment or Mini Containment Method"*, Section 6 – Construction of Containment. Under which, the registered asbestos consultant is also responsible for the structural safety of the containment, and for the provision of safe means of access as well as alternative escape route for emergency situations. Sections extracted from the *"Code of Practice on Asbestos Control, Asbestos Work Using Full Containment or Mini Containment Method"* with regard to the construction, maintenance and emergency procedures for use of the containment approach are included in Annex V of Appendix D for reference.

Overflow of Contaminated Surface Run-off Due to Heavy Rain Storm Attack

6.11.14 As mention in Section 6.9.5, in order to prevent water retention on the site, all storm and surface water drains, ditches and out-falls will be regularly checked and if necessary cleared of debris, soil and litter. Owing to the nature of the Project, removal of ACM / DCM, solidification pilot test, and the actual cement solidification process shall be carried out under "full containment" approach.

6.11.15 Treatment and storage for the ACM / DCM removed shall strictly follow the Asbestos Abatement Report (Appendix 25 to the PS). As such, none of the removed ACM / DCM will be exposed to the surface run-off due to heavy rain storm in its untreated stated, overflow of contaminated surfaces of the ACM / DCM is not anticipated.

On-site Traffic Accident

6.11.16 On-site traffic accident will be minimised by speed control limit for all vehicle to 5 km/hr. In additional, all storage area of ACM / DCM shall form within a fenced /

protected area and/or are inside existing buildings of the project site.

6.11.17 All vehicles shall only be driven by personnel who have been trained in the Emergency Response Procedure and hold a valid Hong Kong driving licence for the class of vehicle operated.

Power Failure during ACM / DCM Decontamination

6.11.18 In the event of loss of power, back-up power will be available from portable generators. These units are readily available in the event of a disruption to the power supply.

6.11.19 Appropriate back-up facilities will be supplied in order to ensure the effective operation of the site and associated ACM / DCM decontamination containment when the standard facilities are out of action due to power failure.

6.12 Post-Emergency Procedures

6.12.1 An investigation will be carried out immediately after incident occurred. It aims to find out the causes of such incident. Base on this information, adequate preventive measures as well as toolbox training to relevant staffs will be provided in order to minimize the probability of recurrence. A post-mortem report of emergency incident including mitigation and preventive measures shall be submitted to the authorities.

7 Training

7.1.1 The Contractor shall arrange and provide training on waste management in the site-specific induction and its refresher training for all employee and subcontractors involved in the works. The content of the training will include the following:

- Concepts of Site cleanliness.
- The steps/requirements of the WMP stipulated in the Contract.
- Classification of different waste types in accordance with the WMP.
- Proper segregation, handling and storage of different types of waste in accordance with the WMP.
- Procedures and measures for waste minimisation, reuse and recycling.
- Locations of designated storage areas for different waste types in accordance with the WMP.
- Handling of the ACM / DCM, including the appropriate PPE requirements.
- Procedures for handling ACM / DCM; and
- Emergency Response Procedure and mitigation measures.

7.1.2 An auditable record will be maintained for all environmental training undertaken.

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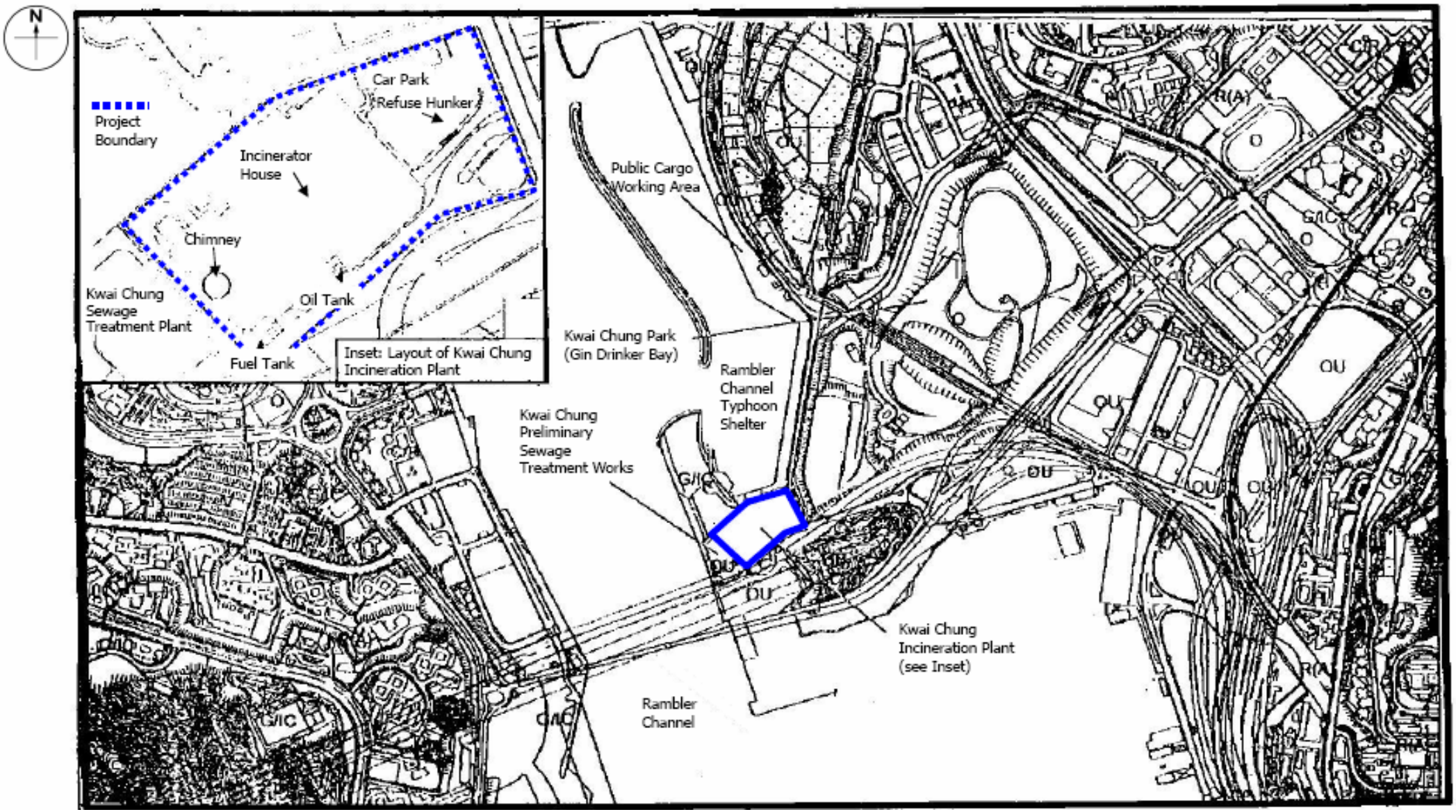


Figure:	1-1		
Title:	Location Plan of Project Site	Drawn by:	RL
		Checked by:	PT
Project:	Kwai Chung Incineration Plant Demolition and Decontamination Works (Environmental Permit No. EP-121/2002/A) Waste Management Plan (WMP) for Demolition Works	Rev.:	1.0
		Date:	May 2009

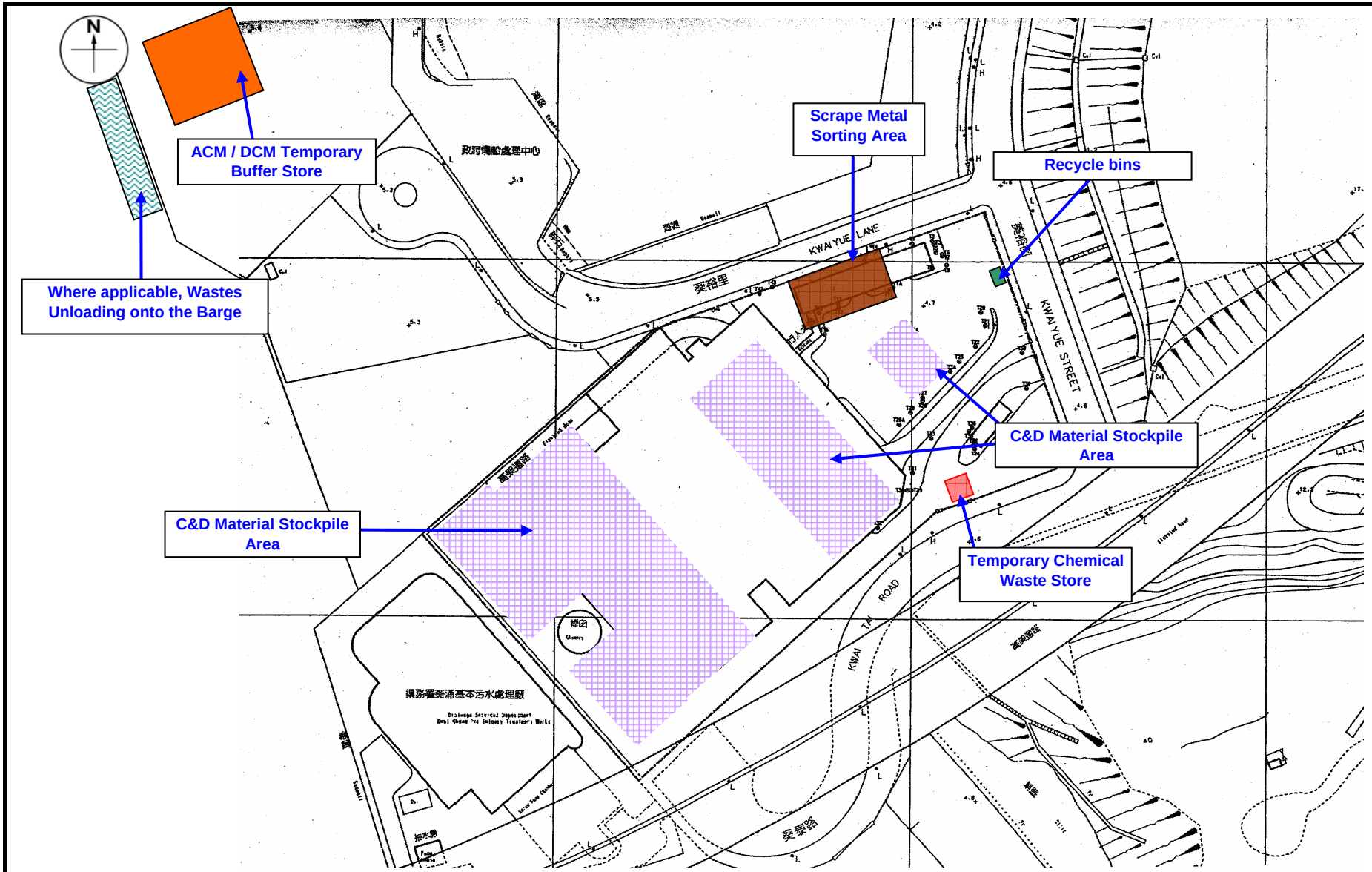


Figure:	4-1		
Title:	Location of Temporary Storage Area	Drawn by:	RL
		Checked by:	PT
Project:	Kwai Chung Incineration Plant Demolition and Decontamination Works (Environmental Permit No. EP-121/2002/A) Waste Management Plan (WMP) for Demolition Works	Rev.:	3.0
		Date:	May 2009

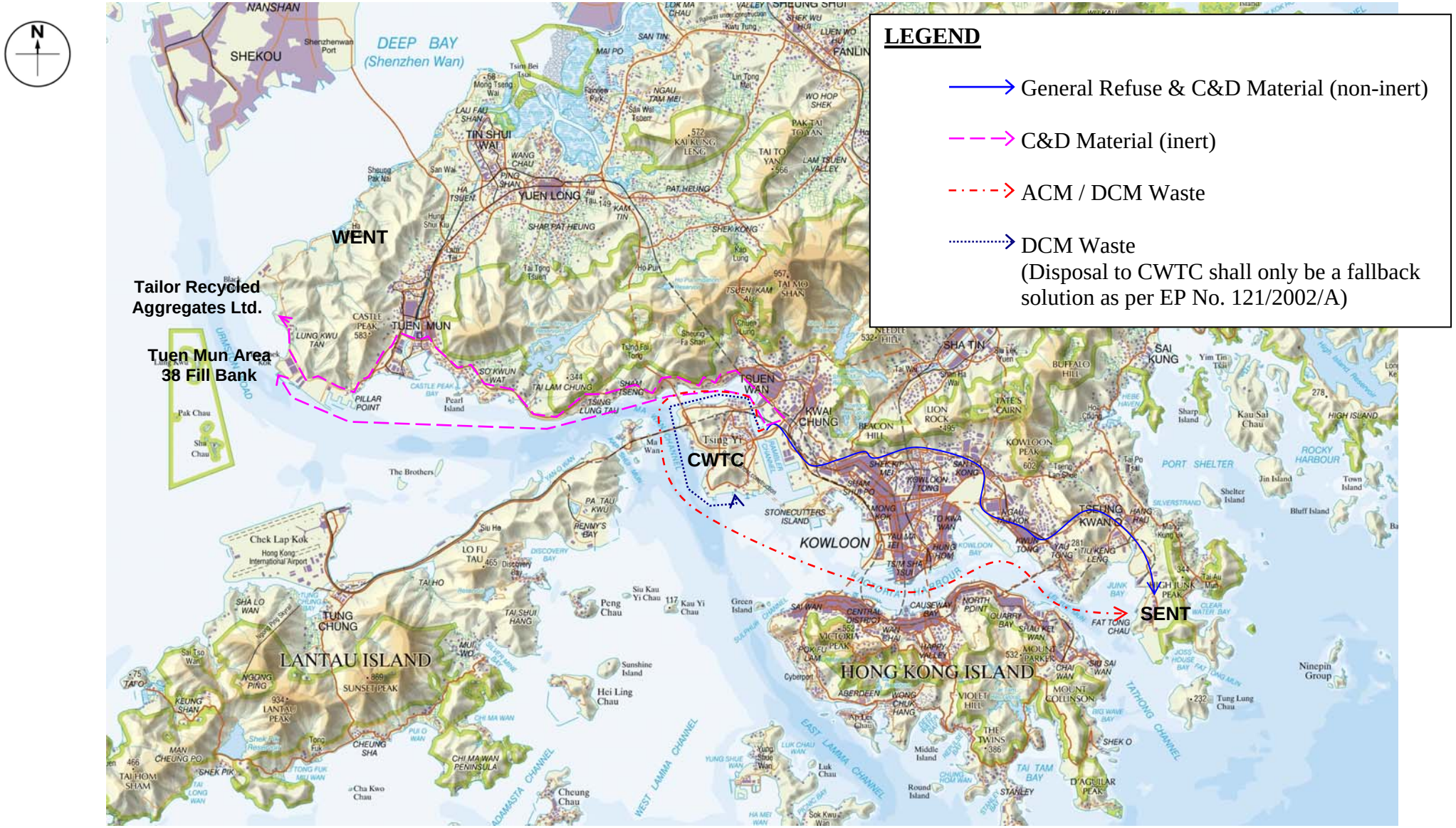


Figure:	4-2		
Title:	Transportation Route for Different Type of Waste	Drawn by:	RL
		Checked by:	PT
Project:	Kwai Chung Incineration Plant Demolition and Decontamination Works (Environmental Permit No. EP-121/2002/A) Waste Management Plan (WMP) for Demolition Works	Rev.:	3.0
		Date:	May 2009

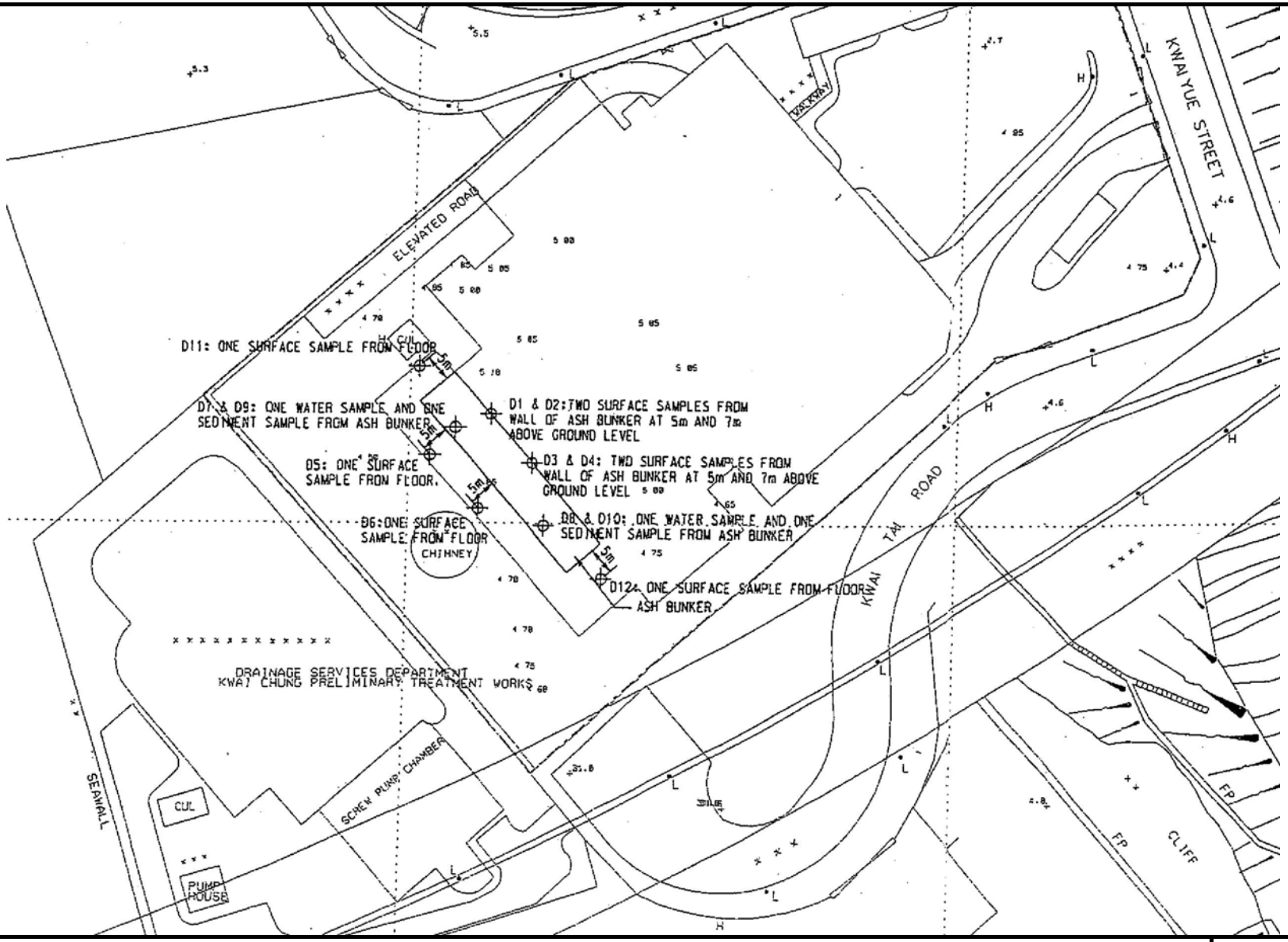


Figure:	4-3		
Title:	Sampling Locations at the Ash Bunker	Drawn by:	RL
		Checked by:	PT
Project:	Kwai Chung Incineration Plant Demolition and Decontamination Works (Environmental Permit No. EP-121/2002/A) Waste Management Plan (WMP) for Demolition Works	Rev.:	3.1
		Date:	May 2009

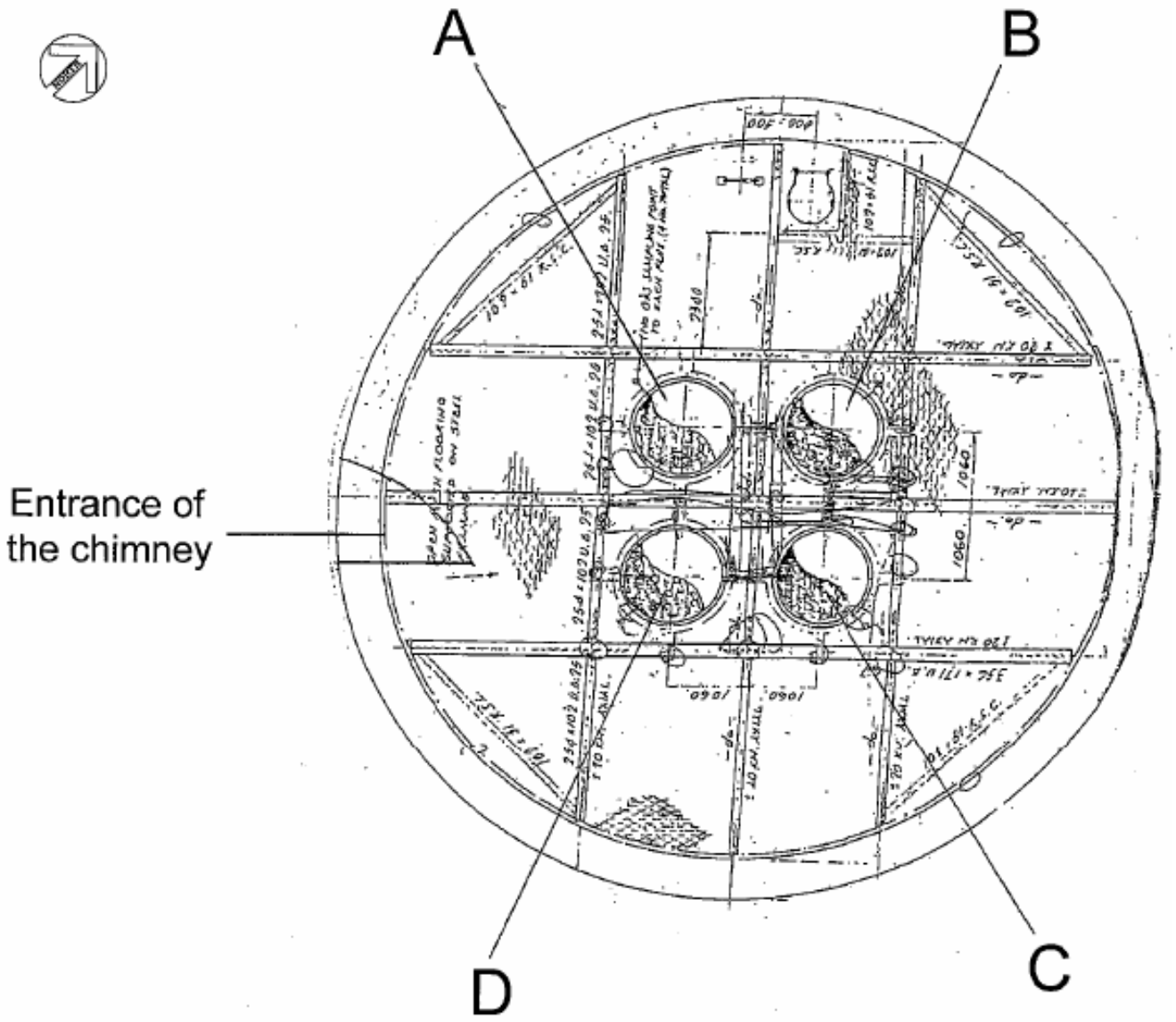


Figure:	4-4		
Title:	Sampling Locations at the Chimney	Drawn by:	RL
		Checked by:	PT
Project:	Kwai Chung Incineration Plant Demolition and Decontamination Works (Environmental Permit No. EP-121/2002/A) Waste Management Plan (WMP) for Demolition Works	Rev.:	3.1
		Date:	May 2009

Appendix B

B1 – Master Construction Programme

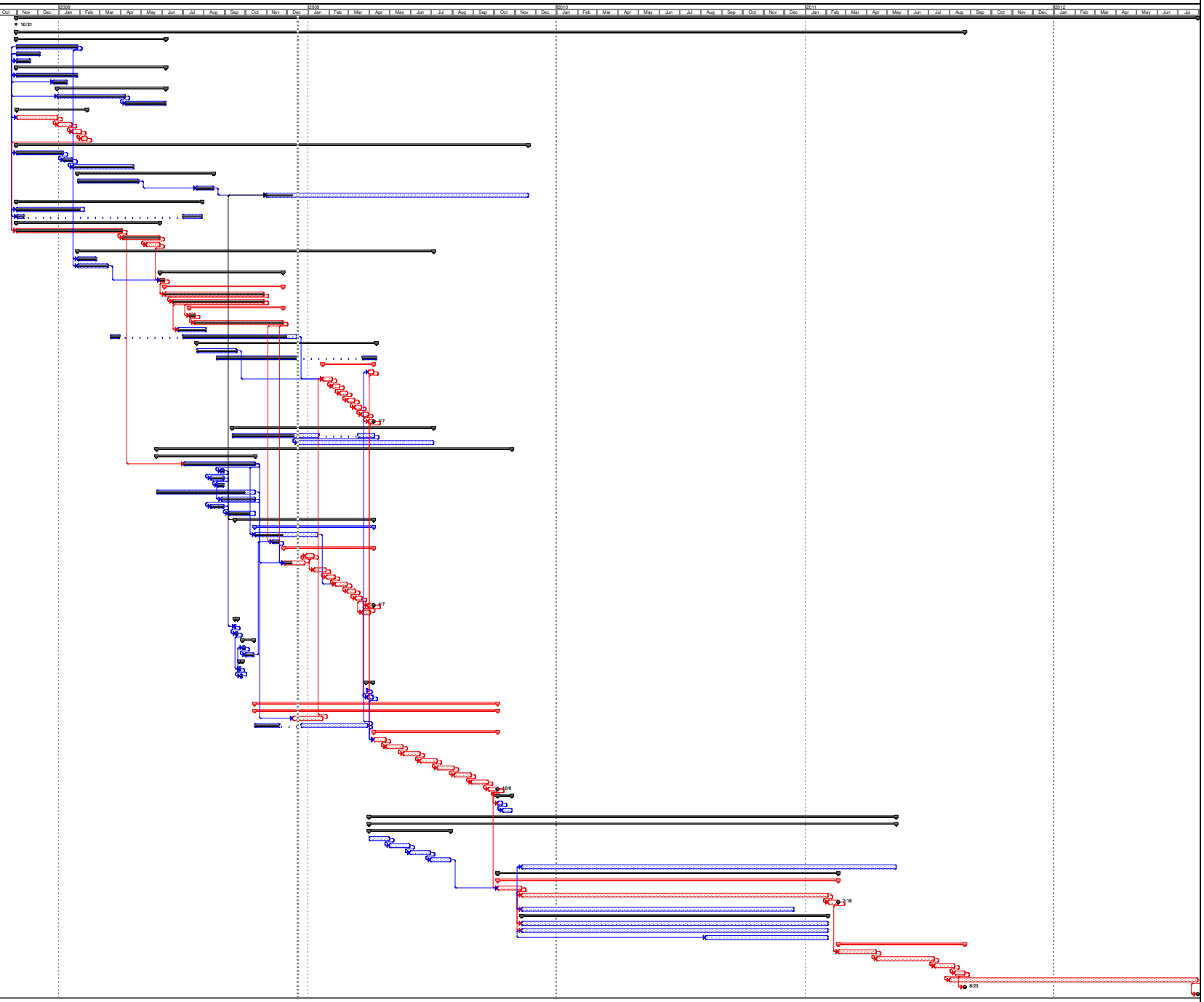
B2 – General Demolition Procedure

Contract No. CV/2007/06

Master Works Programme
for
Kwai Chung Incineration Plant
Demolition and Decontamination Works

Commencement Date : 31 October 2007
Section 1 Completion Date : 23 August 2011
Section 2 Completon Date : 30 July 2012

ID	Task Name	Duration	Start	Finish
1	**Working Programme Section 1 & 2 (1734 days)**	**1735 days**	**Wed 10/31/07**	**Mon 7/30/12**
2	**Possession of site**	0 days	Wed 10/31/07	Wed 10/31/07
3	**Section I (1384 days)**	**1393 days**	**Wed 10/31/07**	**Tue 8/23/11**
4	**A : Preparation and Submission**	**220 days**	**Wed 10/31/07**	**Fri 6/6/08**
5	**A1 Waste Management Plan**	90 days	Wed 10/31/07	Mon 1/28/08
6	**A2 Safety Plan**	35 days	Wed 10/31/07	Tue 12/4/07
7	**A3 EMP & TTS**	21 days	Wed 10/31/07	Tue 11/20/07
8	**A4. Initial, Condition Survey & Baseline Test**	**220 days**	**Wed 10/31/07**	**Fri 6/6/08**
9	A4.1 Initial Survey for Portion A & B	90 days	Wed 10/31/07	Mon 1/28/08
10	A4.2 Baseline Test (Submission, Set Up & Report)	21 days	Mon 12/24/07	Sun 1/13/08
11	**A4.2 Condition Survey for existing structure building**	**160 days**	**Sun 12/30/07**	**Fri 6/6/08**
12	A4.2.1 Structure Building	100 days	Sun 12/30/07	Mon 4/7/08
13	A4.2.1 Chimney	60 days	Tue 4/8/08	Fri 6/6/08
14	**A5 Excavation Permit**	**103 days**	**Thu 11/1/07**	**Mon 2/11/08**
15	A5.1 TTM Submission	60 days	Thu 11/1/07	Sun 12/30/07
16	A5.2 Transport Department and Police Consent for TTM	21 days	Mon 12/31/07	Sun 1/20/08
17	A5.3 Apply Excavation Permit (XP) form Highways Department	14 days	Mon 1/21/08	Sun 2/3/08
18	A5.4 XP Approval	8 days	Mon 2/4/08	Mon 2/11/08
19	**B. Preliminaries works**	**752 days**	**Wed 10/31/07**	**Fri 11/20/09**
20	**B1 Site Clearance & Tree Survey and Felling**	69 days	Wed 10/31/07	Mon 1/7/08
21	**B2 Repair of Existing Paving**	14 days	Tue 1/8/08	Mon 1/21/08
22	**B3 Locating, Protecting and Sealing off Existing Utilities**	90 days	Tue 1/22/08	Sun 4/20/08
23	**B4 Barging Point at portion B**	**200 days**	**Tue 1/29/08**	**Fri 8/15/08**
24	B4.1 Submission to Marine Department for Approval	90 days	Tue 1/29/08	Sun 4/27/08
25	B4.2 Erection of Barging Point	26 days	Mon 7/21/08	Fri 8/15/08
26	**B5 Disposal of C&D Materials**	385 days	Sat 11/1/08	Fri 11/20/09
27	**B6 Site Offices for The Engineer/Contractor Setting up**	**273 days**	**Wed 10/31/07**	**Tue 7/29/08**
28	B6.1 Erection of RE's Office	100 days	Wed 10/31/07	Thu 2/7/08
29	B6.2 Erection of Contractor Offices	40 days	Thu 11/1/07	Tue 7/29/08
30	**C: Submit Design , Erection of Hoarding Type C & F**	**211 days**	**Wed 10/31/07**	**Wed 5/28/08**
31	C.1 Hoarding and Covered Walkway (include Re-submission)	156 days	Wed 10/31/07	Thu 4/3/08
32	C.2 Erection of Hoarding type F	55 days	Fri 4/4/08	Wed 5/28/08
33	C.3 Erection of Hoarding type C	20 days	Fri 5/9/08	Wed 5/28/08
34	**D: Removal DCM & ACM**	**523 days**	**Tue 1/29/08**	**Sat 7/4/09**
35	**D.1 28 days Notice to Labour Department and EPD**	28 days	Tue 1/29/08	Mon 2/25/08
36	**D.2 Method Statement of Removal of ACM to EPD for Approval**	45 days	Tue 1/29/08	Thu 3/13/08
37	**D.3 Asbestos Removal Works**	**181 days**	**Wed 5/28/08**	**Tue 11/25/08**
38	D3.1 Preliminary Decontamination	7 days	Wed 5/28/08	Wed 6/4/08
39	**D3.2 Main Building**	**174 days**	**Thu 6/5/08**	**Tue 11/25/08**
40	1. Erection of scaffolding and working platform	146 days	Thu 6/5/08	Tue 10/28/08
41	2. Setting up the Hygiene Unit for Asbestos removal	135 days	Mon 6/16/08	Tue 10/28/08
42	**3. Removal of ACM Cladding**	**138 days**	**Fri 7/11/08**	**Tue 11/25/08**
43	3.1 Roof of Refuse Reception Bay	9 days	Fri 7/11/08	Sat 7/19/08
44	3.2 External walls	131 days	Fri 7/18/08	Tue 11/25/08
45	**D3.3 Office blocks**	42 days	Tue 6/24/08	Mon 8/4/08
46	**D.4 Method Statement of Removal of DCM to EPD for Approval**	182 days	Mon 3/17/08	Mon 12/15/08
47	**D.5 Removal of DCM & ACM**	**264 days**	**Tue 7/22/08**	**Sat 4/11/09**
48	D.5.1 Preliminary Decontamination & Pilot Test	59 days	Tue 7/22/08	Thu 9/18/08
49	D.5.2 Ash Bunker	141 days	Wed 8/20/08	Sat 4/11/09
50	**D.5.3 Chimney**	**75 days**	**Fri 1/23/09**	**Tue 4/7/09**
51	1. Platform No. 7 (+146.4 to Top)	8 days	Tue 3/31/09	Tue 4/7/09
52	2. Platform No. 6 (+125.9 to 146.4)	14 days	Fri 1/23/09	Thu 2/5/09
53	3. Platform No. 5 (+101.4 to 125.9)	11 days	Fri 2/6/09	Mon 2/16/09
54	4. Platform No. 4 (+78.9 to 101.4)	11 days	Tue 2/17/09	Fri 2/27/09
55	5. Platform No. 3 (+50.4 to 78.9)	11 days	Sat 2/28/09	Tue 3/10/09
56	6. Platform No. 2 (+33.9 to 50.4)	10 days	Wed 3/11/09	Fri 3/20/09
57	7. Platform No. 1 (+11.4 to 33.9)	10 days	Sat 3/21/09	Mon 3/30/09
58	8. Base of Chimney to +11.4	8 days	Tue 3/31/09	Tue 4/7/09
59	**D.6 Disposal of Chemical Contaminated Wastes**	**296 days**	**Fri 9/12/08**	**Sat 7/4/09**
60	D.6.1 Disposal of Asbestos Wastes	153 days	Fri 9/12/08	Wed 4/8/09
61	D.6.2 Disposal of Dioxin Wastes	200 days	Wed 12/17/08	Sat 7/4/09
62	**E : Demolition Works**	**522 days**	**Sat 5/24/08**	**Tue 10/27/09**
63	**E1 Demolition Plans and Method Statements**	**145 days**	**Sat 5/24/08**	**Wed 10/15/08**
64	E1.1 Main Plant	105 days	Thu 7/3/08	Wed 10/15/08
65	E1.2 Weighbridge Office	5 days	Tue 8/26/08	Sat 8/30/08
66	E1.3 Site Office and Store Building	20 days	Mon 8/11/08	Sat 8/30/08
67	E1.4 Link Footbridge	10 days	Thu 8/21/08	Sat 8/30/08
68	E1.5 Chimney	145 days	Sat 5/24/08	Wed 10/15/08
69	E1.6 Up Ramp	50 days	Wed 8/27/08	Wed 10/15/08
70	E1.7 Down Ramp	20 days	Mon 8/11/08	Sat 8/30/08
71	E1.8 Boundary Walls	40 days	Sat 9/6/08	Wed 10/15/08
72	**E2 Buildings and Other Structures**	**204 days**	**Tue 9/16/08**	**Tue 4/7/09**
73	**E2.1 Main Plant**	**175 days**	**Wed 10/15/08**	**Tue 4/7/09**
74	1. Installation of Temporary Platform	93 days	Wed 10/15/08	Thu 1/15/09
75	2. Demolition of Down Ramp	10 days	Mon 11/10/08	Wed 11/19/08
76	**3. Demolition**	**132 days**	**Thu 11/27/08**	**Tue 4/7/09**
77	1. Demolition of Ashing Bay	12 days	Mon 12/29/08	Fri 1/9/09
78	2. Demolition of Refuse Reception Bay	31 days	Thu 11/27/08	Sat 12/27/08
79	3. Removal of the precast concrete units at Roof Level	18 days	Sat 1/10/09	Tue 1/27/09
80	4. Removal of steel structure at Roof Level	13 days	Wed 1/28/09	Mon 2/9/09
81	5. Demolition of Charge Hopper Floor & Bulky Shear Floor	18 days	Tue 2/10/09	Fri 2/27/09
82	6. Demolition of Bunker Walls & R.C. Walls	12 days	Sat 2/28/09	Wed 3/11/09
83	7. Removal of the Steel Structure from Roof to G/F	10 days	Thu 3/12/09	Sat 3/21/09
84	8. Demolition of Ancillary Block	9 days	Mon 3/30/09	Tue 4/7/09
85	9. Demolition of the remaining R.C. Structures	12 days	Sun 3/22/09	Thu 4/2/09
86	**E2.2 Weighbridge Office**	**4 days**	**Tue 9/16/08**	**Fri 9/19/08**
87	1. Installation of precautionary measures	1 day	Tue 9/16/08	Tue 9/16/08
88	2. Demolition	3 days	Wed 9/17/08	Fri 9/19/08
89	**E2.3 Site Office and Store Building**	**17 days**	**Sat 9/27/08**	**Mon 10/13/08**
90	1. Installation of precautionary measures	4 days	Sat 9/27/08	Tue 9/30/08
91	2. Demolition	13 days	Wed 10/1/08	Mon 10/13/08
92	**E2.4 Link Footbridge**	**4 days**	**Tue 9/23/08**	**Fri 9/26/08**
93	1. Installation of precautionary measures	1 day	Tue 9/23/08	Tue 9/23/08
94	2. Demolition	3 days	Wed 9/24/08	Fri 9/26/08
95	**E2.5 Up Ramp**	**10 days**	**Sat 3/28/09**	**Mon 4/6/09**
96	1. Installation of precautionary measures	2 days	Sat 3/28/09	Sun 3/29/09
97	2. Demolition	8 days	Mon 3/30/09	Mon 4/6/09
98	**E3 Chimney**	**357 days**	**Wed 10/15/08**	**Tue 10/6/09**
99	**E3.1 Installation of precautionary measures**	**357 days**	**Wed 10/15/08**	**Tue 10/6/09**
100	2. Erection of Internal Working Platforms	44 days	Wed 12/10/08	Thu 1/22/09
101	3. Fabrication & Erection of External Working Platforms	135 days	Wed 10/15/08	Sun 3/29/09
102	**3. Demolition**	**182 days**	**Wed 4/8/09**	**Tue 10/6/09**
103	1. Platform No. 7 (+146.4 to Top)	18 days	Wed 4/8/09	Sat 4/25/09
104	2. Platform No. 6 (+125.9 to 146.4)	25 days	Sun 4/26/09	Wed 5/20/09
105	3. Platform No. 5 (+101.4 to 125.9)	25 days	Thu 5/21/09	Sun 6/14/09
106	4. Platform No. 4 (+78.9 to 101.4)	25 days	Mon 6/15/09	Thu 7/9/09
107	5. Platform No. 3 (+50.4 to 78.9)	25 days	Fri 7/10/09	Mon 8/3/09
108	6. Platform No. 2 (+33.9 to 50.4)	25 days	Tue 8/4/09	Fri 8/28/09
109	7. Platform No. 1 (+11.4 to 33.9)	25 days	Sat 8/29/09	Tue 9/22/09
110	8. Base of Chimney to +11.4	14 days	Wed 9/23/09	Tue 10/6/09
111	**E4 Boundary Walls**	**21 days**	**Wed 10/7/09**	**Tue 10/27/09**
112	1. Installation of precautionary measures	7 days	Wed 10/7/09	Tue 10/13/09
113	2. Demolition	14 days	Wed 10/14/09	Tue 10/27/09
114	**F: Ground Decontamination Works**	**774 days**	**Wed 4/1/09**	**Sat 5/14/11**
115	**F1. Submission, Backfilling & Disposal of Treated Materials**	**774 days**	**Wed 4/1/09**	**Sat 5/14/11**
116	**F1.1 Submission**	**120 days**	**Wed 4/1/09**	**Wed 7/29/09**
117	1.Remediation Plan	30 days	Wed 4/1/09	Thu 4/30/09
118	2.Excavation and Excavated Material Management Plan	30 days	Fri 5/1/09	Sat 5/30/09
119	3.Health and Safety Plan for Ground Decontamination	30 days	Sun 5/31/09	Mon 6/29/09
120	4. Submission for Cement Solidification/Stabilization	30 days	Tue 6/30/09	Wed 7/29/09
121	F1.2 Backfilling & Disposal of Treated Materials	550 days	Wed 11/11/09	Sat 5/14/11
122	**F2. Setting up, Operation, Excavation & Treatment**	**500 days**	**Wed 10/7/09**	**Fri 2/18/11**
123	**F2.1 Cement solidfication/stabilization**	**500 days**	**Wed 10/7/09**	**Fri 2/18/11**
124	1. Setting up of plant and associated facilities	35 days	Wed 10/7/09	Tue 11/10/09
125	2. Operation and maintenance of plant	450 days	Wed 11/11/09	Thu 2/3/11
126	3. Decommissioning of plant	15 days	Fri 2/4/11	Fri 2/18/11
127	F2.2 Excavation & Demolition of Foundation	400 days	Wed 11/11/09	Wed 12/15/10
128	**F2.3 Treatment**	**450 days**	**Wed 11/11/09**	**Thu 2/3/11**
129	1.Heavy metals contaminated material (52400 cu.m)	450 days	Wed 11/11/09	Thu 2/3/11
130	2. Heavy metals & Hydrocarbons contamination material (3980 cu.m.)	450 days	Wed 11/11/09	Thu 2/3/11
131	3. Hydrocarbons contaminated material (1440 cu.m.)	180 days	Sun 8/8/10	Thu 2/3/11
132	**G : Others works**	**186 days**	**Sat 2/19/11**	**Tue 8/23/11**
133	G.1. Leveling	56 days	Sat 2/19/11	Fri 4/15/11
134	G.2. Drainage Works	65 days	Sat 4/16/11	Sat 7/9/11
135	G.3. Reinstatement & Hydroseeding Works	30 days	Sun 7/10/11	Mon 8/8/11
136	G.3. Site Clearance	15 days	Tue 8/9/11	Tue 8/23/11
137	**H : Section 2 - Establishment Works**	365 days	Mon 8/1/11	Mon 7/30/12
138	**Completion of Section 1**	0 days	Tue 8/23/11	Tue 8/23/11
139	**Completion of Section 2**	0 days	Mon 7/30/12	Mon 7/30/12



Version 4
Date: Tue 12/16/08

Task | Split | Progress | Milestone | Summary | Project Summary

Appendix B2 General Demolition Procedure

1. General Demolition Procedures of Plant

1. General
   - 1.1 The demolition of cantilevered structure shall not commence unless all elements, supported by the cantilevered structure, are removed.
   - 1.2 The demolition of hanger structure shall not commence unless all elements, supported by the hanger structure are removed.
   - 1.3 The demolition of slabs and beams shall be as shown on Drawings 203204/KCIP/GN/02 and 03.
   - 1.4 The demolition of columns and R.C. frames shall be as shown on the Drawings 203204/KCIP/GN/02 and 03.
   - 1.5 Install temporary bracings or ties to ensure the local and overall stability of the remaining structure. The contractor shall submit method statement for checking the stability of the remaining structure.
   - 1.6 Refer to the figures on Drawing 203204/KCIP/IP/03 for details and procedure of demolition of floor composed of prestressed elements.
   - 1.7 Refer to the figures on the Drawing 203204/KCIP/IP/02 for details and procedure of whole building demolition.

2. Demolition of Precast Elements
   - 2.1 Each precast element shall be removed in the reverse order of construction and broken on the ground or an adequately supported platform.
   - 2.2 The reuse of the existing lifting points or accessories to lift the precast element shall be allowed unless the function of the existing lifting points are checked and verified to be adequate for use.
   - 2.3 Special consideration shall be given to long span precast elements with narrow compression flanges during lifting, spreader beans shall be used to reduce the spacing of the lifting points.

3. Demolition of floor composed of prestressed elements
   - 3.1 Each prestressed element shall be removed in the reverse order of construction and broken on the ground.
   - 3.2 The floor composed of prestressed elements shall be properly supported by a temporary platform with 1 m high fence above the top level of floor (designed and built by contractor) before commencement of demolition works.
   - 3.3 During detensioning the tendon, a protective screen made of sand bags or similar material such as backed plywood screen shall be placed at the tendons ends.
   - 3.4 All workers in site shall be informed the presence and location of prestessing members in the structure.
   - 3.5 Detailed procedure of detensioning the prestressed elements shall be prepared and submitted by the design engineer (demolition) to the engineer for approval.

4. Preventing the ‘shoot off’ of tendon from prestressed piles.
   - 4.1 All pile caps shall be undistributed and retained as a safety buffer especially to the pile caps highlighted on Drawing 203204/KCIP/IP/04.
   - 4.2 Pile caps highlighted on Drawing 203204/KCIP/IP/04 to be marked on site and all workers in site shall be informed the presence of prestessing piles.
   - 4.3 The prestressed pile location is based on the information shown on the record drawings available. The contractor shall verify on site.
   - 4.4 Should the pile cap need to be demolished due to decontamination of the surrounding soil, special care is required to prevent the ‘shoot off’ of tendons during demolition. Sand bags should be placed on the top of prestressed piles all the time.

5. Ground floor structures and Structural Elements / Foundations / The like below Ground Level.

   - 5.1 The contractor shall submit the demolition sequence and excavation method for the engineer’s approval.

Appendix B2 General Demolition Procedure

2. General Demolition Procedures of Chimney

1. General
   - 1.1 Each segment of the concrete wall to be cut shall be fixed by the tower crane or other approved method before cutting.
   - 1.2 The size of the concrete segment to be saw cut shall be limited to such that the loading capacity of the lifting appliances is four times bigger than the weight of the concrete segment.
   - 1.3 The lifting route of the segments shall be fixed, within the site area, marked clearly on ground and restricted to access by any people.
   - 1.4 Any loosen debris on segment shall be removed before lifting.
   - 1.5 Cushion, such as sand layer, below the lifting route of the segments is required.

2. Precautionary Measures
   - 2.1 The adjacent incineration plant shall be completely demolished before commencement of demolition of chimney.
   - 2.2 At ground level, fence off the surrounding area by 2.5 m high hoarding.
   - 2.3 Erect the double row steel, scaffolding working platform, catch fans, protective net, ETC as Drawing 203204/KCIP/C/02.

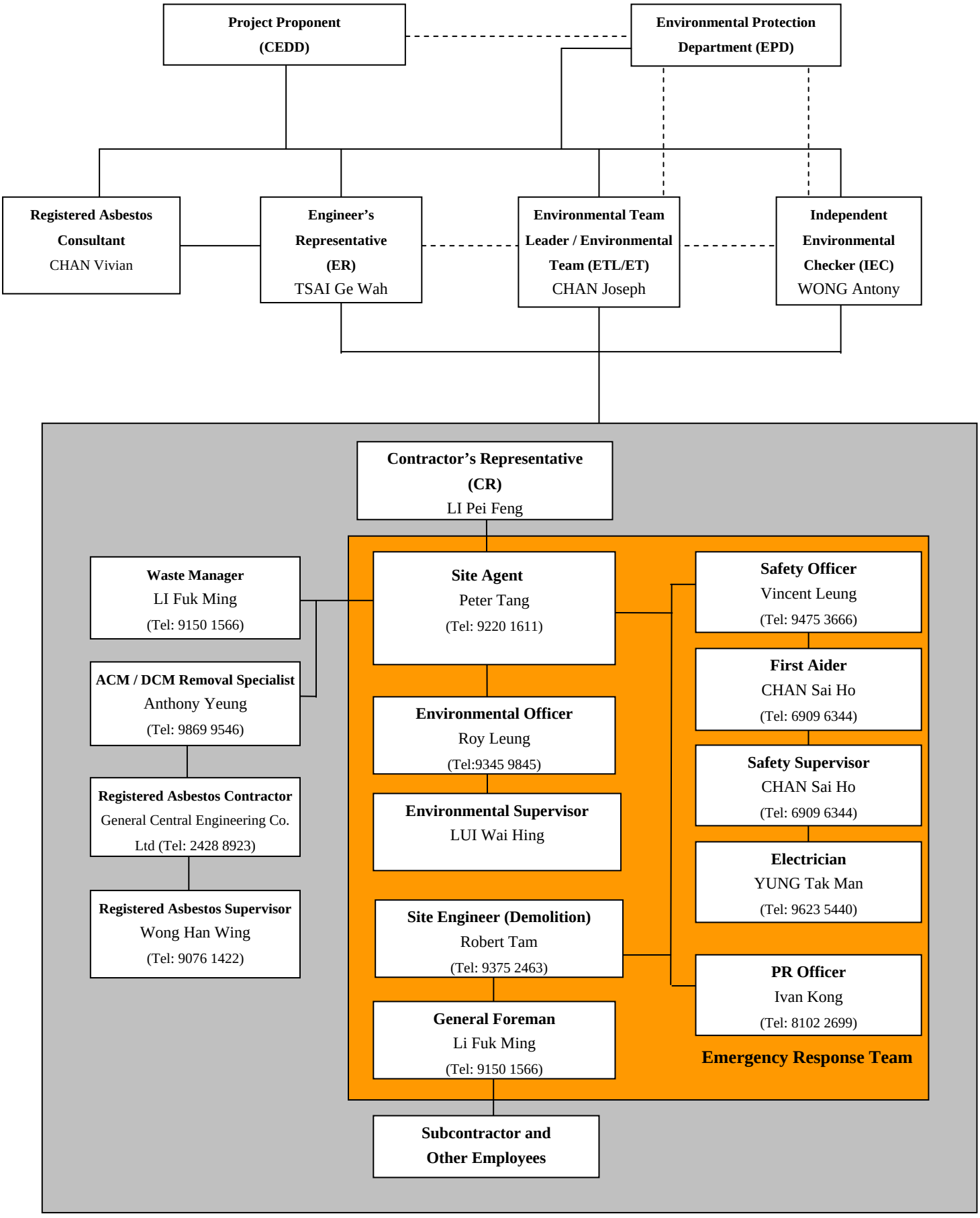
3. Demolition Sequence
   - 3.1 From top of chimney to 10 m above ground (by cutting and lifting method)
     - 3.1.1 Fix the chain link fence firmly immediately behind the working platform at which demolition works is in progress.
     - 3.1.2 Saw cut the flues above roof platform into small segment and lift to ground, refer to relevant Drawings and specification for handling and cleaning of steel flues which may contain dioxin.
     - 3.1.3 Saw cut the chimney R.C. wall above roof platform into small pieces and lift to ground.
     - 3.1.4 Saw cut the R.C. slab at 146.4 mPD into small pieces and lift to ground.
     - 3.1.5 Move down to the next working platform.
     - 3.1.6 Fix the chain link fence firmly immediately behind this working platform.
     - 3.1.7 Saw cut the chimney R.C. wall into small segment and lift to the ground.
     - 3.1.8 Cut the flues and steelworks into small segments and lift to ground.
     - 3.1.9 Repeat steps 3.1.5 to 3.1.8 until the chimney is demolished down to 10 m above ground.

   - 3.2 Bottom 10m
     - 3.2.1 Remove all steel flues inside the chimney.
     - 3.2.2 Demolish the chimney by mechanical excavator.
     - 3.2.3 Control free falling of the broken concrete inside the chimney only.
     - 3.2.4 Demolish the R.C. wall to the ground level. Wall below ground level, pile cap and piles shall remain until approval of the subsequent ground decontamination works.

   - 3.3 Ground Floor Structures and Structural Elements / Foundations / The like below Ground Level.
     - 3.3.1 The contractor shall submit the demolition sequence and excavation method for the Engineer’s approval.

Appendix C

Project Organization Chart


Project Proponent
(CEDD)
Environmental Protection Department (EPD)
Registered Asbestos Consultant
CHAN Vivian
Engineer's Representative (ER)
TSAI Ge Wah
Environmental Team Leader / Environmental Team (ETL/ET)
CHAN Joseph
Independent Environmental Checker (IEC)
WONG Antony
Contractor's Representative (CR)
LI Pei Feng
Waste Manager
LI Fuk Ming
(Tel: 9150 1566)
ACM / DCM Removal Specialist
Anthony Yeung
(Tel: 9869 9546)
Registered Asbestos Contractor
General Central Engineering Co. Ltd (Tel: 2428 8923)
Registered Asbestos Supervisor
Wong Han Wing
(Tel: 9076 1422)
Site Agent
Peter Tang
(Tel: 9220 1611)
Environmental Officer
Roy Leung
(Tel:9345 9845)
Environmental Supervisor
LUI Wai Hing
Site Engineer (Demolition)
Robert Tam
(Tel: 9375 2463)
General Foreman
Li Fuk Ming
(Tel: 9150 1566)
Safety Officer
Vincent Leung
(Tel: 9475 3666)
First Aider
CHAN Sai Ho
(Tel: 6909 6344)
Safety Supervisor
CHAN Sai Ho
(Tel: 6909 6344)
Electrician
YUNG Tak Man
(Tel: 9623 5440)
PR Officer
Ivan Kong
(Tel: 8102 2699)
Emergency Response Team
Subcontractor and Other Employees
Legend:
Line of Reporting
Line of Communication

Appendix D

D1 –The Laboratory Results of ACM Sampling at Chimney in April 2008

D2 – Generic Method Statement and Work Sequence of ACM & DCM Removal

東業德勤測試顧問有限公司
ETS-TESTCONSULT LIMITED
8/F., Block B, Veristrong Industrial Centre, 34-36 Au Pui Wan Street, Fotan, Hong Kong
Tel : 2695 8318 E-mail : etl@ets-testconsult.com
Fax : 2695 3944 Web site : www.ets-testconsult.com

HOKLAS 022

TEST REPORT

Form F/AB/R/02/Issue 7 (1/1) (08/03)

REPORT NO. BUA80329

IDENTIFICATION AND DETERMINATION OF ASBESTOS CONTAINING MATERIAL

Project	: Contract No. CV/2007/06 Kwai Chung Incineration Plant Demolition and Decontamination Works (B/188/08)	Report Date	: 16 April 2008
Customer	: China International Water & Electric Corp	Test Method	: TPE/002/A & TPE/004/A : Clause 5.1
Address	: Room 1508, 15/F Fortress Tower 250 King's Road, North Point, Hong Kong	Page	: 1 of 1

The sample(s) with referenced as shown below were submitted and examined to determine the presence of asbestos fibres by following methods:

1. Fibres in the samples were identified using a polarised light and dispersion staining technique as described in the In-house method TPE/002/A - Identification of asbestos bulk samples.
2. Determination of asbestos-containing material (ACM) by visual estimation using the method set out in the In-house method TPE/004/A - Determination of asbestos-containing material by visual estimation, gravimetric reduction & point-counting method.

RESULTS

Date receipt of sample(s) 14 April 2008
Date of identification : 16 April 2008

Sample Reference Number	Sample Location	Results	Conclusion (ACM/Non-ACM/ Non-Determined)
B/188/08/1	F1G1M	Asbestos not detected	non-ACM
B/188/08/2	F2G1M	Asbestos not detected	non-ACM
B/188/08/3	F3G1M	Asbestos not detected	non-ACM
B/188/08/4	F4G1M	Asbestos not detected	non-ACM

Remarks:

'**ACM**' refers to a sample that is found to be an asbestos containing material as defined in the Air Pollution Control Ordinance

'**Non-Determined**' refers to a sample that should be further analysed by Gravimetric Reduction & Point Counting method for the determination of asbestos containing material

'**Non-ACM**" refers to a sample which asbestos cannot be detected during the identification.

REPORTED BY

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Supervisor

APPROVED BY

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HOKLAS 022

TEST REPORT

Form F/AB/R/02/Issue 7 (1/1) (08/03)

REPORT NO. BUA80341

IDENTIFICATION AND DETERMINATION OF ASBESTOS CONTAINING MATERIAL

Project	:	Contract No. CV/2007/06 Kwai Chung Incineration Plant Demolition and Decontamination Works (B/197/08)	Report Date	:	22 April 2008
Customer	:	China International Water & Electric Corp	Test Method	:	TPE/002/A & TPE/004/A : Clause 5.1
Address	:	Room 1508, 15/F Fortress Tower 250 King's Road, North Point, Hong Kong	Page	:	1 of 1

The sample(s) with referenced as shown below were submitted and examined to determine the presence of asbestos fibres by following methods:

1. Fibres in the samples were identified using a polarised light and dispersion staining technique as described in the In-house method TPE/002/A - Identification of asbestos bulk samples.
2. Determination of asbestos-containing material (ACM) by visual estimation using the method set out in the In-house method TPE/004/A - Determination of asbestos-containing material by visual estimation, gravimetric reduction & point-counting method.

RESULTS

Date receipt of sample(s) : 16 April 2008
Date of identification : 21 April 2008

Sample Reference Number	Sample Location	Results	Conclusion (ACM/Non-ACM/ Non-Determined)
B/197/08/1	F1GF3M	Asbestos not detected	non-ACM
B/197/08/2	F2GF3M	Asbestos not detected	non-ACM
B/197/08/3	F3GF3M	Asbestos not detected	non-ACM
B/197/08/4	F4GF3M	Asbestos not detected	non-ACM

Remarks:

'ACM' refers to a sample that is found to be an asbestos containing material as defined in the Air Pollution Control Ordinance.

'Non-Determined' refers to a sample that should be further analysed by Gravimetric Reduction & Point Counting method for the determination of asbestos containing material.

'Non-ACM" refers to a sample which asbestos cannot be detected during the identification.

REPORTED BY :
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TEST REPORT

Form F/AB/R/02/Issue 7 (1/1) (08/03)

REPORT NO. BUA80342

IDENTIFICATION AND DETERMINATION OF ASBESTOS CONTAINING MATERIAL

Project	:	Contract No. CV/2007/06 Kwai Chung Incineration Plant Demolition and Decontamination Works (B/199/08)	Report Date	:	22 April 2008
Customer	:	China International Water & Electric Corp	Test Method	:	TPE/002/A & TPE/004/A : Clause 5.1
Address	:	Room 1508, 15/F Fortress Tower 250 King's Road, North Point, Hong Kong	Page	:	1 of 1

The sample(s) with referenced as shown below were submitted and examined to determine the presence of asbestos fibres by following methods:

1. Fibres in the samples were identified using a polarised light and dispersion staining technique as described in the In-house method TPE/002/A - Identification of asbestos bulk samples.
2. Determination of asbestos-containing material (ACM) by visual estimation using the method set out in the In-house method TPE/004/A - Determination of asbestos-containing material by visual estimation, gravimetric reduction & point-counting method.

RESULTS

Date receipt of sample(s) : 18 April 2008
Date of identification : 21 April 2008

Sample Reference Number	Sample Location	Results	Conclusion (ACM/Non-ACM/ Non-Determined)
B/199/08/1	F1P1 (17-4-08)	Asbestos not detected	non-ACM
B/199/08/2	F2P1 (17-4-08)	Asbestos not detected	non-ACM
B/199/08/3	F3P1 (17-4-08)	Asbestos not detected	non-ACM
B/199/08/4	F4P1 (17-4-08)	Asbestos not detected	non-ACM
B/199/08/5	F1P2 (18-4-08)	Asbestos not detected	non-ACM
B/199/08/6	F2P2 (18-4-08)	Asbestos not detected	non-ACM
B/199/08/7	F3P2 (18-4-08)	Asbestos not detected	non-ACM
B/199/08/8	F4P2 (18-4-08)	Asbestos not detected	non-ACM

Remarks:
'ACM' refers to a sample that is found to be an asbestos containing material as defined in the Air Pollution Control Ordinance.
'Non-Determined' refers to a sample that should be further analysed by Gravimetric Reduction & Point Counting method for the determination of asbestos containing material.
'Non-ACM" refers to a sample which asbestos cannot be detected during the identification.

REPORTED BY :
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TEST REPORT

Form F/AB/R/02/Issue 7 (1/1) (08/03)

REPORT NO. BUA80353

IDENTIFICATION AND DETERMINATION OF ASBESTOS CONTAINING MATERIAL

Project	: Contract No. CV/2007/06 Kwai Chung Incineration Plant Demolition and Decontamination Works (B/202/08)	Report Date	: 28 April 2008
Customer	: China International Water & Electric Corp	Test Method	: TPE/002/A & TPE/004/A : Clause 5.1
Address	Room 1508, 15/F Fortress Tower 250 King's Road, North Point, Hong Kong	Page	: 1 of 1

The sample(s) with referenced as shown below were submitted and examined to determine the presence of asbestos fibres by following methods:

1. Fibres in the samples were identified using a polarised light and dispersion staining technique as described in the In-house method TPE/002/A - Identification of asbestos bulk samples.
2. Determination of asbestos-containing material (ACM) by visual estimation using the method set out in the In-house method TPE/004/A - Determination of asbestos-containing material by visual estimation, gravimetric reduction & point-counting method.

RESULTS

Date receipt of sample(s) : 19 April 2008
Date of identification : 25 April 2008

Sample Reference Number	Sample Location	Results	Conclusion (ACM/Non-ACM/ Non-Determined)
B/202/08/1	F1P3 (19-4-08)	Chrysotile	non-Determined
B/202/08/2	F2P3 (19-4-08)	Asbestos not detected	non-ACM
B/202/08/3	F3P3 (19-4-08)	Asbestos not detected	non-ACM
B/202/08/4	F4P3 (19-4-08)	Asbestos not detected	non-ACM

Remarks:

'**ACM**' refers to a sample that is found to be an asbestos containing material as defined in the Air Pollution Control Ordinance.

'**Non-Determined**' refers to a sample that should be further analysed by Gravimetric Reduction & Point Counting method for the determination of asbestos containing material.

'**Non-ACM**" refers to a sample which asbestos cannot be detected during the identification.

REPORTED BY :
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TEST REPORT

Form F/AB/R/02/Issue 7 (1/1) (08/03)

REPORT NO. BUA80355

IDENTIFICATION AND DETERMINATION OF ASBESTOS CONTAINING MATERIAL

Project	Contract No. CV/2007/06 Kwai Chung Incineration Plant Demolition and Decontamination Works (B/204/08)	Report Date	28 April 2008
Customer	China International Water & Electric Corp	Test Method	: TPE/002/A & TPE/004/A : Clause 5.1
Address	Room 1508, 15/F Fortress Tower 250 King's Road, North Point, Hong Kong	Page	1 of 1

The sample(s) with referenced as shown below were submitted and examined to determine the presence of asbestos fibres by following methods:

1. Fibres in the samples were identified using a polarised light and dispersion staining technique as described in the In-house method TPE/002/A - Identification of asbestos bulk samples.
2. Determination of asbestos-containing material (ACM) by visual estimation using the method set out in the In-house method TPE/004/A - Determination of asbestos-containing material by visual estimation, gravimetric reduction & point-counting method.

RESULTS

Date receipt of sample(s) : 22 April 2008
Date of identification : 25 April 2008

Sample Reference Number	Sample Location	Results	Conclusion (ACM/Non-ACM/ Non-Determined)
B/204/08/1	F1P4 (21-4-08)	Asbestos not detected	non-ACM
B/204/08/2	F2P4 (21-4-08)	Asbestos not detected	non-ACM
B/204/08/3	F3P4 (21-4-08)	Asbestos not detected	non-ACM
B/204/08/4	F4P4 (21-4-08)	Chrysotile	non-Determined

Remarks:

'**ACM**' refers to a sample that is found to be an asbestos containing material as defined in the Air Pollution Control Ordinance.

'**Non-Determined**' refers to a sample that should be further analysed by Gravimetric Reduction & Point Counting method for the determination of asbestos containing material.

'**Non-ACM**" refers to a sample which asbestos cannot be detected during the identification.

REPORTED BY : LEE, Siu Fung Clifford
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TEST REPORT

Form F/AB/R/02/Issue 7 (1/1) (08/03)

REPORT NO. BUA80357

IDENTIFICATION AND DETERMINATION OF ASBESTOS CONTAINING MATERIAL

Project	Contract No. CV/2007/06 Kwai Chung Incineration Plant Demolition and Decontamination Works (B/208/08)	Report Date	: 28 April 2008
Customer	China International Water & Electric Corp	Test Method	: TPE/002/A & TPE/004/A : Clause 5.1
Address	Room 1508, 15/F Fortress Tower 250 King's Road, North Point, Hong Kong	Page	: 1 of 1

The sample(s) with referenced as shown below were submitted and examined to determine the presence of asbestos fibres by following methods:

1. Fibres in the samples were identified using a polarised light and dispersion staining technique as described in the In-house method TPE/002/A - Identification of asbestos bulk samples.
2. Determination of asbestos-containing material (ACM) by visual estimation using the method set out in the In-house method TPE/004/A - Determination of asbestos-containing material by visual estimation, gravimetric reduction & point-counting method.

RESULTS

Date receipt of sample(s) 23 April 2008
Date of identification : 26 April 2008

Sample Reference Number	Sample Location	Results	Conclusion (ACM/Non-ACM/ Non-Determined)
B/208/08/1	F1P5 (22-4-08)	Asbestos not detected	non-ACM
B/208/08/2	F2P5 (22-4-08)	Asbestos not detected	non-ACM
B/208/08/3	F3P5 (22-4-08)	Asbestos not detected	non-ACM
B/208/08/4	F4P5 (22-4-08)	Asbestos not detected	non-ACM

Remarks:

'ACM' refers to a sample that is found to be an asbestos containing material as defined in the Air Pollution Control Ordinance.

'Non-Determined' refers to a sample that should be further analysed by Gravimetric Reduction & Point Counting method for the determination of asbestos containing material.

'Non-ACM' refers to a sample which asbestos cannot be detected during the identification.

REPORTED BY : LEE, Siu Fung Clifford
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TEST REPORT

Form F/AB/R/02/Issue 7 (1/1) (08/03)

REPORT NO. BUA80358

IDENTIFICATION AND DETERMINATION OF ASBESTOS CONTAINING MATERIAL

Project	Contract No. CV/2007/06 Kwai Chung Incineration Plant Demolition and Decontamination Works (B/209/08)	Report Date	28 April 2008
Customer	China International Water & Electric Corp	Test Method	: TPE/002/A & TPE/004/A : Clause 5.1
Address	Room 1508, 15/F Fortress Tower 250 King's Road, North Point, Hong Kong	Page	: 1 of 1

The sample(s) with referenced as shown below were submitted and examined to determine the presence of asbestos fibres by following methods:

1. Fibres in the samples were identified using a polarised light and dispersion staining technique as described in the In-house method TPE/002/A - Identification of asbestos bulk samples.
2. Determination of asbestos-containing material (ACM) by visual estimation using the method set out in the In-house method TPE/004/A - Determination of asbestos-containing material by visual estimation, gravimetric reduction & point-counting method.

RESULTS

Date receipt of sample(s) : 24 April 2008
Date of identification : 26 April 2008

Sample Reference Number	Sample Location	Results	Conclusion (ACM/Non-ACM/ Non-Determined)
B/209/08/1	F1P6 (23-4-08)	Asbestos not detected	non-ACM
B/209/08/2	F2P6 (23-4-08)	Asbestos not detected	non-ACM
B/209/08/3	F3P6 (23-4-08)	Asbestos not detected	non-ACM
B/209/08/4	F4P6 (23-4-08)	Asbestos not detected	non-ACM

Remarks:

'**ACM**' refers to a sample that is found to be an asbestos containing material as defined in the Air Pollution Control Ordinance.

'**Non-Determined**' refers to a sample that should be further analysed by Gravimetric Reduction & Point Counting method for the determination of asbestos containing material.

'**Non-ACM**" refers to a sample which asbestos cannot be detected during the identification.

REPORTED BY :
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TEST REPORT

Form F/AB/R/02/Issue 7 (1/1) (08/03)

REPORT NO. BUA80359

IDENTIFICATION AND DETERMINATION OF ASBESTOS CONTAINING MATERIAL

Project	Contract No. CV/2007/06 Kwai Chung Incineration Plant Demolition and Decontamination Works (B/210/08)	Report Date	: 28 April 2008
Customer	China International Water & Electric Corp	Test Method	: TPE/002/A & TPE/004/A : Clause 5.1
Address	Room 1508, 15/F Fortress Tower 250 King's Road, North Point, Hong Kong	Page	1 of 1

The sample(s) with referenced as shown below were submitted and examined to determine the presence of asbestos fibres by following methods:

1. Fibres in the samples were identified using a polarised light and dispersion staining technique as described in the In-house method TPE/002/A - Identification of asbestos bulk samples.
2. Determination of asbestos-containing material (ACM) by visual estimation using the method set out in the In-house method TPE/004/A - Determination of asbestos-containing material by visual estimation, gravimetric reduction & point-counting method.

RESULTS

Date receipt of sample(s) : 25 April 2008
Date of identification : 26 April 2008

Sample Reference Number	Sample Location	Results	Conclusion (ACM/Non-ACM/ Non-Determined)
B/210/08/1	F1P7 (24-4-08)	Asbestos not detected	non-ACM
B/210/08/2	F2P7 (24-4-08)	Asbestos not detected	non-ACM
B/210/08/3	F3P7 (24-4-08)	Asbestos not detected	non-ACM
B/210/08/4	F4P7 (24-4-08)	Asbestos not detected	non-ACM

Remarks:

'ACM' refers to a sample that is found to be an asbestos containing material as defined in the Air Pollution Control Ordinance.

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'Non-ACM' refers to a sample which asbestos cannot be detected during the identification.

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Generic Methodology of DCM/ACM Removal at KCIP

(Please note that this appendix only serves a general guide to removal of dioxin/asbestos materials and hence generic method statements are presented herein for reference only.)

1 Introduction

As specified in Environmental Permit Clause, all dioxin contaminated material (DCM) and asbestos containing material (ACM) shall be removed prior to demolition of the existing structures within the Kwai Chung Incineration Plant (KCIP). In certain areas of the site facility or plant, there is a close distance between dioxin contaminated ash and asbestos containing material, and thus it is advisable to remove the contaminated ash material before asbestos removal works. In order to prevent the release and re-suspension of the ash when carrying out decontamination and to provide the prior preparation for asbestos removal in close proximity to the dioxin ash containing areas, removal of DCM and ACM will be conducted using full containment method as described in the "Code of Practice on Asbestos Control for Asbestos Work using Full Containment or Mini Containment Method" issued by Environmental Protection Department. Extraction from the Code of Practice with regard to the section on Full Containment setup is enclosed in this appendix whereas the removal methods in Segregation setup for "Low-Risk ACM Only" scenario are outlined in other sections of this document.

2 Work Site Preparation

The work areas shall be segregated from adjacent areas using red/white plastic tapes to prohibit unauthorized access to the work site. Warning notices or signs in both Chinese and English shall be attached in a conspicuous position of work area every time and shall remain posted until removal work has been completed. Before setting up full containment for removal of DCM/ACM, each work area shall be preliminarily decontaminated (refer to section on Preliminary Decontamination enclosed in this appendix). No matter what the existing condition and the extent of contamination are, the workers should wear appropriate air respirators for cleaning. Full-body protective clothing and negative air pressure environment will be required if seriously damaged ACM prior to removal are found on site. Any movable items within the work areas shall be cleaned by wet-wiping and vacuuming with High Efficiency Particulate Air (HEPA) filter equipment. Any unmovable objects and surfaces without DCM/ACM shall be decontaminated by a vacuum cleaner fitted with HEPA filter and then covered with two layers of polythene sheeting.

3 Equipment and Materials for DCM/ACM Removal

The Registered Asbestos Contractor shall acquire and provide all necessary equipment and materials for the dioxin/asbestos removal works including but not limited to the following:

(a) Air mover which shall be a local exhaust system equipped with HEPA filtration with a filter efficiency of 99.97% at 0.3μm mass median aerodynamic diameter.

The system shall be capable of creating a negative pressure differential between the outside and inside of the work area and provide sufficient air changes for workers. Each air mover shall be brought to the site without filters (i.e. pre-filters) and new filters shall be fitted on site before use. The Contractor shall keep sufficient spare filters on site for replacement purpose.

(b) HEPA vacuum cleaner which shall be a piece of vacuuming equipment with a HEPA filter capable of trapping and retaining 99.97% of particles (or fibres) greater than 0.3µm in mass median aerodynamic equivalent diameter.

At least two HEPA filter type heavy duty vacuum cleaners suitable for use in asbestos removal works shall be provided for operation in each work zone. One small vacuum cleaner unit shall be provided at the exit of the asbestos working area for personal cleaning. In situations where a Hygiene Unit is attached to the exit of the asbestos working area, the vacuum cleaner may be located in the dirty chamber for surface cleaning. Each vacuum cleaner shall be brought to the work site without filters (i.e. pre-filters), and new filters shall be fitted on site before use. The Contractor shall keep sufficient spare filters on site for replacement purpose.

(c) Respirators to protect workers during DCM/ACM removal works:

A powered air-purifying full-face respirator (e.g. Jupiter model) with a P100 type air filter for removal work not being conducted in an oxygen-deficient environment, and effective for retaining dioxin ash (i.e. not a gas or vapour) of particle size greater than 0.3 micron;

Full-face positive pressure type as approved under the Factories and Industrial Undertakings (Asbestos) (Approval of Respiratory Protective Equipment) Notice; and

Half-face or nasal respirators of nominal protection factor of 10, equipped with HEPA replaceable cartridge type filters as approved under the Factories and Industrial Undertakings (Asbestos) (Approval of Respiratory Protective Equipment) Notice.

(d) Decontamination Unit

A 3-compartment air-locked Hygiene Unit comprising Dirty Room, Shower Room and Clean Room, which should be constructed with timber or metal frames, 3 layers of 0.15mm thick polythene sheeting and sealed with 75mm tape. An I-slit opening door with cover flap weighted at bottom is made to separate the Dirty Room from the Shower Room. In the Dirty Room, facilities for temporary storage of soiled equipment and footwear and a waste bag should be provided. Likewise, another I-slit opening door with cover flap weighted at bottom shall separate the Shower Room from the Clean Room. Before being discharged to the site, covered drainage, waste water shall pass through a filter unit approved by the client. The Clean Room shall provide secure storage of personal protective clothing, respirator face pieces, gloves, etc as well as a mirror and a charging unit for the respirator batteries. A third door of the same design shall give access to and from the outside of the Clean Room.

(e) Other Essential Materials and Instruments

Asbestos Waste Bags – double-bagging with 0.15mm polythene bags colour-coded should be available for use in the work area:

- white inner bag for chrysotile (white asbestos); and
- orange inner bag for amosite (brown asbestos) or crocidolite (blue asbestos).

The outer bag should be transparent to facilitate visual inspection.

The inner bag should be labelled or printed "Danger Asbestos Waste" in English and Chinese as shown in "Code of Practice on the Handling, Transportation and Disposal of Asbestos Wastes" issued by the Environmental Protection Department.

Nylon woven sacks may be required to be used as the innermost bag (i.e. triple-bagging) when the debris contains sharp edges and/or proves to be too heavy for the
plastic waste bags.

Round containers with airtight seal caps may be used to pack all cement/dioxin ash mixtures.

Chemical waste drums should be used to store wet or heavy asbestos or dioxin waste. They are of the full aperture type and the lids may be secured with latch, lever, or nut and bolt closures. Details of container type requirements should also be referred to "Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes" published by the Environmental Protection Department. During handling of chemical substances, protective clothing is mandatory and shall be of a disposable type and approved by the Labour Department under the Factories and Industrial Undertakings (Asbestos) Special Regulations. Protective coveralls shall be with integral hoods, elasticized cuffs and ankles and zipper fastening. Workers should wear rubber knee length boots with non-slip soles or wear shoe covers. Eye protection and safety helmets shall be made available as appropriate. In other words, the Contractor shall provide all necessary protective outfits for the on-site working staff and other Government officials during the dioxin/asbestos removal work period.

Amended water shall be water to which a wetting agent is added for damping asbestos prior to removal. A wetting agent is 50% polyoxyethylene ester and 50% polyoxyethylene ether or equivalent.

Coating material/sealant for coating surfaces previously contaminated with asbestos. A suitable sealant is polyvinyl acetate (PVA) emulsion adhesive.

Pressure monitor capable of continuously measuring the static negative pressure of a contained work area and producing a permanent print-out record should be provided. The normal negative pressure range of -0.05” to -0.15” (or -1.5mm to -4mm) water gauge inside the containment should be maintained during the course of asbestos removal work. The pressure monitoring device should also be fitted with an audible alarm to give early warning of abnormal pressure differential.

4 Maintenance and Testing of Plant and Equipment for Dioxin/Asbestos Removal Works

The Registered Asbestos Contractor (hereinafter referred to as ”the Contractor”) shall ensure that personal protective equipment, mechanical plant and equipment brought to the work site are all uncontaminated, well maintained and in efficient working order, and that all scaffolding, working platforms, tools, equipment, etc brought to the site are also free of contamination. It should be noted that Labour Department “Code of Practice for Metal Scaffolding Safety” should be referred to if scaffolding with working platform is required for removal of DCM/ACM. Certified records of routine maintenance of all plant and equipment, particularly the HEPA equipment, shall be prepared for inspection by the Registered Asbestos Consultant (hereinafter referred to as “the Asbestos Specialist”).

All mechanical plant and equipment, scaffolding, working platforms, tools and equipment, etc used for dioxin/asbestos removal shall be decontaminated before removal from the site. However, since the HEPA air movers and vacuuming cleaners (separately labelled “Dioxin Only”) for dioxin removal cannot be re-used, they are to be disposed of as toxic chemical waste.

5 Construction of Full Containment

For removal of DCM, a full containment under negative pressure is always required to ensure air-tightness of the enclosed work area. Containment setup is shown on layout plans attached to this appendix. Details of constructing full containment on site are also listed in section on Full Containment setup.

6 List of DCM and ACM Items

A list of DCM and ACM items at KCIP is given below for quick reference:

(a) DCM in Ash Bunker

The DCM concerned is ash material on walls of bunker located in Incineration Plant area close to chimney.

(b) DCM inside Chimney Flues

The DCM concerned is ash material on internal walls of metal flues from Platform No.7 down to chimney base.

(c) ACM in Main Building (Incineration Plant)

The ACM item involved is weather cladding on metal corrugated sheets.

(d) ACM in Main Building Offices/Workshops/Lab (Incineration Plant) & Site Office Block

The ACM items involved are fuse boxes with arc chutes, floor tiles with adhesive and gasket/ribbon sealant of ventilation duct outside Kitchen, all located in Incineration Plant, and also floor tiles inside rooms on 1/F of Site Office Block.

(e) ACM in Ash Bunker Area

The ACM item involved is the cement water pipe adjacent to the ash bunker on the rear side of Incineration Plant, close to chimney.

(f) ACM in Chimney

The ACM items involved are the lining material of flue guide plates from Platform No.7 down to No.1 and the 6 ventilation louvers on Platform No.7. In addition, the sampling port gaskets from Platform No.2 down to Platform No.1 and the gas tight door sealants on flues at Platform No.1 are ACM. Lastly at Chimney Base, there are 4 asbestos flexible joints of air ducts connecting to flues.

7 The Proposed DCM and ACM Removal Methods:

The methods suggested below are applicable to various types of DCM and ACM present in the existing buildings and facilities at Kwai Chung Incineration Plant (KCIP). In the event that DCM and ACM are located in the same work zone, no asbestos abatement work should be carried out until all ashes, deposits or rubbles contaminated with dioxin in the vicinity were physically segregated or cleared. Detailed procedures of asbestos removal work in containment and/or segregation setup can be referred to corresponding sections at the end of this appendix. Work flow diagrams for DCM/ACM removal process are also enclosed as Figure B1a, B1b & Figure B2 for illustration.

Removal of DCM in Chimney Flues & Ash Bunker – Cement Stabilization

In general, a full containment should be constructed to enclose the dioxin contaminated area where negative pressure condition is maintained by HEPA air movers producing 6 air changes per hour. The full containment layout as shown in Fig. B3 attached to this appendix should be adopted for removal of the DCM in ash bunkers whereas removal of the DCM in chimney is referred to Fig. B4. Details of full containment setup and calculation of number of air mover units required are presented in Supplementary Section on Full Containment Setup.

As deposits or debris may be present at the chimney base, they shall be cleared by following the same preliminary decontamination procedures as for asbestos abatement at the beginning of removal work in the vicinity of the main entry/exit door on G/F. Subsequently, DCM removal inside the chimney should start from Chimney Base to Platform 7.

Inside the containment, structurally strengthened raised working platform should be constructed for access to ash bunker walls and metal flues at height. While DCM on contaminated surfaces is being scrabbled manually, HEPA vacuuming is applied to effectively remove ash material on the wall and floor surfaces around ash bunkers and also on the internal walls of the chimney flues.

The discharged ash material (DCM waste) from the HEPA vacuum cleaner is then treated with cement to give a stabilized mixture. The best ash/cement mixing ratio should have been previously determined through a series of pilot tests, starting from cement content of say, 50% (1:0.5), 100% (1:1) to 150% (1:1.5) by weight. This mixture can be made in a rotary mixer until a mud-like product (i.e. homogenized material) is formed and it should finally be allowed to fill up individual cube moulds of dimensions: ~700mm x ~700mm. Pilot tests for on-site solidification for the sample mixtures should be carried out inside the single ground containment prior to delivery to the testing laboratory for Toxicity Characteristic Leaching Procedure (TCLP) to confirm their stable condition. Given the appropriate mixing ratio of ash to cement, the scrabbled ash material collected in the HEPA vacuum cleaner can be mixed with a specified amount of cement.

Before packing of the prepared ash/cement mixtures, cylindrical containers or drums should be protected with double-layer plastic linings. When each container or drum is filled with the ash/cement mixture cubes, it should be covered with airtight lids.

Samples of the ash/cement mixture are required for undergoing Toxicity Characteristic Leaching Procedure (TCLP) by the testing laboratory to confirm its stable condition.

When satisfactory test results are obtained, the waste material can be transferred to a temporary storage area on site prior to properly arranged transportation to a designated landfill site for disposal. Details of the entire solidification process are presented in a flow diagram in Figures B1a & B1b.

After DCM was removed, the metal flues will be cut into manageable sizes from top to bottom to be agreed by the landfill operator for disposal.

Concerning the decontaminated ash bunker wall and floor structures remaining in the incineration plant, they should be dismantled later as part of the overall demolition work program.

In any case, the removal, treatment and disposal approach for DCM should be referred to and primarily based on the Environmental Permit, EP-121/2002 as included in the Approved Environmental Impact Assessment Report, Registration No. AEIAR-049/2002.

Removal of Weather Cladding on Metal Corrugated Sheets in Segregation Setup

The ACM paint coating applied to the metal wall sheets as weather cladding covers most of the main building. Although these materials have been subject to heavy rain and wind over the years, the mastic type paint is designed to resist weathering and the coating which contains the ACM has stood up well. There is little chance of fibre release if it is left undisturbed. It is proposed that the individual sections be unbolted and dismounted from the steel supporting beams. Metal scaffolding and working platforms are required for carrying out bolts or screw removal process. Caution should also be exercised while loosening or breaking bolts or screws with hand tools like screwdrivers, pliers or clippers. Continuous PVA spraying would help minimize accidental release of fibres or particles. A mechanical crane is then used to enable safe transfer of these metal corrugated sheets individually to ground level for wrapping and disposal in line with EPD “Code of Practice on Safe Handling of Low Risk ACM” (Refer to Segregation setup section and layout plan-Fig. B5).

Removal of Vinyl Floor Tiles & Fuse Box Arc Chutes in Segregation Setup

Removal of ACM vinyl floor tiles in demolition works not within a fire site is regarded as “Class II” under section 75(5) of the Air Pollution Control Ordinance (APCO) and is thus exempted from the appointment of a registered asbestos contractor (RACr). For the asbestos arc chutes inside fuse boxes, they belong to “Class I” item exempted under section 69(3) of the APCO. As a result, the owner of premises is not required to submit an asbestos investigation report or an asbestos abatement plan concerning these two ACM items to the Authority under section 69(1) of the APCO. However, with such extensive asbestos abatement at KCIP, it may be convenient for the proponent to include the abatement of these ACM items in a contract for the RACr.

Since the vinyl floor tile adhesive is the asbestos-containing part and is not friable although with localized cracks, asbestos fibres effectively encapsulated within the mastic adhesive bottom layer can be easily prised from the floor using hand tools like scrapers or chisels with moderate force in a segregated work area. In applying such force and methods, care should be taken not to cause the flooring to crumble in such as way as to release the asbestos fibres. Such work should be conducted in a segregated area with continuous floor skirting up to 300mm from ground. Concerning fuse box arch chutes, the whole fuse box is to be removed with the ACM intact in a segregation zone with the ACM inside remaining intact.

All such asbestos removal procedures can be carried out in line with EPD “Code of Practice on Safe Handling of Low Risk ACM” (Refer to supplementary Full Containment & Segregation Setup sections and layout plan-Fig. B6).

Removal of Gasket at the Kitchen Ventilation Duct in Segregation Setup

The ACM gasket at the ventilation duct outside the kitchen although friable is only exposed at the edges such that in demolition the ACM can remain undisturbed and removal can be accomplished as duct is dismantled. When the main civil demolition contractor reaches the kitchen area, the metal flange sections around the gasket can be cut out and the excised material, i.e. metal and ACM, can be wrapped ready for disposal. Either side of the flange should be supported by metal scaffolding that structurally complies with the standards set by the Labour Department. After the construction of the segregated area, the ductwork could be cut, at least 20cm from the gasket joint. It is recommended that the section of metal and ACM could be lowered to ground level by block and tackle without disturbing the joint. At ground level the section would be lowered into a segregated area and placed in drums or wrapped ready for disposal in line with EPD “Code of Practice on Safe Handling of Low Risk ACM” (Refer to supplementary Full Containment & Segregation Setup sections and layout plan-Fig. B7).

Removal of Cement Pipe in Ash Bunker Area in Segregation Setup

The ACM cement pipe in the ash bunker area is present as twelve sections of 20cm diameter pipe of varying lengths up to 5m. Although it has been cracked open, there is little chance of fibre release if left undisturbed due to its non-friable nature. Asbestos fibres are effectively encapsulated within the cement which can be easily lifted from its joints by hand or using a lifting device such as a block-and-tackle secured to the steel beams of the ash bunker frame above. The pipe can be lifted by exercising moderate force. In applying such force and methods, care should be taken not to cause the pipe to crumble in such a way as to release the asbestos fibres. In addition, the area adjacent to the pipe may require segregation, so work can be carried out in line with EPD “Code of Practice on Safe Handling of Low Risk ACM” (Also refer to supplementary Full Containment & Segregation Setup sections and layout plan-Fig. B8).

Removal of ACM in Chimney – Flue Guides

The ACM cement at the flue guides in the chimney is not friable. The location of the ACM is such that in demolition the ACM can remain undisturbed. This removal can be accomplished as the chimney flues are dismantled. Similarly, the work strategy is to start from Platform 7 to Platform 1, one floor after another in a descending manner. By the time the main civil demolition contractor reaches each platform, the metal sections around the flue guides can be cut out and the excised material, metal and ACM can be wrapped ready for disposal. It is recommended that a small section of the metal floor nearest the flue guides be temporarily removed to facilitate cutting. A circular section of the flue could then be cut out with the flue guides attached intact and with the ACM undisturbed. The thin sections of metal and ACM can then be placed in drums or wrapped ready for disposal in line with EPD "Code of Practice on Safe Handling of Low Risk ACM" (Also refer to supplementary Full Containment & Segregation Setup sections and layout plan-Fig. B9).

Removal of ACM in Chimney – Ventilation Louvres

(Reference made to the amendment of methods dated 12 September 2008)

1) Set up a movable working platform outside the chimney for safe access to external surfaces of existing asbestos ventilation louvres.
2) Cover up the external surfaces of the ventilation louvers completely with plywood and seal up all gaps with expansion foam. Afterwards, fix double layers of plastic sheeting on plywood with duct tape.
3) Inside the chimney, set up and strengthen the temporary scaffold, working platform with safe access and egress around the internal flues in a way of structurally safe from the floor of Platform 6 for getting access to the ventilation louvres underneath the floor of Platform 7. Refer to Figure B11 for layout of the temporary work structure.
4) After erection of the temporary scaffold and working platform immediately below the ventilation louvres, cover them with double layers of plastic sheeting to prevent from cross- contamination during asbestos removal.
5) Construct the segregation zone on the structurally stable working platform so that the louvres will be completely covered up and so will the cat-ladder connecting the working platform to the decontamination unit set up on the floor of Platform 6 be covered as part of the segregation zone.
6) Establish a debris port for transfer of packed asbestos waste on the temporary scaffold. Refer to Figure B11.
7) A movable platform surrounding the chimney on the outside is built as a protecting shield and tarpaulin sheets are used to cover the louvers on the chimney external wall.
8) Set up a safe and stable winch system at the upper Platform 7 for loading and unloading the heavy ventilation louvers during removal. The lifting appliances should be certified to be safe before use.
9) Inside the segregation zone, all workers should wear approved full-face powered air-purifying respirators of minimum nominal protection factor 100, equipped with HEPA filters, as well as full-body protective clothing with hood and shoe covers.
10) Use wires or slings tied to winch to restrain the asbestos ventilation louvers before dismounting them from chimney wall with hand tools such as screwdriver, chisel and hammer. Mist-spray or chisel the rusted screws if necessary, chain up the detached ventilation louvers safely and transfer them to the double layered floor of the temporary scaffold for wrapping with two layers of plastic sheet with the lifting aid of the winch

system. The double-wrapped ACM should then be surface decontaminated by HEPA vacuuming and wet-wiping before passing through a debris port established on the temporary scaffold and transfer to Platform 6 – refer to Figure B11 & Figure B12 for details. Continue using the lifting aid to transfer the packed ACM from Platform 6 to G/F where a licensed vehicle is ready for collection and delivery to a buffer store on site pending disposal. The ventilation louvre over the access door to the chimney near ground level can be dealt with conveniently in a similar manner. Refer to Figure B14 for details.

11) When removing the asbestos ventilation louvres, environmental air samples outside the segregation zone and outside movable working platform should be collected. If air samples indicate fibre counts greater than original background levels or greater than 0.01 fibre/ml, whichever is larger, work should stop immediately for inspection and remedy. Refer to Figure B13 for leakage sampling locations.

12) One personal air sample for every 4 workers on each shift should be taken to monitor fibre exposure level throughout the asbestos removal process inside the containment. Refer to Figure B13 for personal sampling location.

13) All wastewater from the shower room of the decontamination unit shall be sump pumped through an approved aquarium type filter unit to remove suspended particles down to 5μm before being properly discharged.

14) All exposed metal surfaces should be wire-brushed carefully to remove all residues. The workplace atmosphere should be mist-sprayed with wetting agent continuously along with stripping and wire-brushing.

15) Debris should be collected into waste bags and duct tape sealed as soon as it is generated. Asbestos waste properly wrapped and sealed should then be transported out through the debris port.

16) Wet-wipe and HEPA vacuum all surfaces of the segregation zone and spray the PVA onto all exposed sheets inside the zone. HEPA vacuuming followed by wet-wiping should be performed on all surfaces from top to bottom and in a direction from the decontamination unit towards the far end of the segregation area. Wet-wiping materials such as rags, mops and sponges must be discarded after single use to avoid re-contamination.

17) After decontamination of the segregation zone and disposal of all asbestos debris, carry out reassurance air test inside the segregation. If the air test result is below 0.01 fibre/ml, a thorough visual inspection should be made by the Asbestos Specialist to certify in writing that all visible asbestos has been removed to a satisfactory standard with no visible debris or dust present; otherwise the segregation should be re-cleaned and reassurance air samples should be re-taken. This procedure should be repeated until the air test results are satisfactory.

18) All used clothes, gloves and polythene sheeting should be treated as contaminated waste and should be disposed of along with the ACM removed. All such waste materials generated are to be treated as the Type 2 asbestos waste.

19) All tools and equipment that have been used inside segregation including vacuum cleaners, ladders, sprayers, hard hats, goggles etc. must be properly decontaminated by HEPA vacuuming and wet-wiping before being taken out of containment.

20) Dismantle the segregation zone after declaration of zone clearance in terms of free of any visible debris and used materials inside the work area by the Asbestos Specialist. Peel off the last two layers of plastic sheeting covering the scaffold and working platform to release them for future use.

Submit the final completion certificate, along with air monitoring results and copies of waste disposal trip tickets to EPD by the supervising Asbestos Specialist within 1

month after completion of the asbestos abatement work.

Removal of ACM in Chimney – Sampling Port Gaskets and Gas Tight Doors

(Reference made to the amendment of methods dated 12 September 2008)

Removal of asbestos gastight door sealants at chimney base (i.e. on G/F) is to be conducted in the remaining containment structure after DCM removal. Such ACM removal work is based on the assumption that dioxin contaminated material inside the metal flue internal space has already been cleared and the metal flue sections above the gastight doors have been dismantled.

1) Inside the containment, all workers should wear approved full-face powered air-purifying respirators of minimum nominal protection factor 100, equipped with HEPA filters, as well as full-body protective clothing with hood and shoe covers. If necessary, additional battery powered lights should be placed inside the work zone to maintain sufficient lighting.
2) Leakage air samples outside the containment should be collected daily during the removal work. If air samples indicate fibre counts greater than original background levels or greater than 0.01 fibre/ml, whichever is larger, work should stop immediately for inspection and remedy. Refer to Figure B9 for leakage sampling locations.
3) One personal air sample for every 4 workers on each shift should be taken to monitor fibre exposure level throughout the asbestos removal process inside each containment. Refer to Figure B9 for personal sampling location.
4) Asbestos gastight door sealants on Ground Floor can be easily removed by stripping and/or cutting along the door edge with hand-held cutting tools (e.g. saw disc) after double-wrapping the external flue surfaces. Refer to Figure B10 for work procedures illustrated diagrammatically.
5) The detached metal door containing the ACM should be double-wrapped with plastic sheet and labelled as Type 2 asbestos waste.
6) Decontamination by means of HEPA vacuuming and wet-wiping to the double-wrapped door surfaces are needed to ensure free of deposits. Afterwards, the ACM sealant pieces and the dismantled gastight door parts are altogether to be collected in white asbestos waste bag, double-bagged and duct-tape sealed for disposal as asbestos waste.
7) Debris should be collected into waste bags and duct-tape sealed as soon as it is generated. The workplace atmosphere should be mist-sprayed with PVA continuously along with stripping and wire-brushing.
8) All exposed metal surfaces should be wire-brushed and HEPA-vacuumed carefully to remove any residues.
9) Asbestos waste properly wrapped and sealed should be transported out through the debris port.

Removal of ACM in Chimney – Flexible Joints

(Reference made to the amendment of methods dated 12 September 2008)

1) Inside the containment, all workers should wear approved full-face powered air-purifying respirators of minimum nominal protection factor 100, equipped with HEPA

filters, as well as full-body protective clothing with hood and shoe covers and can enter the containment after successful completion of smoke test.

2) Erect a temporary scaffold to support and consolidate the whole air duct at height before removal and allow an asbestos removal worker to get safe access to the air duct for in-situ decontamination of its internal surface – refer to attached Figure B16 and Figure B17. A working platform at 2.1 to 2.2m surrounding the four metal flues is available for the worker to stand adjacent to the air duct to apply cutting with hand tools in order to separate the part containing ACM flexible joint from the duct junction fused with vertical flue.

3) Seal up the duct-and-flue junction with tailored-made plywood of a shape fitting the junction opening after cutting, apply expansion foam along the edges, and then cover the fixed plywood with double layers of plastic sheeting. Afterwards, the drums shall be covered with its lid for mixing with cement in a specified ratio of cement and ash.

4) After successfully sealing up the junction, make open a small area on the air duct body by cutting with hand tools to facilitate cleaning up the ash on internal surfaces of the air duct and flexible joint by HEPA vacuuming and wet wiping. Put the collected ash into a steel drum lined inside with double layers of plastic sheeting prior to removal of the ACM flexible joint.

5) While removing the ash from the air duct and flexible joint, impact air monitoring of dioxin ash is being conducted outside the full containment at the decontamination unit entrance and at the exhaust of the air movers.

6) After removing all ash, conduct a visual inspection by the Asbestos Specialist and check the degree of decontamination inside the air duct and flexible joint by wiping the internal surface with a “White Cloth”. If the surface is not thoroughly cleaned, the decontamination process will be repeated by HEPA vacuuming and wet wiping until no more ash material is visually found.

7) The acceptance criteria of decontamination procedure carried out inside the full containment are that all internal surfaces of the air duct and the full containment are free of visible ash material or sediments.

8) Upon confirmation of free of ash inside the containment, peel off the innermost and second plastic sheet and immediately clean the third plastic sheet by HEPA vacuuming and wet-wiping. HEPA vacuuming followed by wet-wiping should be performed on all surfaces from top to bottom and in a direction from the decontamination unit towards the air movers. Wet-wiping materials such as rags, mops and sponges must be discarded after single use to avoid re-contamination.

9) Spray the third plastic sheet with wetting agent such as polyvinyl acetate and peel off the plastic sheet after drying of wet agent for preparation of removal of asbestos flexible joint.

10) When removing the flexible joint, leakage air samples outside the containment should be collected daily during the removal work. If air samples indicate fibre counts greater than original background levels or greater than 0.01 fibre/ml, whichever is larger, work should stop immediately for inspection and remedy. Refer to Figure B15 for leakage sampling locations.

11) One personal air sample for every 4 workers on each shift should be taken to monitor fibre exposure level throughout the asbestos removal process inside the containment. Refer to Figure B15 for personal sampling location.

12) Hand tools (e.g. hammer, chisel, screwdriver, hand-drill and pliers) should only be used to carefully disengage the metal flange around the asbestos flexible joint so that the asbestos-containing compartment can be locally dismantled or cut out. Afterwards, the excised material, loose metal parts and ACM should be properly double-wrapped with plastic sheets for disposal. The ACM incorporated material should be made wet by spraying wetting agent such as polyvinyl acetate (PVA) or amended water before and during cutting. Any particle release should then be kept to minimum by spraying the wetting agent and HEPA vacuum cleaner should be used to remove debris as it is created.

13) All wastewater from the shower room shall be sump pumped through an approved aquarium type filter unit to remove suspended particles down to 5μm before being properly discharged.

14) All exposed metal surfaces should be wire-brushed carefully to remove all residues. The workplace atmosphere should be mist-sprayed with PVA continuously along with stripping and wire-brushing.

15) Debris should be collected into waste bags and duct tape sealed as soon as it is generated. Asbestos waste properly wrapped and sealed should then be transported out through the debris port.

16) Wet-wipe and HEPA vacuum the fourth layer of plastic sheet and spray the PVA onto all exposed sheets inside the containment.

17) Peel off the fourth plastic layer until drying of the PVA and clean the fifth layer of plastic sheeting by HEPA vacuuming and wet wiping.

18) Carry out penultimate air test inside the containment (refer to Figure B15). If the air test result is below 0.01 fibre/ml, a thorough visual inspection should be made by the Asbestos Specialist to certify in writing that all visible asbestos has been removed to a satisfactory standard with no visible debris or dust present; otherwise the containment should be re-cleaned and penultimate air samples should be re-taken. This procedure should be repeated until the penultimate test results are satisfactory.

19) After the penultimate test results are satisfactory, spray PVA on the fifth layer and vacates the containment for 12 hours and visually re-check by registered asbestos consultant for commencement of final clearance air test inside the containment

20) Clean the fifth layer with HEPA vacuuming and wet-wiping and then peel it off and decontaminate the sixth layer by HEPA vacuuming and carry out final clearance air test.

21) Upon receipt of satisfactory final clearance air test result of less than 0.01 fiber/ml, conduct visual inspection to ensure free of ACM waste or debris by the asbestos specialists inside the containment. Final clearance air tests evenly distributed inside the abatement area should be performed to confirm an air quality of no more than 0.01 fibre/ml is attained or else the work area should be re-cleaned and further clearance air tests should be carried out. Refer to Figure B15 for final clearance sampling locations.

22) Upon confirmation of satisfactory final clearance air test result, clean the sixth layer by HEPA vacuuming and wet wiping. All used clothes, gloves and polythene sheeting should be treated as contaminated waste and should be disposed of along with the ACM removed. All such waste materials generated are to be treated as Type 2 asbestos waste.

23) All tools and equipment that have been used inside containment including air movers, vacuum cleaners, ladders, sprayers, hard hats, goggles etc. must be properly

decontaminated by HEPA vacuuming and wet-wiping before being taken out of containment.

24) Dismantle the full containment after declaration of zone clearance in terms of free of any visible debris and used materials inside the containment by the Asbestos Specialist. Peel off the last two layers of plastic sheeting covering the scaffold and working platform to release them for future use. Transit all packed asbestos waste to a temporary storage area.

25) Submit the final completion certificate, along with air monitoring results and copies of waste disposal trip tickets to EPD by the supervising Asbestos Specialist within 1 month after completion of the asbestos abatement work.

8 Supervision of DCM/ACM Removal Work

Given that several of the locations for DCM/ACM removal are at height, the DCM/ACM removal contractor and the Asbestos Specialist will need to ensure that at the detailed design stage the removal methods can be suitably supervised by the Asbestos Specialist. Whereas the day-to-day supervision of the removal work will be undertaken by the Registered Asbestos Supervisor, methods to allow access for the Asbestos Specialist to check the work will need to be developed. Workers will need to gain access safely to works at height and lifts etc will need to comply with all relevant safety regulations. Consideration may also be given to the use of audio/visual aids such as CCTV to provide the Asbestos Specialist on ground floor with a means to view the works and give instructions where necessary.

9 Air Monitoring for Removal of DCM & ACM

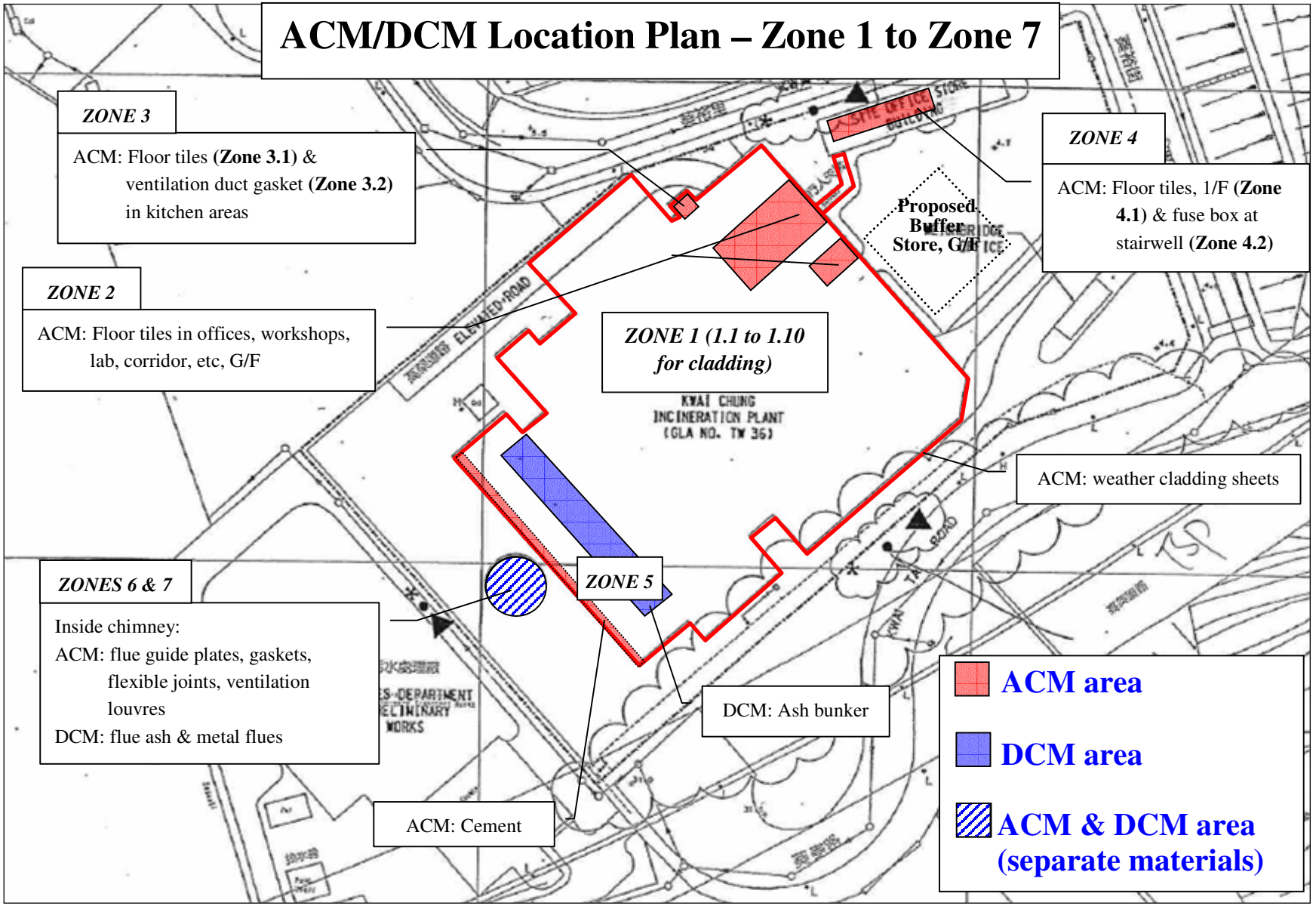
Information on environmental air monitoring for DCM removal can be found in “Method Statement for Baseline and Impact Monitoring for Dioxin in Air” according to the Contract requirements.

For airborne fibre concentration in relation to ACM removal, the air monitoring program and requirements given in Asbestos Investigation Report (AIR) and Asbestos Abatement Plan (AAP) submitted in 2000 should be referred to.

Supplementary Section A

Site Location Plan of KCIP & Proposed Buffer Store

ACM/DCM Location Plan – Zone 1 to Zone 7



Supplementary Section B

DCM & ACM Work Flow Diagrams and Removal Work Layout Plans

Figure B1a – Work Flow Diagram for Cement Solidification (where tested dioxin levels are less than 1 ppb)

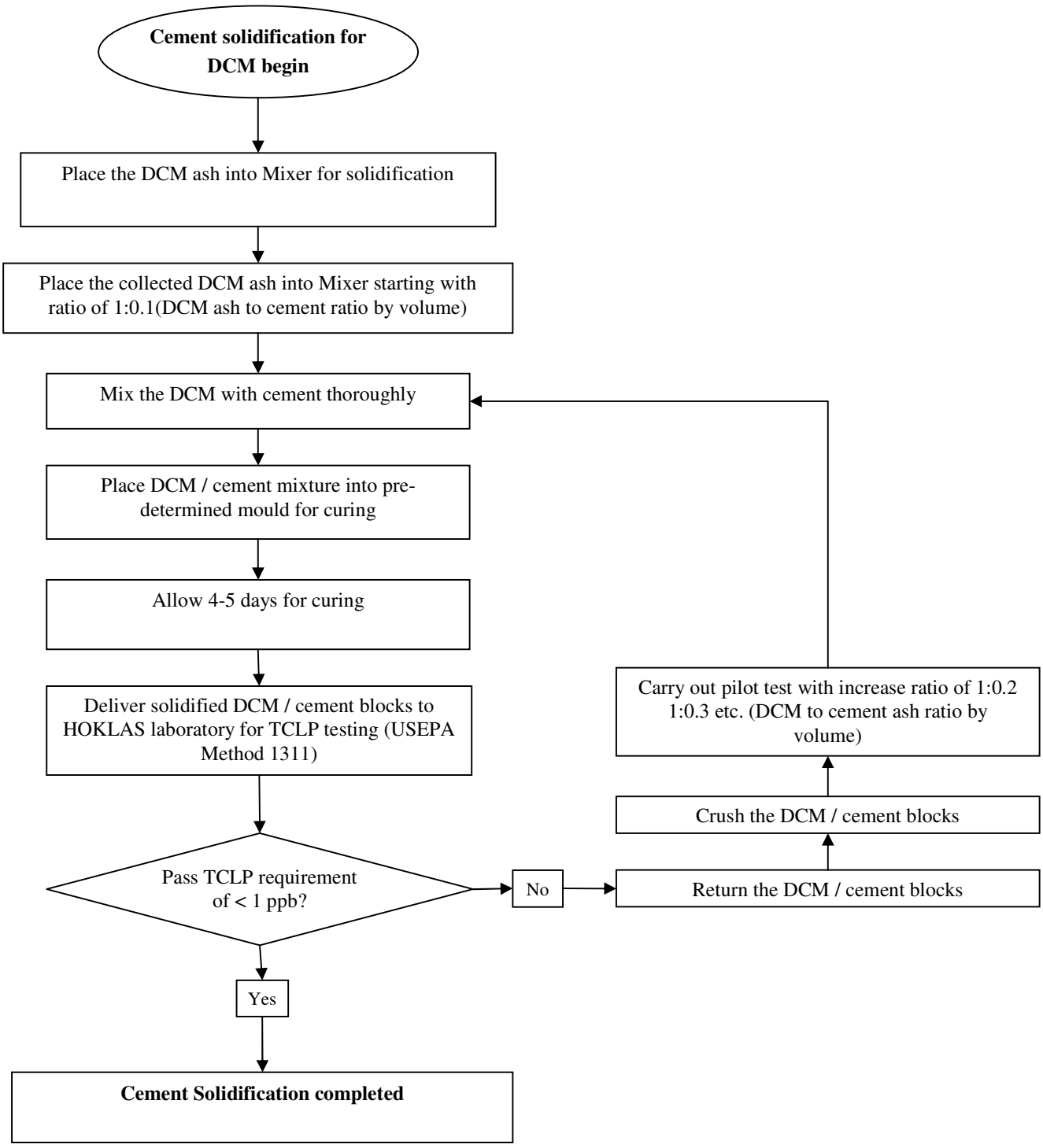


Figure B1b – Work Flow Diagram for Cement Solidification (where tested dioxin levels are more than 1 ppb)

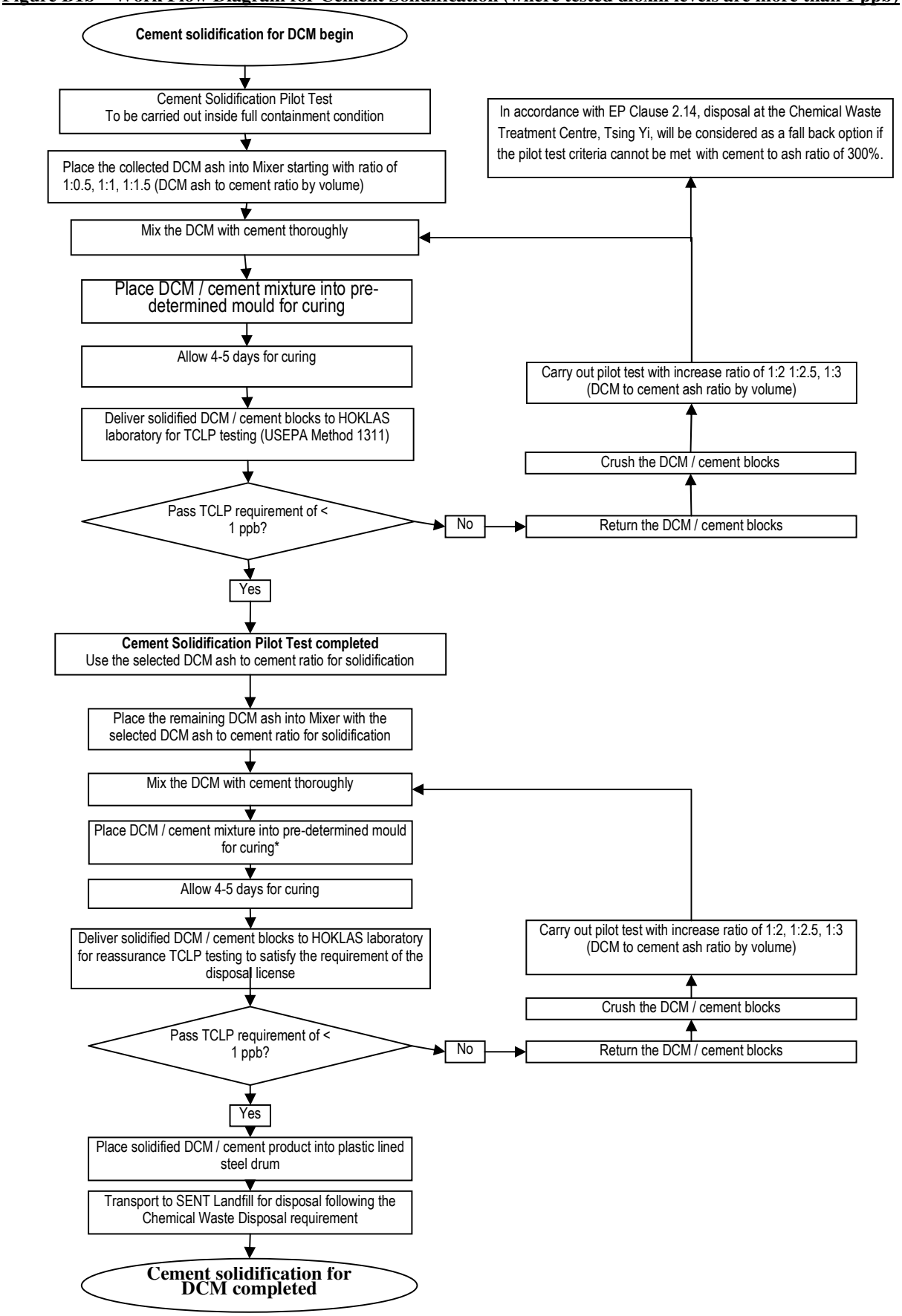
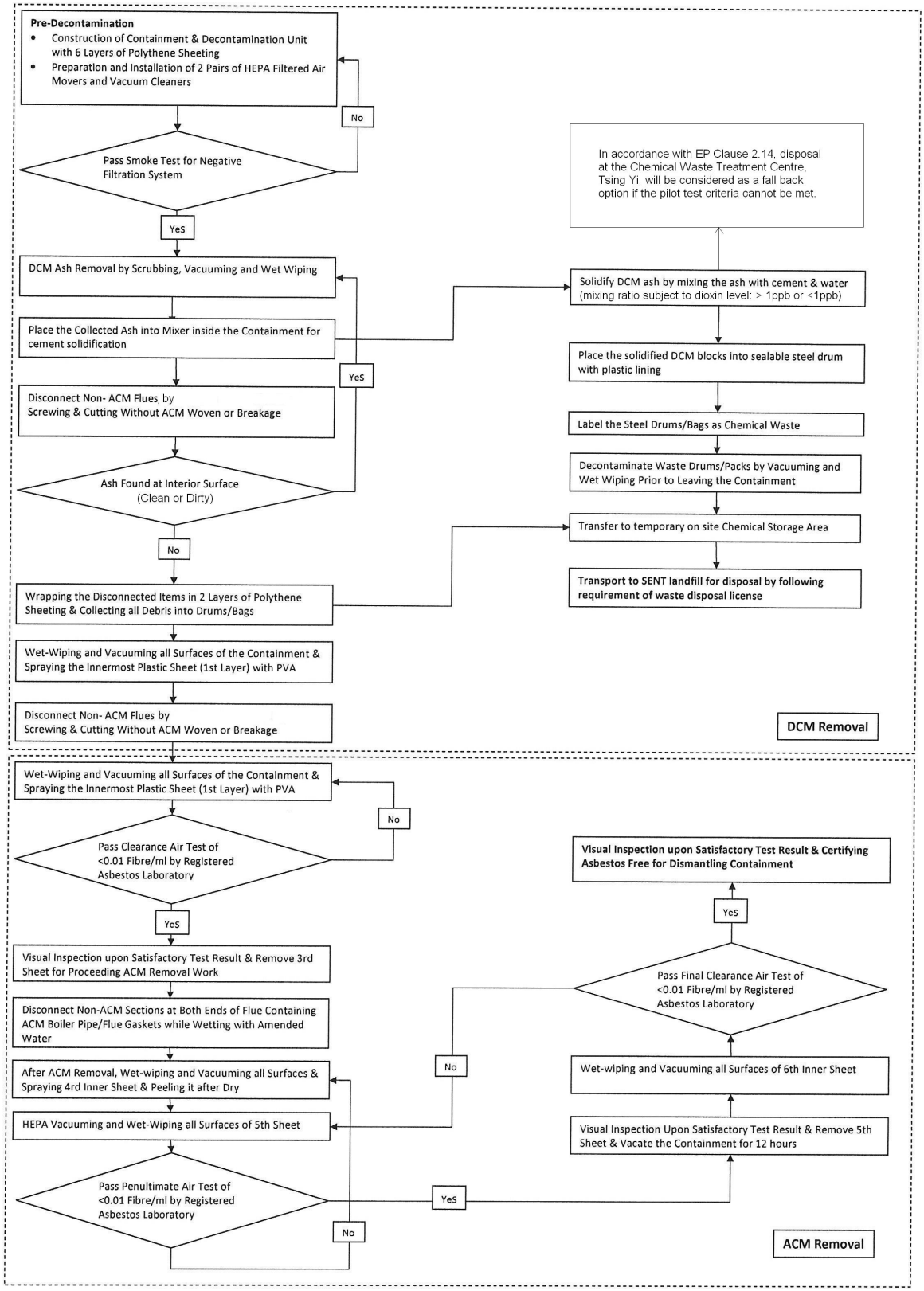


Figure B2:

Work Flow Diagram for Removal of DCM & ACM



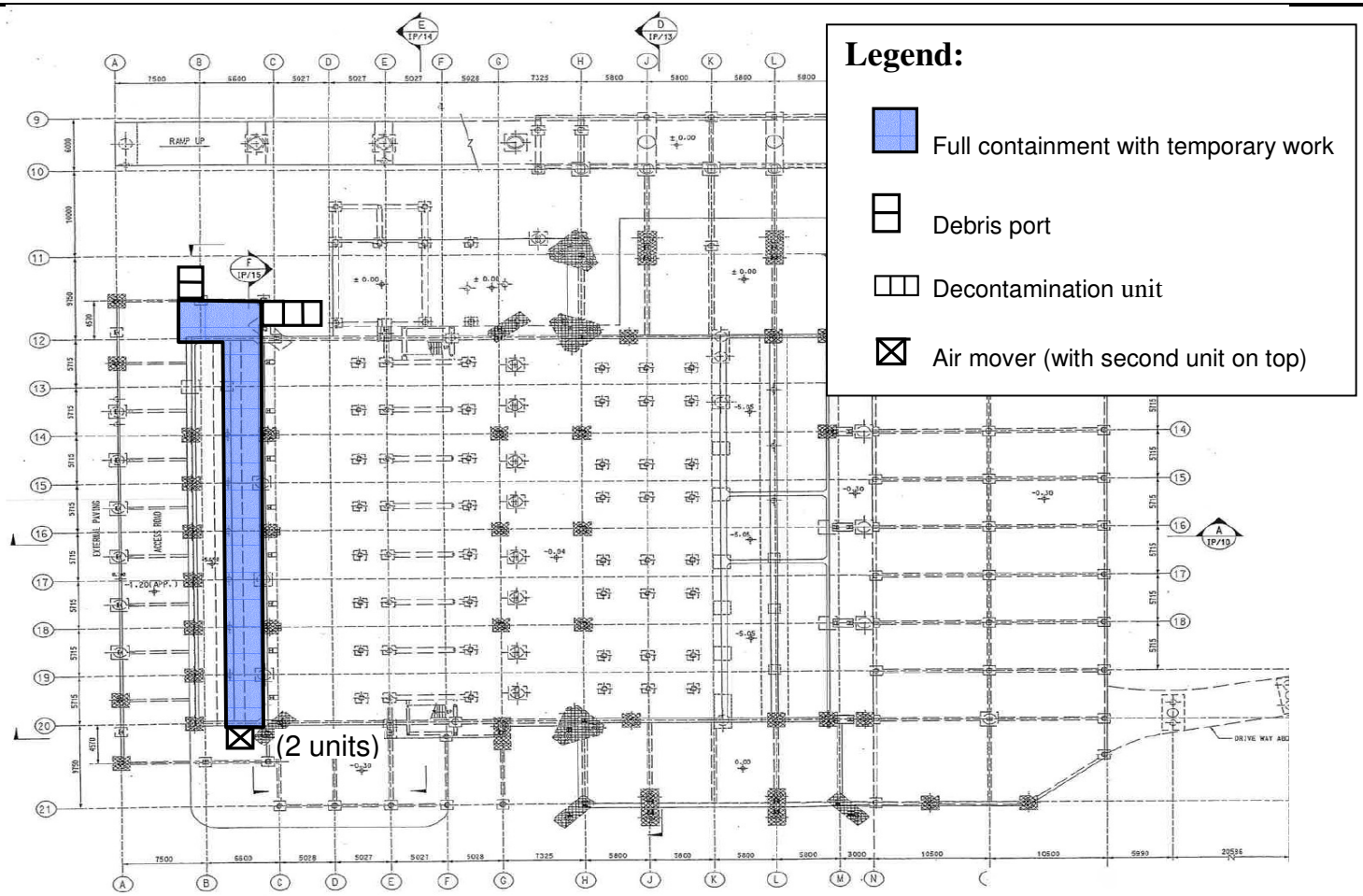
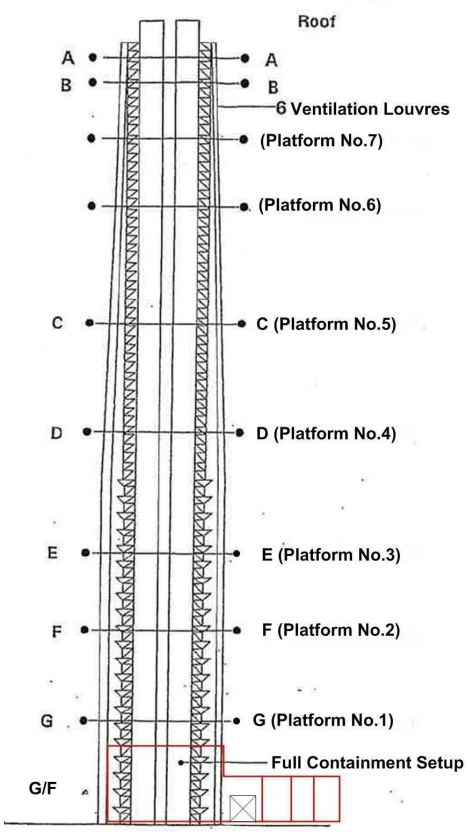
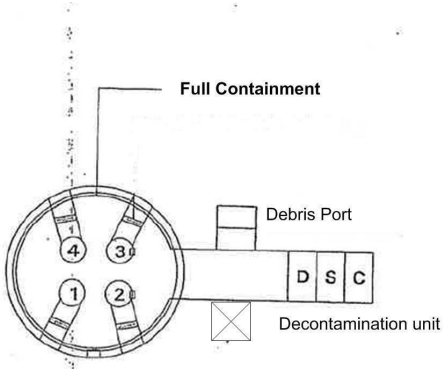


Figure: B3	N.T.S.
Title: Layout Plan of DCM Removal in Kwai Chung Incineration Plant – Ash Bunker	Drawn by: RL Checked by: AY
Project: Contract No. CV/2007/06 Kwai Chung Incineration Plant Demolition and Decontamination Works	Rev.: 1.0 Date: Jul



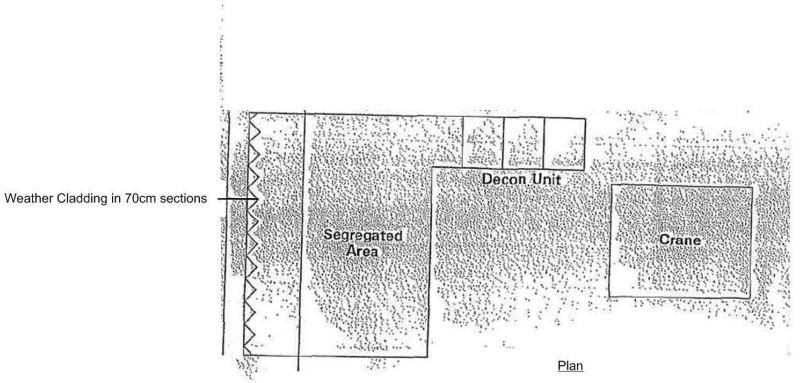


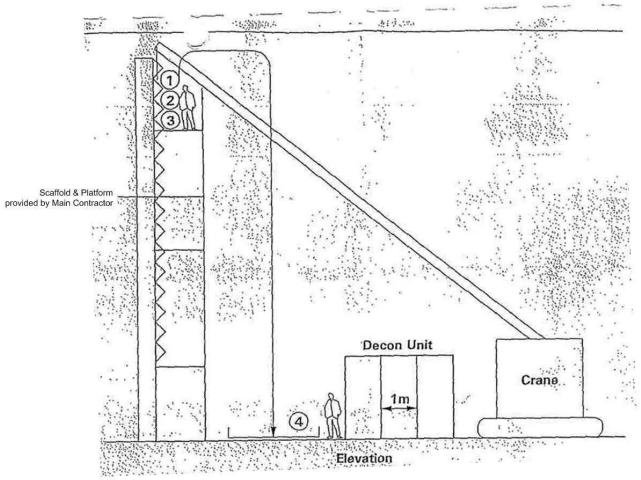
Plan

Fig.B4 : Layout Plan of DCM Removal Work in Chimney

Scale : Not to scale
Drawn by : AY
Date of Review : June , 2008

Legend :
Containment
Decontamination unit
Debris port
Air mover



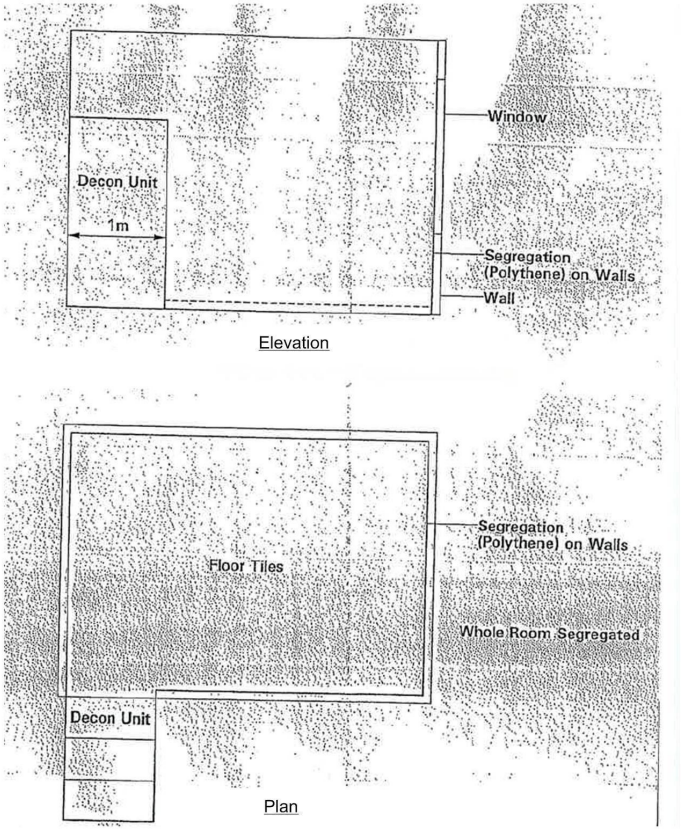


1. Initial bolts removed by unscrewing/unbolting
2. Weather cladding secured to lifting chain
3. 3m x 70cm section unbolted and attached to crane for lowering
4. Section lowered to segregation area for wrapping

Fig. B5 : Layout Plan of Asbestos Abatement Work in Incineration Plant - Asbestos Weather Cladding

Scale : Not to scale
Drawn by : AY
Date of Review : Jan , 2008

Legend : Segregation; Decontamination unit

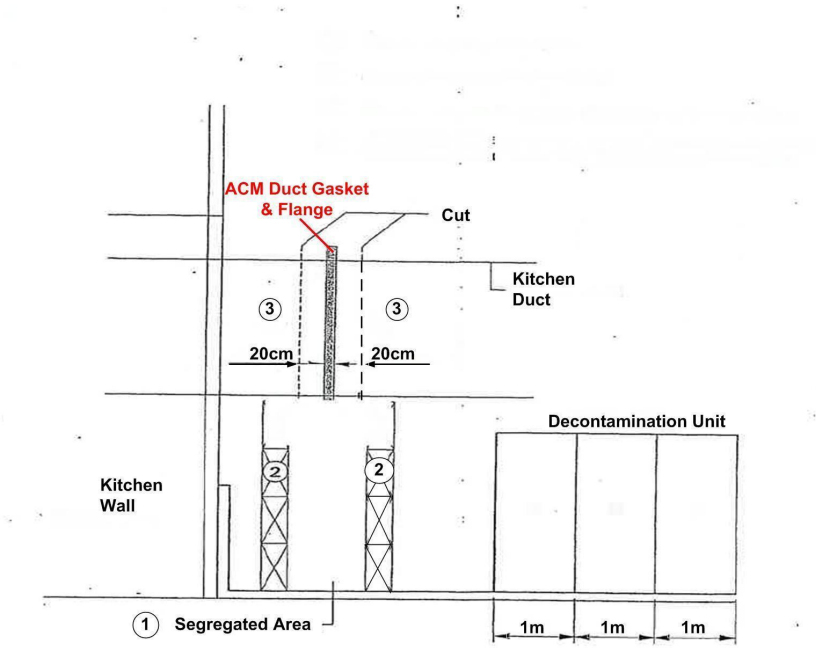


1. Area wetted using amended water
2. Floor tiles prised up / loosened with floor adhesive scrapped up
3. All materials bagged ready for disposal

Fig.B6 : Layout Plan of Asbestos Abatement Work in Incineration Plant - Asbestos Floor Tiles

Scale : Not to scale
Drawn by : AY
Date of Review : Jan , 2008

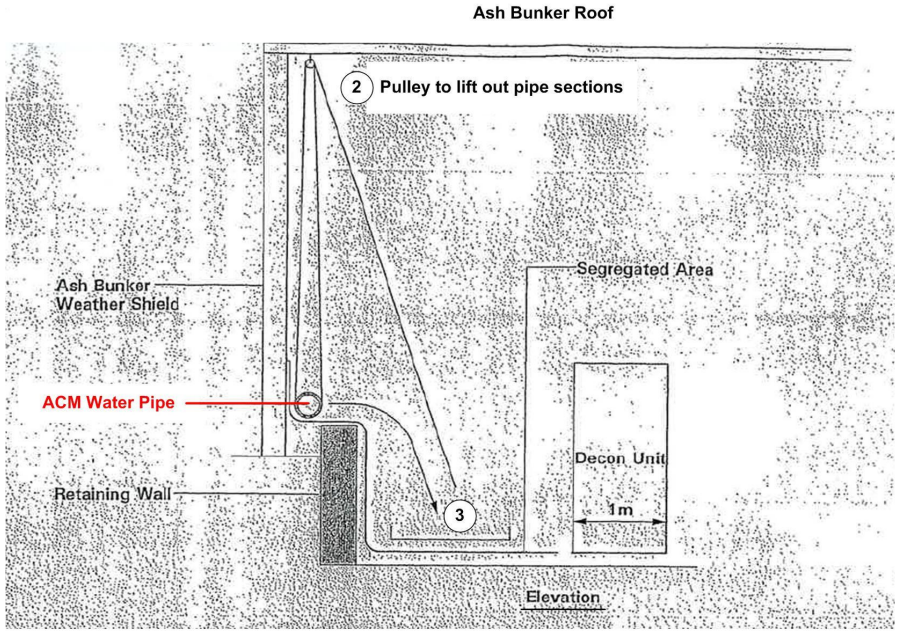
Legend : Segregation Decontamination unit



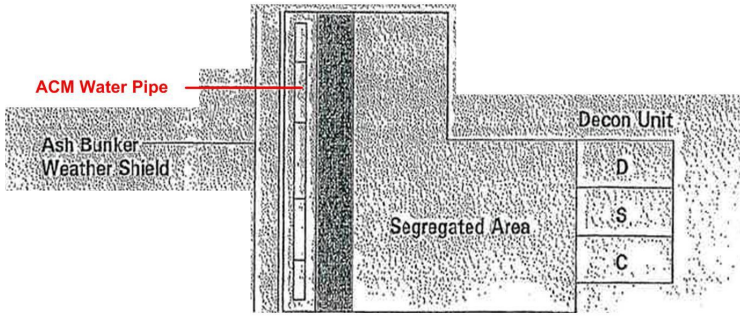
Elevation

1. Create segregation area
2. Support duct with scaffold
3. Kitchen ventilation duct gasket & flange cut
4. Undisturbed duct gasket & flanged lowered using pulley to a segregated area for wrapping and labelling

Fig.B7 : Layout Plan of Asbestos Abatement Work outside Incineration Plant Kitchen - ACM Duct Gasket & Flange	Scale : Not to scale Drawn by : AY Date of Review : Jan , 2008	Legend :



1. Wet ACM pipe with amended water
2. Lift out pipe sections using pulley block and tackle
3. Lower sections to floor of segregated area for wrapping and labelling

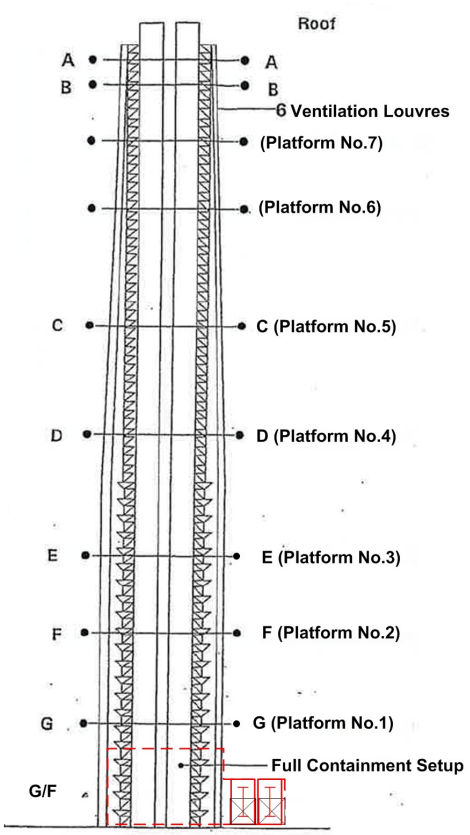


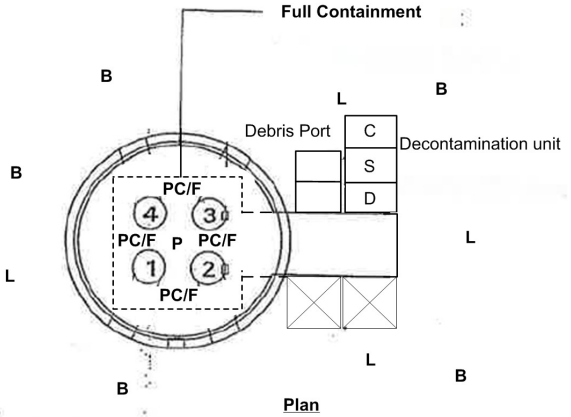
Plan

Fig.B8 : Layout Plan of Asbestos Abatement Work in Incineration Plant - Asbestos Cement Pipe

Scale : Not to scale
Drawn by : AY
Date of Review : February, 2008

Legend : Segregation Decontamination unit





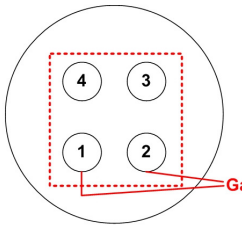
Air Test Locations:

B - Background
L - Leakage
P - Personal
PC/F - Penultimate/Final Clearance

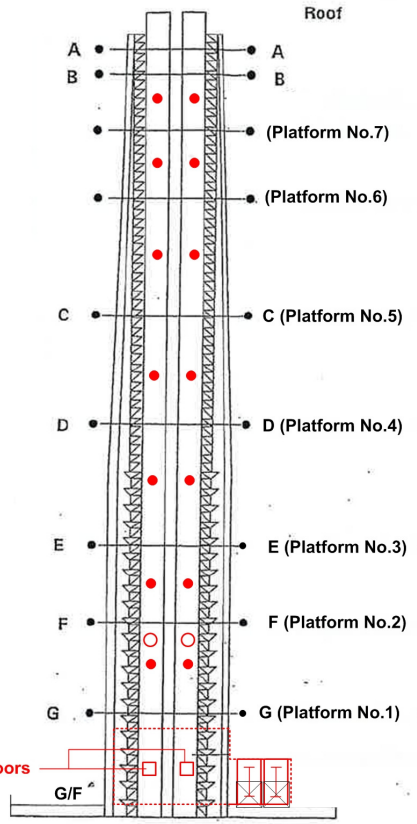
Fig.B9 : Layout Plan of Asbestos Abatement Work in Chimney - ACM Door Sealants at Base of Chimney

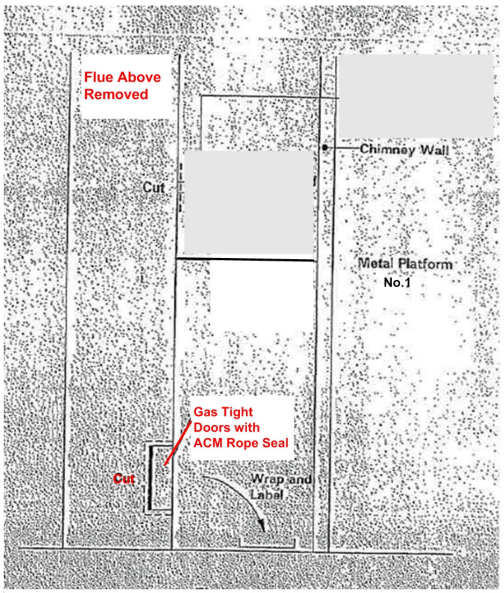
Scale : Not to scale
Drawn by : AY
Date of Review : September, 2008

Legend :
- I-slit opening of debris port / decontamination unit
- Debris port
- Containment
- D S C Decontamination unit
- Air mover (standby unit on top)



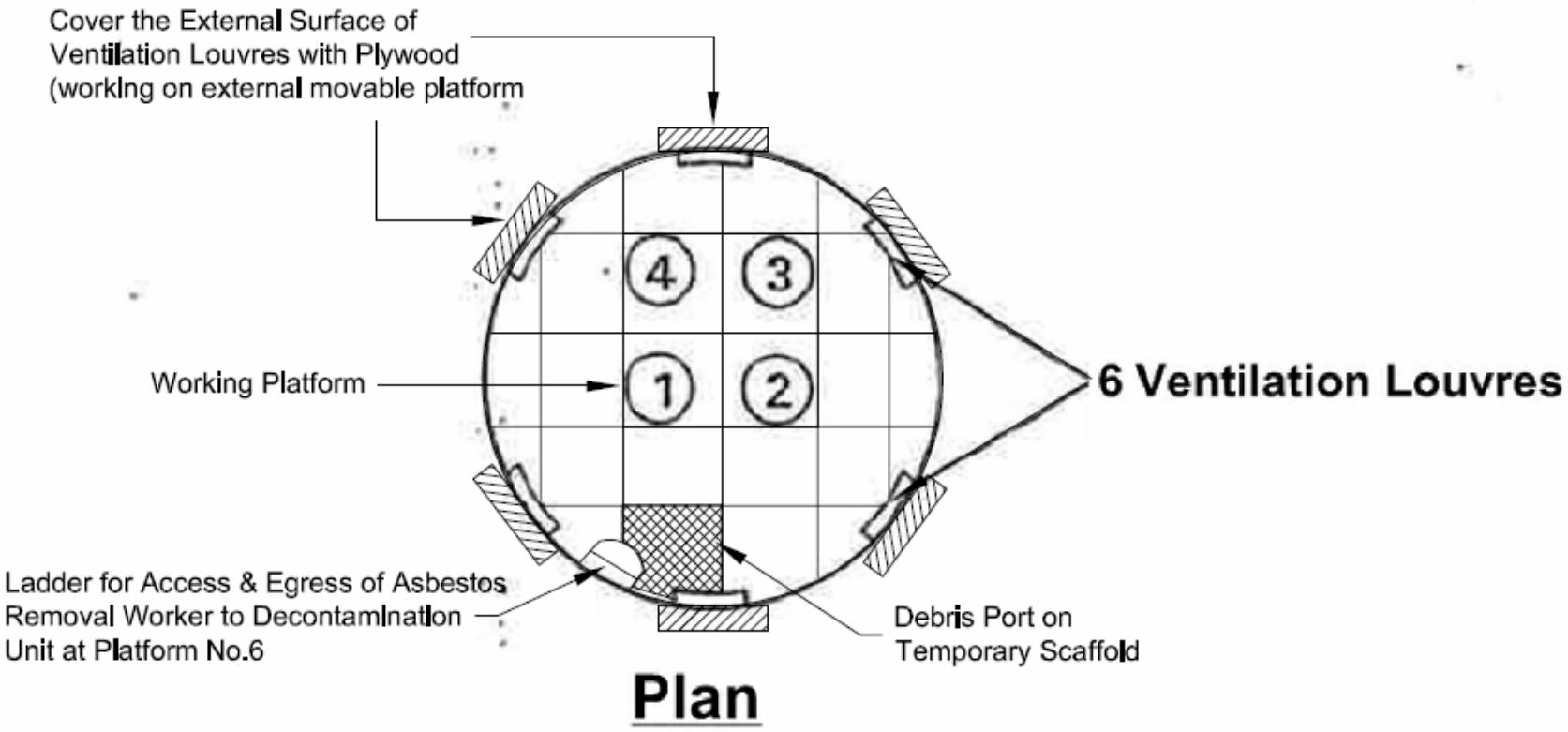
Section G-G to G/F





Elevation

Fig.B10 : Layout Plan of Asbestos Abatement Work in Chimney - Asbestos Gastight Door Sealant	Scale : Not to scale Drawn by : AY Date of Review : September, 2008	Legend : Gas tight door with ACM rope seal Air mover Decontamination unit / debris port Containment boundary



Plan

Figure: B11	ENVIRON
Title: Plan View For Removal of Ventilation Louvres of the Chimney of KCIP	Drawn by: JL
	Checked by: AY
Project: Contract No. CV/2007/06 - Kwai Chung Incineration Plant Demolition and Decontaminations Works	Rev.: 1.0
	Date: Sep 2008

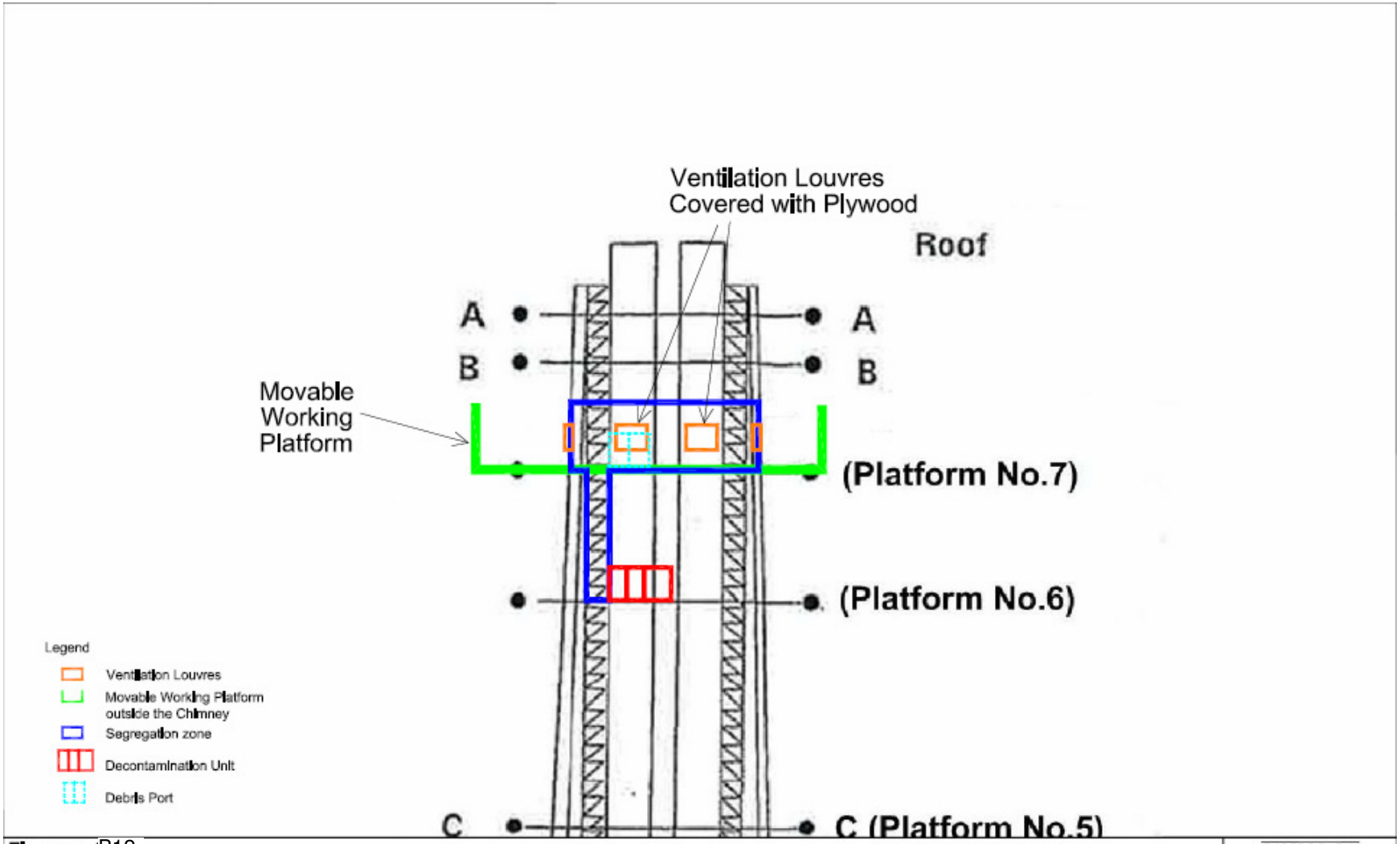


Figure:	B12	ENVIRON
Title:	Elevation View For Removal of Ventilation Louvres pf the Chimney Using Segregation Method between Platform 6 and Platform 7	Drawn by: SL Checked by: AY
Project:	Contract No. CV/2007/06 - Kwai Chung Incineration Plant Demolition and Decontaminations Works	Rev.: 1.0 Date: Sep 2008

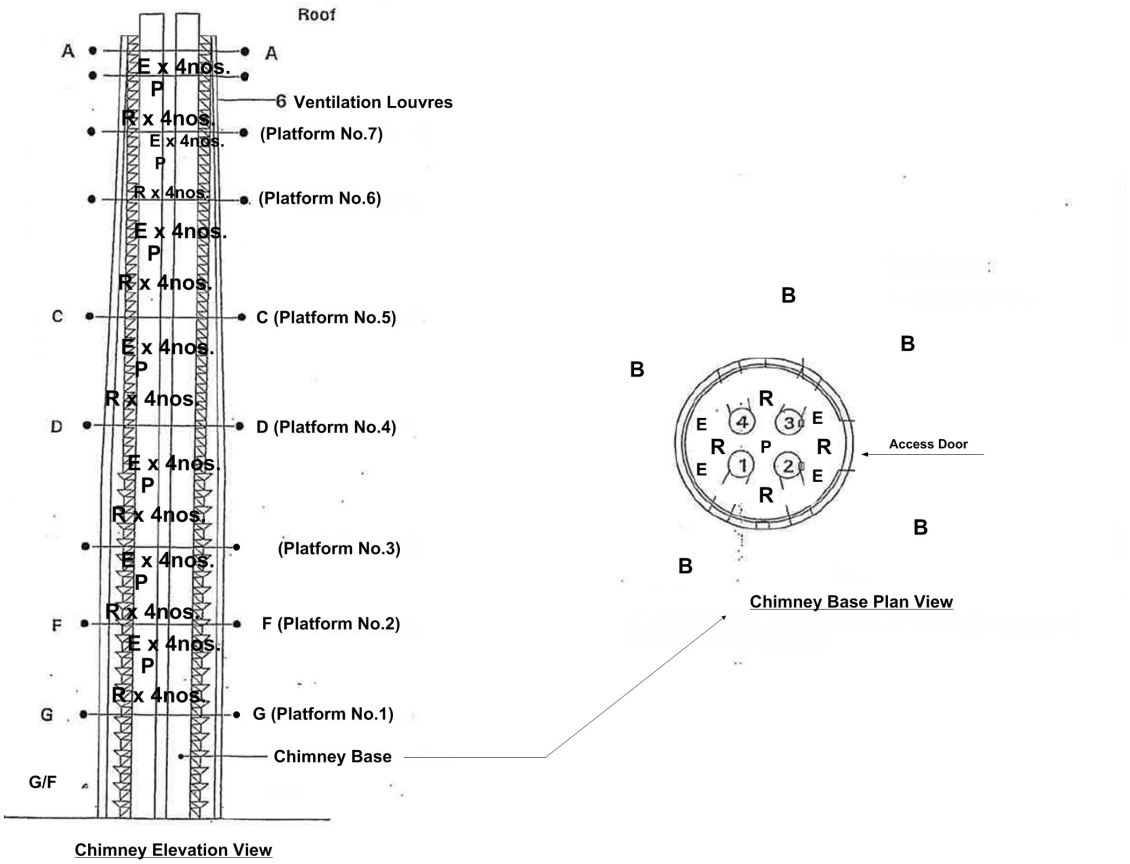


Fig.B13 Asbestos Abatement Work inside Chimney at KCIP - Air Monitoring Locations in Zone 7	Scale : Not to scale Drawn by : AY Date of Review : July, 2008	Legend : **B - Background Air Test (completed in Zone 6)** **E - Environmental Air Test** **P - Personal Air Test** **R - Reassurance Air Test**

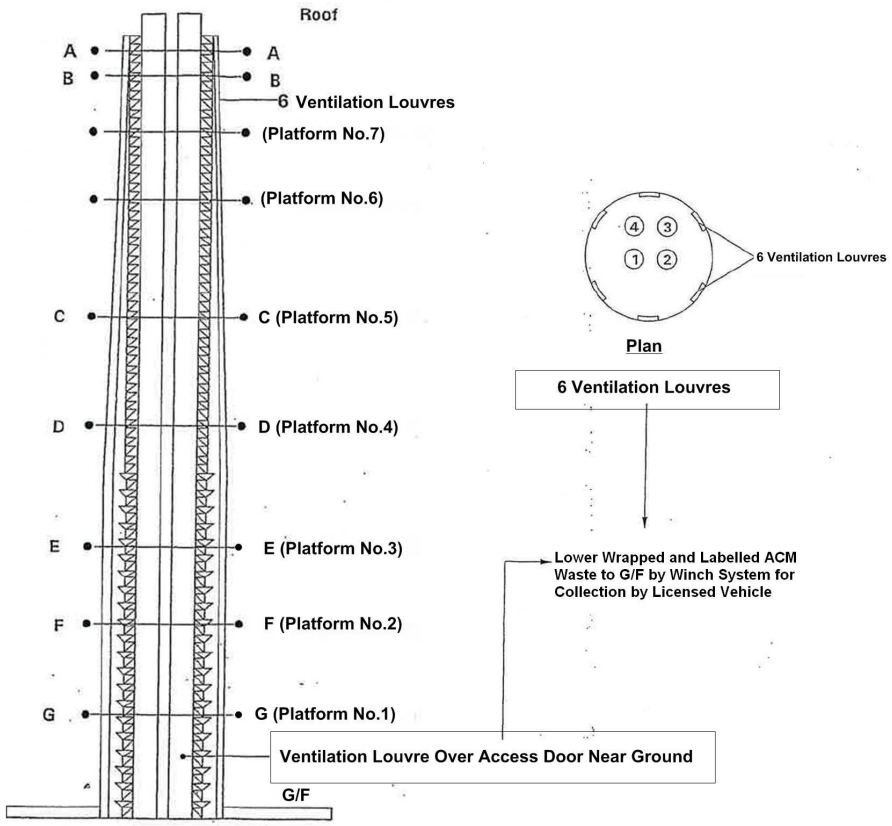
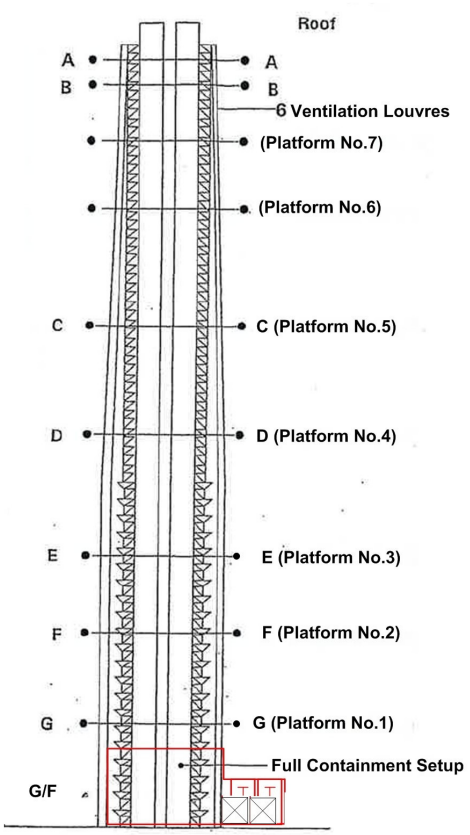
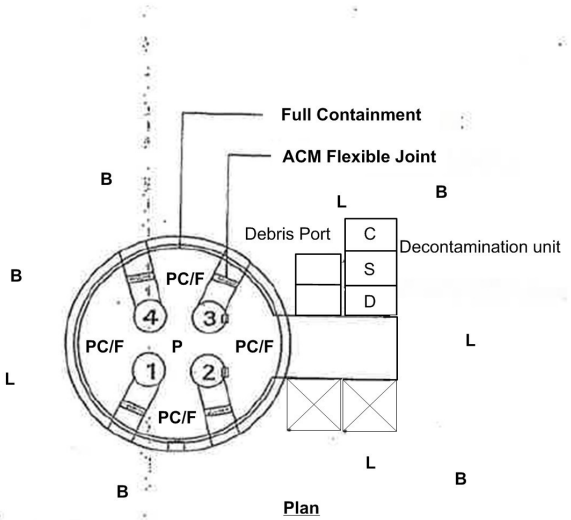


Fig.B14 : Layout Plan of Asbestos Abatement Work in Chimney - ACM Ventilation Louvres	Scale : Not to scale Drawn by : AY Date of Review : September, 2008	Legend :





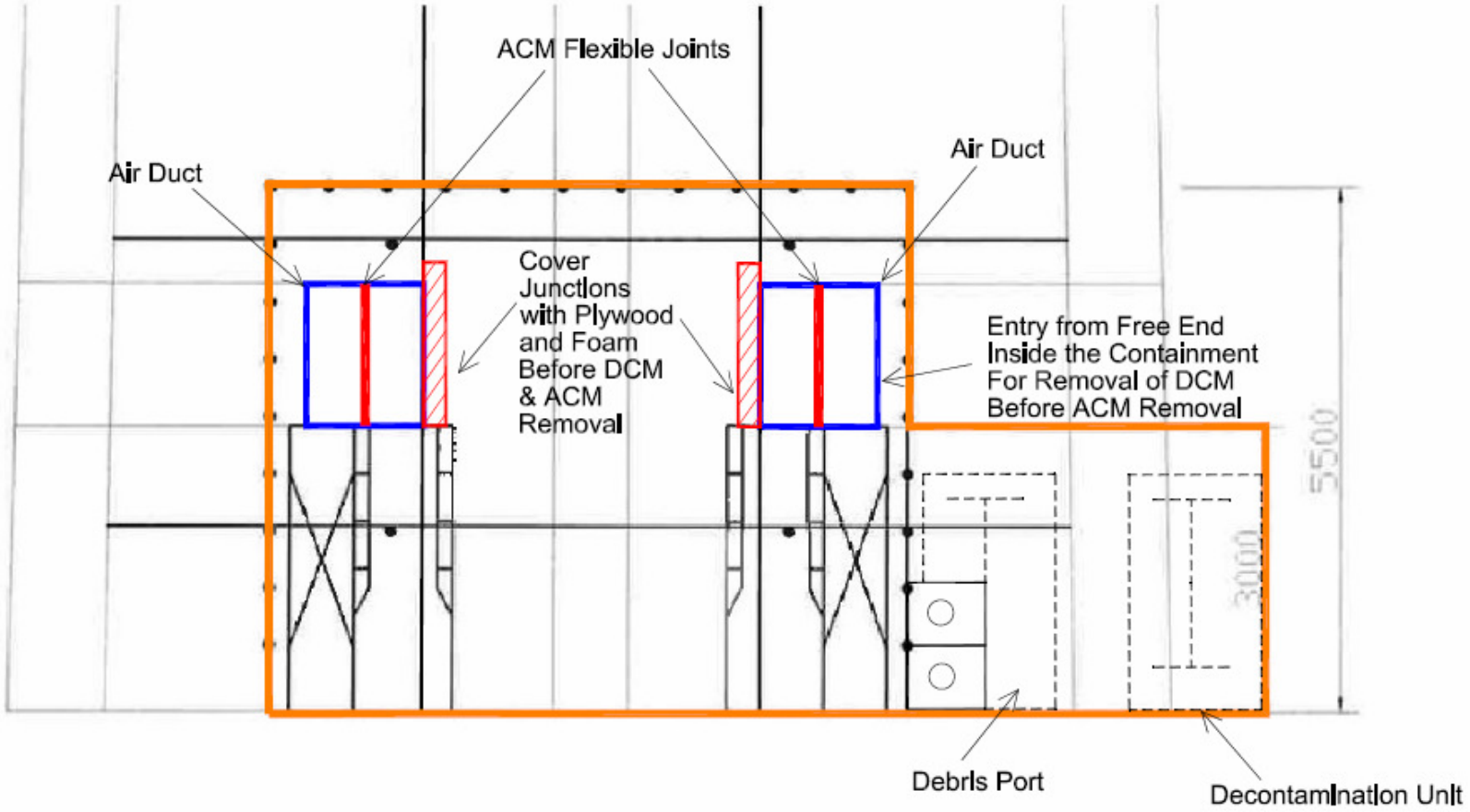
Air Test Locations:

B - Background
L - Leakage
P - Personal
PC/F - Penultimate/Final Clearance

Fig.B15 : Layout Plan of Asbestos Abatement Work in Chimney - ACM Flexible Joints at Base of Chimney

Scale : Not to scale
Drawn by : AY
Date of Review : August, 2008

Legend :
- I-slit opening of debris port / decontamination unit
- Debris port
- Containment
- D S C Decontamination unit
- Air mover (standby unit on top)



Section A-A

Figure: B16	ENVIRON
Title: Elevation View For Removal of Flexible Joints at KCIP Chimney Base Using Full Containment Method	Drawn by: SL Checked by: AY
Project: Contract No. CV/2007/06 - Kwai Chung Incineration Plant Demolition and Decontaminations Works	Rev.: 1.0 Date: Sep 2008

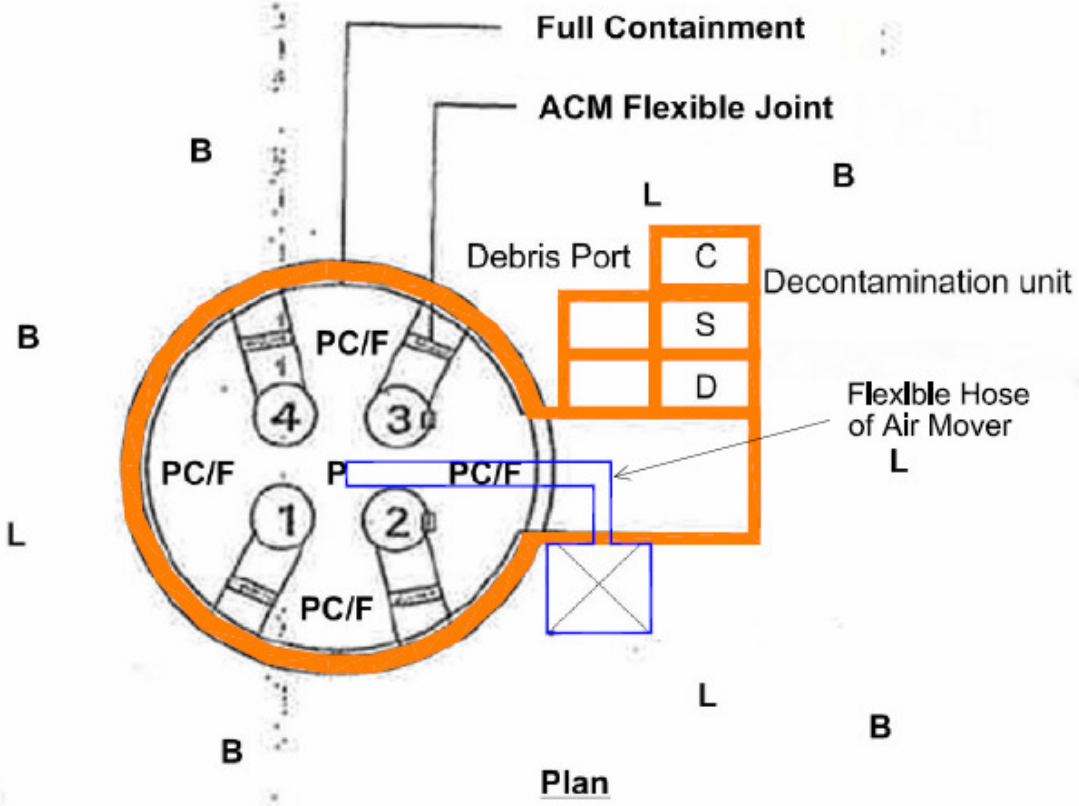


Figure: B17		ENVIRON
Title: Plan View For Removal of Flexible Joints at KCIP Chimney Base Using Full Containment Method		Drawn by: SL
		Checked by: AY
Project: Contract No. CV/2007/06 - Kwai Chung Incineration Plant Demolition and Decontaminations Works		Rev.: 1.0
		Date: Sep 2008

Supplementary Section C – Full Containment & Segregation Setup

C1 Removal of DCM/ACM in Full Containment Setup

Site Preparation

All loose materials and movable objects should be decontaminated and then taken away from the work area. The work area should be pre-cleaned systematically by HEPA vacuuming and wet-wiping. Preliminary decontamination as detailed in Supplementary Section D may be followed.

C1.1 Warning sign should be posted at the entrance of the work area to alert the public to the DCM or ACM removal work in progress to avoid unauthorized entry.

C1.2 Before the commencement of the DCM or ACM abatement work, any water and gas supplies to the work area should be isolated from the mains. Any openings in the work area such as ceiling/wall/floor voids, floor drains and power points in the vicinity should be sealed off with duct tape or 4 layers of polythene sheet securely taped in place. The registered asbestos contractor should find out all such openings and seal them up with 4 layers of polythene sheeting in advance.

C1.3 For objects that will remain in the work area, they should be decontaminated and enclosed with a minimum of 4 layers of polythene sheet sealed to protect from re-contamination.

C1.4 All used cloths should be removed and packed for disposal as asbestos waste.

C1.5 Baseline/impact air monitoring for DCM should be carried out accordingly. Background air samples for presence of ACM should also be taken prior to commencement of any asbestos abatement activities.

Construction of Containment

The containment should be of a manageable size without exceeding 2800m^3 in total volume. The containment boundary is individually shown on layout plans in Supplementary Section B.

C1.6 All workers should wear approved half-face respirators of minimum nominal protection factor 10, equipped with HEPA replaceable cartridge type filters, and full-body protective clothing with hood (a safety helmet with headlight if required), safety goggles and shoe covers. If necessary, additional battery powered lights should be placed inside the work zone so that sufficient lighting are provided.

C1.7 Partitions should be constructed of 37 mm x 63 mm minimum wood strut framing or equivalent material of sufficient strength (maximum spacing 400 mm centre-to-centre) to support plastic barrier sheeting on all openings larger than 2.9 sq.m. except where one dimension is 0.3 m or less or where openings are for emergency exit. As a general rule, each expanse of plastic sheeting should not exceed 2.9 sq.m. without adequate continuous support.

C1.8 The partition should be caulked/sealed at the floor, ceiling, walls, joints and fixtures to form an airtight seal.

C1.9 Individual polythene sheeting should be fixed to the timber frame by running a length of duct tape on the sheeting along a line of support provided by the frame then stapling through the duct tape and applying another length of tape on top to strengthen the grip. Timber battens (say, 25 mm x 50 mm) or equivalent material may be used instead but they need to be dyed red for easy identification later on as contaminated items.

C1.10 All floor, ceiling and wall surfaces inside the containment should be masked and sealed with double polythene sheeting. Each layer of plastic sheeting should be applied separately and the minimum number required is given respectively below: -

- 4 individual layers to solid wall
- 4 individual layers to solid floor
- 6 individual layers to temporary partition wall
- 8 individual layers to temporary platform

C1.11 If containment is built onto any window, wood battens should be put on the window framework and plywood of at least 6mm thickness should be applied to the battens. In secure interior areas where partitions are not subject to access from the public, an additional layer of polythene sheeting (i.e. giving a total of 3 layers) may be substituted for solid construction material.

C1.12 The plastic layer on the floor should extend at least 300 mm up all wall surfaces to form a continuous skirting while plastic sheeting on the walls should overlap this floor skirting by a minimum of 300 mm. Floor sheeting should be applied first, followed by wall sheeting, and then alternatively until the required number of layers is met. Joints throughout should be lapped for at least 150 mm and securely sealed with moisture resistant duct tape.

C1.13 Clear viewing panels (300mm x 450mm with the lower edge no more than 1.2 m above floor level) should be provided in the barrier walls of the containment at strategic locations so as to facilitate observation of the abatement work from the outside. The panel should comprise one 2 mm thickness clear acrylic sheet per layer of polythene sheeting, have at least 50 mm overlap with the polythene sheeting at the edges, and be securely fixed with 50 mm wide duct tape.

C1.14 A 3-chamber decontamination unit should be constructed to isolate the work area and permit safe access and egress of authorised working personnel. Connect temporary water supply for use in decontamination unit. Post warning signs in both English and Chinese at all access points and doorways to the work area. Supplementary Section D for the construction and use of decontamination facilities may also be referred to.

C1.15 The location and arrangement of each full containment, decontamination unit, etc as illustrated in Supplementary Section B should be re-confirmed by the appointed Registered Asbestos Contractor ("the Contractor") and Registered Asbestos Consultant ("the Consultant"). Any modifications deemed necessary should be submitted to the Environmental Protection Department (EPD) before commencement of asbestos abatement work.

C1.16 HEPA-filter equipped air movers should be used to exhaust the enclosed work area (i.e. each containment) having a volume, say V m^3. Openings made in the containment to accommodate the air movers must be made airtight. As a minimum of six air changes per hour is required, the number of air mover units of 1200m^3/hr flow capacity required is calculated as follows:

$$\text{No. of air movers required} = \frac{\text{6 air changes/hr x Containment Volume V } (m^3)}{\text{Design Flow Capacity of Air Mover } (m^3/hr)}$$

C1.17 The air filtration system should maintain a static negative air pressure of -0.05" to -0.15" (or -1.5mm to -4 mm) water gauge inside the containment across all faces. An additional air mover should also be installed to function as a standby in case any other unit breaks down. The flow capacity of the standby unit should match that of the largest unit in use.

C1.18 If there is physical constraint hindering proper ventilation in the work area, the exhausted air should be diverted to the ambient environment by using an extended flexible hose securely attached to the air mover exhaust.

Smoke Test and Negative Pressure Monitoring

A portable, purpose-built smoke generator should be used to test for air-tightness of the containment prior to the actual asbestos removal work.

C1.19 The entire volume of the containment, including various chambers of the decontamination unit, should be filled with sufficient amount of smoke to reduce the visibility inside to no more than 2 metres. The smoke generator should be switched off and a thorough check for smoke leakage can proceed from outside the containment. Any leaks spotted should be immediately rectified.

C1.20 When integrity of the containment is satisfactorily concluded, the air mover (other than the one on standby which should be tested separately) should be switched on and timed to find out how long it would take to clear 90% of the smoke for 6 air changes per hour. The acceptable time limit should be within 30 minutes. Meanwhile, filtration efficiency of the air movers should be checked qualitatively by looking for traces of white fume at their exhaust.

C1.21 The Consultant should confirm in writing the integrity and air-tightness of the containment after checking.

C1.22 In general, the full containment and the decontamination unit(s) should be thoroughly checked for leaks by the supervisor on site with the aid of smoke tubes for at least twice per shift.

C1.23 A negative pressure monitoring equipment with an audible alarm should be installed at the location of containment with the lowest pressure differential to monitor the static negative pressure inside the containment. The monitoring equipment should also produce hard copy time record of pressure differential on a continuous basis and the records (in the form of chart recording) should be kept on site for inspection by the Consultant.

Abatement Method

C1.24 Inside the containment, all workers should wear approved full-face powered air-purifying respirators of minimum nominal protection factor 100, equipped with HEPA filters, as well as full-body protective clothing with hood and shoe covers. If necessary, additional battery powered lights should be placed inside the work zone to maintain sufficient lighting.

C1.25 While DCM is being removed, impact air monitoring should be conducted as scheduled to cover the entire dioxin removal process to detect for any ambient dioxin concentration. Leakage air samples outside the containment should also be collected daily during the asbestos removal work to check for any escape of fibres from the enclosed work area. If air samples indicate fibre counts greater than original background levels or greater than 0.01 fibre/ml, whichever is larger, work should stop immediately for inspection and remedy.

C1.26 One personal air sample for every 4 workers on each shift should be taken to monitor fibre exposure level throughout the asbestos removal process inside each containment.

C1.27 Hand tools (e.g. hammer, chisel, hand-drill and pliers) should only be used to carefully scrabble ash material with continuous HEPA-vacuuming or they are used to break up and cut the material surrounding the ACM. The ACM incorporated material should be made wet by spraying wetting agent such as polyvinyl acetate (PVA) or amended water before and during cutting. Any particle release during the removal process should then be kept to minimum by spraying the wetting agent and HEPA vacuum cleaner should be used to remove debris as it is created.

C1.28 All wastewater should pass through a filter of an approved type, for removal of particles down to 5 micron in suspension, before being discharged into the drainage system.

C1.29 Debris should be collected into waste bags and duct tape sealed as soon as it is generated. The workplace atmosphere should be mist-sprayed continuously along with stripping and wire-brushing.

C1.30 Asbestos waste properly wrapped and sealed should be transported out through the decontamination unit.

C1.31 When the DCM or ACM has been removed, all stripped metal surfaces should be wire-brushed carefully to remove all residues. The remaining parts could be cut into sections of manageable size using a handsaw, triple-wrapped and then disposed of as chemical waste. Workplace atmosphere should be kept moist by mist-spraying all over.

Final Cleaning

C1.32 Upon completion of wire-brushing of surfaces previously covered with ash or asbestos, final clean-up of work area can start. HEPA vacuuming followed by wet-wiping should be performed on all surfaces from top to bottom and in a direction from the decontamination unit towards the air movers. Wet-wiping materials such as rags, mops and sponges must be discarded after single use to avoid re-contamination.

C1.33 All exposed plastic surfaces inside the containment including the decontamination unit(s) should be sprayed with PVA solution, allowed to dry, peeled off (only the innermost layer) and placed in approved plastic bags for disposal as asbestos waste.

C1.34 The 'new' plastic surfaces, i.e. the second innermost plastic layer, should be HEPA vacuumed and wet-wiped to remove any visible debris. The work area should then be ready for penultimate air tests (evenly distributed inside the abatement area) to check on the effectiveness of cleaning.

C1.35 If the air test result is below 0.01 fibre/ml, a thorough visual inspection should be made by the Consultant to certify in writing that all visible asbestos has been removed to a satisfactory standard with no visible debris or dust present; otherwise the containment should be re-cleaned and penultimate air samples should be retaken. This procedure should be repeated until the penultimate test results are satisfactory.

C1.36 Upon written approval by the Asbestos Specialist, all surfaces stripped of DCM or ACM should be sealed with PVA or other suitable sealing materials. The second layer of plastic sheeting should be PVA sprayed and removed for disposal as asbestos waste. Peripheral barrier sheeting including the decontamination unit(s) should remain in place so that the work area is still segregated from the ambient environment.

C1.37 The area should be vacated for 12 hours to allow fibres to settle and then all objects and surfaces in the work area should be HEPA vacuumed and wet-cleaned systematically from top to bottom and in a general direction from the decontamination unit(s) towards the air movers.

C1.38 Final clearance air tests evenly distributed inside the abatement area should be performed to confirm an air quality of no more than 0.01 fibre/ml is attained or else the work area should be re-cleaned and further clearance air tests should be carried out.

C1.39 Upon satisfactory air test results, all remaining plastic sheeting, decontamination facility, air movers, etc. may be dismantled. All used plastic sheeting, etc. should be disposed of as contaminated waste.

C1.40 All used clothes, gloves and polythene sheeting should be treated as contaminated waste and should be disposed of along with the DCM or ACM removed. All such waste materials generated are to be treated as the highest category of chemical waste for DCM or Type 3 asbestos waste.

C1.41 All tools and equipment that have been used inside containment including air movers, vacuum cleaners, ladders, sprayers, hard hats, goggles etc. must be properly decontaminated by HEPA vacuuming and wet-wiping before being taken out of containment.

C1.42 The work area should be thoroughly cleaned with a HEPA vacuum cleaner. The Asbestos Specialist will carry out a reassurance visual inspection in writing for reoccupation after successful final clearance test and removal of all remaining polythene sheeting, air mover, air locks and disposal of asbestos waste to certify the absence of any visible ash or asbestos debris and proper decontamination of hand tools and transit of packed chemical/asbestos waste to a temporary buffer store as shown in Supplementary Section A.

Work Completion

C1.43 If requested, the final completion certificate or report, along with air monitoring results and copies of waste disposal trip tickets, should be submitted to EPD by the supervising consultant within 14 days after completion of the asbestos abatement work.

If during the course of asbestos abatement work an accident or adverse weather is encountered, the emergency procedures as described in Supplementary Section E should be followed.

C2 Removal of ACM in Segregation Setup

A segregation work zone should be constructed for protection to remove the low-risk and asbestos-containing materials present. Details of the procedures applicable to removal of asbestos-containing flue guide plates on chimney flues, sampling port gaskets, door rope seal and ventilation louvres are as follows:

C2.1 All workers should wear approved half-face respirators of minimum nominal protection factor 10, equipped with HEPA replaceable cartridge type filters; and full-body protective clothing with hood, goggles and shoe covers.

C2.2 A 3-chamber decontamination unit should be constructed to isolate the work area and permit safe access and egress of authorized working personnel for the segregated area. Refer to Supplementary Section D for the construction and use of decontamination facilities.

C2.3 Before the start of the asbestos removal work, a continuous nylon or tarpaulin dust barrier sealed to the floor and high enough (approximately two metres high) to fully cover the ACM should be constructed around the segregated work area and preliminary decontamination of the work area should be carried out as detailed in Supplementary Section D. In close proximity to the ACM, double-layer plastic sheeting should also be laid to form continuous floor skirting of 300mm up from the ground.

C2.4 Cloths used for wet cleaning, gloves and polythene sheets used in the following procedures should be treated as asbestos waste and disposed of with the ACM.

C2.5 After preliminary decontamination has been completed, background air samples should be taken in the work area.

C2.6 Personal air samples at daily intervals should be taken to monitor the fibre level to which workers are exposed throughout the asbestos removal process.

C2.7 Environmental air samples at daily intervals should be taken in the nearest neighbourhood from the work area to monitor the fibre level during the asbestos removal process.

C2.8 The asbestos arc cloth inside fuse box should be removed intact using a hand tool and then placed in a white asbestos waste plastic bag. Similarly, other ACM items are to be removed by scrapping or cutting with hand tools with continuously PVA spraying and wrapped with properly labelled plastic sheets or bags.

C2.9 All ACM removed should then be placed into transparent outer plastic bags, put in containers, vacuum packed and sealed.

C2.10 After completion of the removed work, surfaces which have been in contact with the ACM should be wire-brushed and wiped to remove all visible residues.

C2.11 HEPA-vacuuming followed by wet-wiping should be performed on all contact surfaces.

C2.12 A thorough visual inspection should then be performed by the Contractor to ensure that any debris regarded as contaminated items, dust, chips, untreated effluents, etc. have been cleared from the work area.

C2.13 Reassurance air samples should be taken to monitor the cleanliness of the site after clearance. Air test results showing fibre concentration in excess of 0.01 fibre/mL will not be accepted and the work area should be re-cleaned until airborne fibre level below the regulatory limit is attained.

C2.14 When satisfactory air test result is obtained, all exposed plastic surfaces inside the work area should be sprayed with a PVA solution, allowed to dry, peeled off and disposed of as contaminated waste.

C2.15 The site should be declared clean for the conduct of any other demolition work after a satisfactory visual inspection by the Consultant.

If during the course of asbestos abatement work an accident or adverse weather is encountered, the emergency procedures as described in Supplementary Section E should be followed.

Supplementary Section D – Construction of Decontamination Facilities & Preliminary Decontamination

CONSTRUCTION REQUIREMENTS AND USE OF DECONTAMINATION FACILITIES

A 3-chamber airlock decontamination hygiene unit with water supply, waste water filters and HEPA vacuum unit should be constructed at the entrance of each work area. Workers who have entered contaminated areas must carry out thorough decontamination every time they leave the site. Detailed construction requirements and use of decontamination facilities as outlined below should be followed.

D1 Construction of Decontamination Unit

D1.1 The decontamination unit should consist of three sealable compartments namely the dirty room, the shower room and the clean room. Each compartment should have a minimum size of 2m (height) x 1m (width) x 1m (length). The size of the shower room should be 1m square and 2m headroom for every shower head provided. Appropriate warning notices should be posted conspicuously at eye level at the clean entrance of the decontamination unit.

D1.2 The unit can either be of a prefabricated design (thoroughly cleaned and decontaminated before re-use) or it can be constructed on site with 3 individual layers of plastic sheeting with sealed taped joints supported on suitable framing.

D1.3 Each compartment is separated by a curtained doorway consisting of a polythene sheet with an I-shaped slit opening covered by a plastic flap which hangs and lifts in the direction of access. The plastic flap should have an overlap of at least 100mm on each side of the slit opening and weighted at the bottom to maintain a good seal.

D1.4 The shower room should be constructed and tested against water leakage and fitted with a tray of adequate size to collect waste water. Water adjustable at the shower should be provided at a minimum of one shower per 6 workers calculated on the basis of the largest shift. All waste water should be taken by a sump pump through pipework/hosing to an aquarium type filter unit to remove suspended particles (down to 5 microns) before being discharged either to the soil drainage system or drummed and then properly disposed of. The sump pump should be switched on while the facility is in use to prevent overflow of waste water. The electrical fittings, etc. must also be installed and protected to eliminate any chance of electrocution.

D1.5 The shower room should be wet-cleaned and HEPA-vacuumed after each shift change and meal break.

D2 Use of Decontamination Facilities

Procedures for Using the 3-chamber Decontamination Unit

Preparing for work

IN THE CLEAN ROOM, WORKER:

1. Removes clothing, places in locker
2. Puts on nylon swim suit (optional) or disposable underpants
3. Puts on clean coveralls
4. Puts on separate disposable foot coverings if necessary
5. Applies tape around ankles, wrists, etc.
6. Inspects respirator, puts it on, checks if close-fitting
7. Puts on hood over respirator headstraps
8. Proceeds to Equipment Room

IN THE EQUIPMENT ROOM, WORKER:

9. Puts on any additional clothing - deck shoes, hard hat, etc.
10. Collects necessary tools and proceeds to Work Area

Exiting

IN INDIVIDUAL WORK AREA, WORKER:

11. Cleans tools and equipment by HEPA vacuum cleaner and wet-wiping
12. HEPA-vacuums or wet-wipes protective clothing
13. Leaves the work area and enter the Equipment Room of the decontamination unit for further cleaning and disinfection

IN THE EQUIPMENT ROOM, WORKER:

14. Removes all protective clothing except respirator
15. Wipe-cleans the hands and the respirator externally
16. Disposes of used wet cloths and contaminated coveralls into the labelled asbestos waste bags
17. Stores used tools and any other cleaned articles
18. Proceeds to Shower Room

D2 Use of Decontamination Facilities (cont'd)

IN THE SHOWER ROOM, WORKER:

19. Washes respirator and soaks filters (without removing)
20. Removes respirator, discards used air filters and washes the face piece with soap and water
21. Washes swim suit if applicable, or places disposable underpants and used air filters in the bag or bin placed inside the Equipment Room
22. Thoroughly washes body and hair
23. Proceeds to Clean Room

IN THE CLEAN ROOM, WORKER:

24. Dries off, dresses in clean coveralls or street clothes
25. Cleans and dries respirator, replaces filters (if applicable)
26. Leave the Clean Room

PRELIMINARY DECONTAMINATION

After the completion of the decontamination facilities, the segregated areas should be pre-cleaned systematically by HEPA-vacuuming and wet-wiping methods. Procedures of preliminary decontamination as outlined below should be followed.

D3.1 Workers should wear half-face respirators and protective clothing.

D3.2 All openings of the segregated areas such as windows, corridors, doors, grilles, floor drains and power points should be individually sealed off with 2 layers of polythene sheet securely taped in place. HVAC ducting or other system components that pass through the work area should also be enclosed with 2 layers of polythene sheet.

D3.3 If the asbestos-containing materials have been damaged or in poor condition, the whole unit might have been contaminated with released asbestos fibres.

D3.4 Immediate repair to these damaged asbestos-containing materials to curb further deterioration should be carried out, but care must be taken not to disturb any of the other part of the asbestos-containing materials unnecessarily.

D3.5 Movable objects within the areas should be decontaminated before being removed.

D3.6 Those objects which would remain should be decontaminated and enclosed with a minimum of 2 layers of polythene sheeting sealed to protect from re-contamination.

D3.7 Large asbestos debris should be collected and removed by hands. The work areas will be pre-cleaned by HEPA vacuuming and wet-wiping methods.

D3.8 All used filters as well as contaminated cloths, etc. should be removed and packed for disposal as asbestos waste.

D3.9 The segregated areas should be vacated for 12 hours to allow fibres to settle. All objects and surfaces in the area should be HEPA vacuumed and wet cleaned for a second time.

D3.10 A visual inspection should be carried out by the Consultant who should verify that preliminary decontamination has been satisfactorily completed and the area deemed temporarily uncontaminated. The acceptance criterion should be free of visible debris and dust.

D3.11 Background air sampling may therefore be conducted.

Supplementary Section E – Emergency Procedures

EMERGENCY PROCEDURES

E1: Procedures in the Case of a Fire Outbreak

If during the course of asbestos abatement work, a fire breaks out, the Contractor should immediately:

1. Stop all work.

2. Leave the work area and follow normal decontamination procedures. For life-threatening situations, however, decontamination should take a lower priority. The operatives evacuated from the containment should avoid contact with other parties to prevent spread of asbestos fibres unless proper decontamination has been performed.

3. Switch off power fuel supply to machinery and plant.

4. Seal up the decontamination unit with adhesive tape.

5. Leave the premises as quickly as possible.

6. Urge and assist other workers on the premises to leave if necessary.

7. Supervisor should take roll calls for the workers.

<u>After Fire</u>

8. Spray all surfaces and debris with amended water in a fine mist spray, using airless spray equipment, when the site is safe for re-entry.

9. Place all loose asbestos materials/debris into suitably labelled containers.

10. Wipe clean the surfaces and thoroughly clean the contaminated area with a HEPA vacuum cleaner once the surfaces become dry.

11. The works are allowed to proceed only after a satisfactory visual inspection by the Consultant.

E2: Procedures in the Case of an Accident

If during the course of asbestos abatement work, a worker collapses or some other accident occurs, the Contractor should immediately:

1. Stop all work and if necessary remove worker or workers to safety.

2. Assist the victim(s) to follow normal decontamination procedures before exiting the work area. For life-threatening situations, however, decontamination should take a lower priority and every effort should be made to ensure the victim(s) receives immediate medical treatment.

3. Carry out normal Emergency First Aid procedures. Dial 999, and arrange for the victim(s) to be taken to a Hospital, if necessary.

4. Clean thoroughly any area contaminated during the emergency by wet-wiping and HEPA vacuuming at the earliest opportunity and ask the Consultant to verify before works are allowed to continue.

E3: Procedures in the Case of a Rainstorm or Typhoon

If during the course of asbestos abatement work, a rainstorm warning signal or Typhoon Signal Number Three or above is issued, the Contractor should immediately:

1. Stop all processes which would result in producing more asbestos debris.

2. Place all loose asbestos materials/debris into suitably labelled containers and remove to the secure storage area.

3. Clean the contaminated area thoroughly with a HEPA vacuum cleaner. Cut off all power and water supplies and secure all loose equipment and materials against rain-storm or typhoon damage.

4. Move all bags of asbestos waste to a secure storage area.

5. Prepare the site for visual inspection by the Contractor, who shall verify that the above measures have been carried out, before workers are allowed to leave the site.

6. Recommence the abatement work only after the rainstorm signal has been cancelled, or after Typhoon Signal Number Three has been lowered in the case of a typhoon, and the Consultant has verified that any necessary cleaning up work and repairs to the setup have been completed.

E4: Procedures in the Case of Exceeding the Environmental Limits

If during the course of asbestos abatement work environmental air samples collected at the periphery of the site during abatement indicate fibre counts greater than 0.01 fibre/ml, the Contractor should immediately:

1. Stop all work immediately for inspection and remedy.

2. Inform the Consultant of the exceedances immediately.

3. Clean up all surfaces outside within 6 m from the working area by HEPA vacuuming and wet-wiping methods.

4. Carry out air monitoring and the test results should be reviewed by the Consultant.

5. Recommence the abatement works when the Consultant is satisfied with the results of air monitoring test and visual inspection.

E5: Procedures in the Case of a HEPA Air Mover Breakdown

If during the course of asbestos abatement work the HEPA air mover breaks down, the Contractor should immediately:

1. Stop the work.

2. Evacuate all work personnel and follow normal decontamination procedures.

3. Seal the exhaust outlet of air mover with plastic sheeting, and the decontamination unit and the debris port with adhesive tape to prevent asbestos fibre released from the containment.

4. Monitor all adjacent areas for increases in the airborne fibre level.

5. Switch on the standby air mover.

6. Check to ensure that a static negative pressure of 1.5 to 4mm (approx. 0.05 to 0.15 inch) water gauge is maintained inside the containment across all faces.

7. Recommence the abatement works.

E6: Procedures in the Case of Flooding

If during the course of asbestos abatement work the work area is flooded, the Contractor should immediately:

1. Stop the work.

2. Evacuate all work personnel and follow normal decontamination procedures.

3. Shut off the leaking pipe.

4. Use the sump pump to drain the work area.

5. The Contractor should check the condition of the segregated area and repair any damaged area.

6. Recommence the abatement works after the above measures have been carried out.

Appendix E

Memo from Mines Division of CEDD for the Use of TKO Area 137 Pier

MEMO

RECEIVED ON 13 FEB 2008 Fill Management Division

From	CGE/Mines	*To*	CGE/FM
Ref.	( ) in MQ 2B/8/1	*(Attn.:*	Mr. KH IP
Tel. No.	2716 8690	*Your Ref.*	00YU M-01 *in* PM CN/CV/2007/06/M05/300 Pt2
Fax No.	2714 0193	*dated*	*Fax. No.* 2714 0113
Date	13 February 2008	*Total pages*	1

Contract No. CV/2007/06
Kwai Chung Incineration Plant Demolition and Decontamination Works
Pier at Tseung Kwan O Area 137

I refer to your memo under reference.

2. Again, I have no objection to your request for using our pier at TKO Area 137 in handling ACM and DCM generated from the captioned contract for disposal of in SENT Landfill during the period from August 2008 to December 2008. Please be reminded that you could only use the pier in the afternoon for we usually occupy the pier as an off-loading point for our explosives vessels in the morning during weekdays. Furthermore, it is possible for us to occupy the pier the whole day when there is air shipment for onward delivery to our Kau Shat Wan Explosives Depot.

3. To avoid clash with our explosives delivery operations, please contact our Explosives Officer/Delivery, Mr. Liu Chi-ming, at 2716 8630 at least two days before using our pier.

(Lui Tin-kwong)
for Chief Geotechnical Engineer/Mines

c.c. Explosives Offcier/Delivery
Mott Connell Ltd. (Attn.: Mr. KM Yeung fax: 2827 1823)
SE/P3

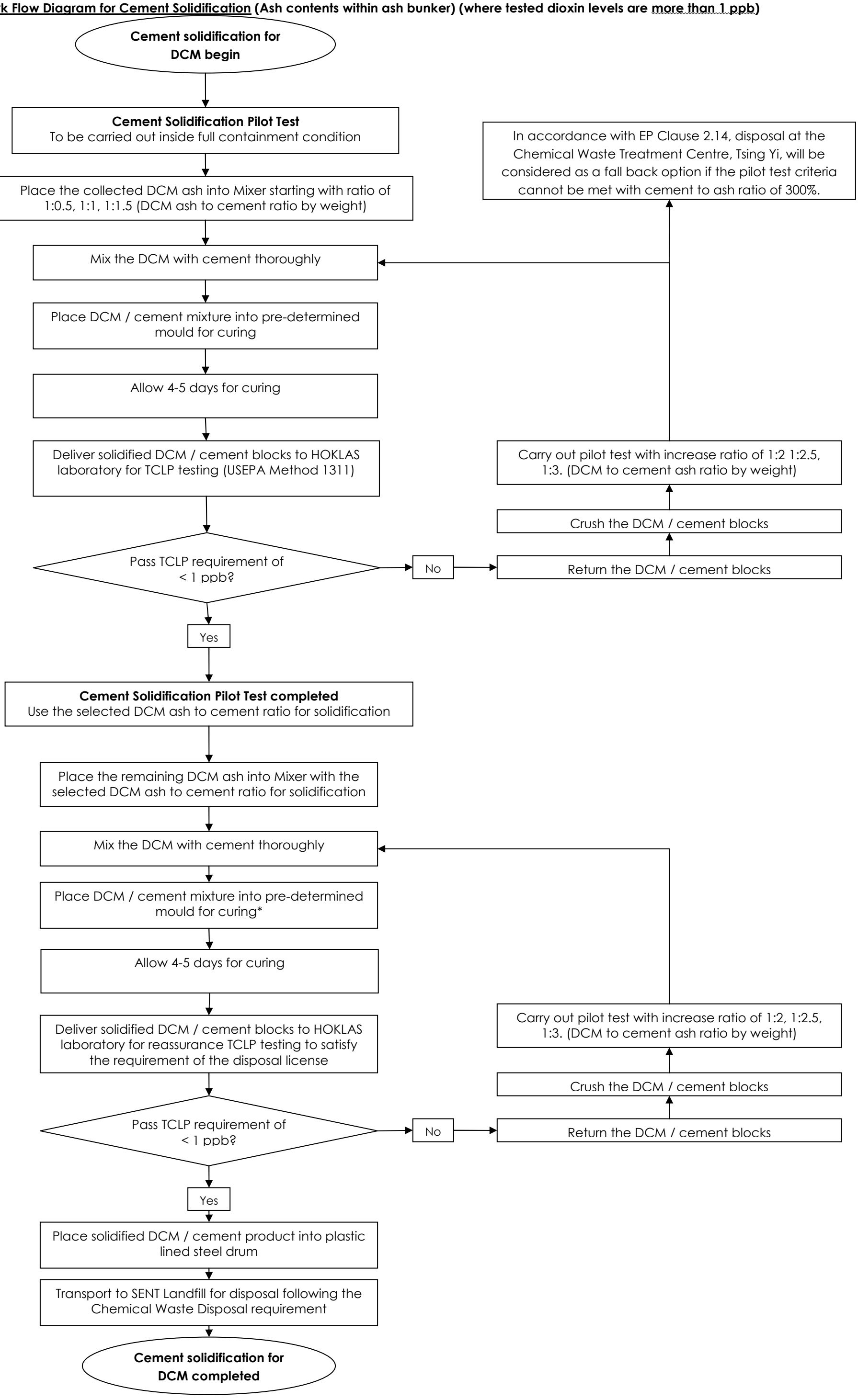
CAM Franks/LTK/kl

FM	CE	SE/P1	SE/P2	SE/P3	SE/P4	SE/P5	SE/IT	SE/S
Initial								
Date								
E/		GR		CIR				
PS II		FM	/	/	BU			

Appendix F

F1 – Flow Diagram of Cement Solidification
F2 – Methodology of TCLP Test
F3 – Pilot Test Result for DCM

Work Flow Diagram for Cement Solidification (Ash contents within ash bunker) (where tested dioxin levels are more than 1 ppb)



METHOD 1311

TOXICITY CHARACTERISTIC LEACHING PROCEDURE

1.0 SCOPE AND APPLICATION

1.1 The TCLP is designed to determine the mobility of both organic and inorganic analytes present in liquid, solid, and multiphasic wastes.

1.2 If a total analysis of the waste demonstrates that individual analytes are not present in the waste, or that they are present but at such low concentrations that the appropriate regulatory levels could not possibly be exceeded, the TCLP need not be run.

1.3 If an analysis of any one of the liquid fractions of the TCLP extract indicates that a regulated compound is present at such high concentrations that, even after accounting for dilution from the other fractions of the extract, the concentration would be above the regulatory level for that compound, then the waste is hazardous and it is not necessary to analyze the remaining fractions of the extract.

1.4 If an analysis of extract obtained using a bottle extractor shows that the concentration of any regulated volatile analyte exceeds the regulatory level for that compound, then the waste is hazardous and extraction using the ZHE is not necessary. However, extract from a bottle extractor cannot be used to demonstrate that the concentration of volatile compounds is below the regulatory level.

2.0 SUMMARY OF METHOD

2.1 For liquid wastes (i.e., those containing less than 0.5% dry solid material), the waste, after filtration through a 0.6 to 0.8 μm glass fiber filter, is defined as the TCLP extract.

2.2 For wastes containing greater than or equal to 0.5% solids, the liquid, if any, is separated from the solid phase and stored for later analysis; the particle size of the solid phase is reduced, if necessary. The solid phase is extracted with an amount of extraction fluid equal to 20 times the weight of the solid phase. The extraction fluid employed is a function of the alkalinity of the solid phase of the waste. A special extractor vessel is used when testing for volatile analytes (see Table 1 for a list of volatile compounds). Following extraction, the liquid extract is separated from the solid phase by filtration through a 0.6 to 0.8 μm glass fiber filter.

2.3 If compatible (i.e., multiple phases will not form on combination), the initial liquid phase of the waste is added to the liquid extract, and these are analyzed together. If incompatible, the liquids are analyzed separately and the results are mathematically combined to yield a volume-weighted average concentration.

3.0 INTERFERENCES

3.1 Potential interferences that may be encountered during analysis are discussed in the individual analytical methods.

4.0 APPARATUS AND MATERIALS

4.1 Agitation apparatus: The agitation apparatus must be capable of rotating the extraction vessel in an end-over-end fashion (see Figure 1) at 30 ± 2 rpm. Suitable devices known to EPA are identified in Table 2.

4.2 Extraction Vessels

4.2.1 Zero-Headspace Extraction Vessel (ZHE). This device is for use only when the waste is being tested for the mobility of volatile analytes (i.e., those listed in Table 1). The ZHE (depicted in Figure 2) allows for liquid/solid separation within the device, and effectively precludes headspace. This type of vessel allows for initial liquid/solid separation, extraction, and final extract filtration without opening the vessel (see Section 4.3.1). The vessels shall have an internal volume of 500-600 mL, and be equipped to accommodate a 90-110 mm filter. The devices contain VITON®[1] O-rings which should be replaced frequently. Suitable ZHE devices known to EPA are identified in Table 3.

For the ZHE to be acceptable for use, the piston within the ZHE should be able to be moved with approximately 15 psi or less. If it takes more pressure to move the piston, the O-rings in the device should be replaced. If this does not solve the problem, the ZHE is unacceptable for TCLP analyses and the manufacturer should be contacted.

The ZHE should be checked for leaks after every extraction. If the device contains a built-in pressure gauge, pressurize the device to 50 psi, allow it to stand unattended for 1 hour, and recheck the pressure. If the device does not have a built-in pressure gauge, pressurize the device to 50 psi, submerge it in water, and check for the presence of air bubbles escaping from any of the fittings. If pressure is lost, check all fittings and inspect and replace O-rings, if necessary. Retest the device. If leakage problems cannot be solved, the manufacturer should be contacted.

Some ZHEs use gas pressure to actuate the ZHE piston, while others use mechanical pressure (see Table 3). Whereas the volatiles procedure (see Section 7.3) refers to pounds per square inch (psi), for the mechanically actuated piston, the pressure applied is measured in torque-inch-pounds. Refer to the manufacturer's instructions as to the proper conversion.

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[1] VITON® is a trademark of Du Pont.

4.2.2 Bottle Extraction Vessel. When the waste is being evaluated using the nonvolatile extraction, a jar with sufficient capacity to hold the sample and the extraction fluid is needed. Headspace is allowed in this vessel.

The extraction bottles may be constructed from various materials, depending on the analytes to be analyzed and the nature of the waste (see Section 4.3.3). It is recommended that borosilicate glass bottles be used instead of other types of glass, especially when inorganics are of concern. Plastic bottles, other than polytetrafluoroethylene, shall not be used if organics are to be investigated. Bottles are available from a number of laboratory suppliers. When this type of extraction vessel is used, the filtration device discussed in Section 4.3.2 is used for initial liquid/solid separation and final extract filtration.

4.3 Filtration Devices: It is recommended that all filtrations be performed in a hood.

4.3.1 Zero-Headspace Extractor Vessel (ZHE): When the waste is evaluated for volatiles, the zero-headspace extraction vessel described in Section 4.2.1 is used for filtration. The device shall be capable of supporting and keeping in place the glass fiber filter and be able to withstand the pressure needed to accomplish separation (50 psi).

NOTE: When it is suspected that the glass fiber filter has been ruptured, an in-line glass fiber filter may be used to filter the material within the ZHE.

4.3.2 Filter Holder: When the waste is evaluated for other than volatile analytes, any filter holder capable of supporting a glass fiber filter and able to withstand the pressure needed to accomplish separation may be used. Suitable filter holders range from simple vacuum units to relatively complex systems capable of exerting pressures of up to 50 psi or more. The type of filter holder used depends on the properties of the material to be filtered (see Section 4.3.3). These devices shall have a minimum internal volume of 300 mL and be equipped to accommodate a minimum filter size of 47 mm (filter holders having an internal capacity of 1.5 L or greater, and equipped to accommodate a 142 mm diameter filter, are recommended). Vacuum filtration can only be used for wastes with low solids content (<10%) and for highly granular, liquid-containing wastes. All other types of wastes should be filtered using positive pressure filtration. Suitable filter holders known to EPA are shown in Table 4.

4.3.3 Materials of Construction: Extraction vessels and filtration devices shall be made of inert materials which will not leach or absorb waste components. Glass, polytetrafluoroethylene (PTFE), or type 316 stainless steel equipment may be used when evaluating the mobility of both organic and inorganic components. Devices made of high density polyethylene (HDPE), polypropylene (PP), or polyvinyl chloride (PVC) may be used only when evaluating the mobility of metals. Borosili-

cate glass bottles are recommended for use over other types of glass bottles, especially when inorganics are analytes of concern.

4.4 Filters: Filters shall be made of borosilicate glass fiber, shall contain no binder materials, and shall have an effective pore size of 0.6 to 0.8 µm, or equivalent. Filters known to EPA which meet these specifications are identified in Table 5. Pre-filters must not be used. When evaluating the mobility of metals, filters shall be acid-washed prior to use by rinsing with 1N nitric acid followed by three consecutive rinses with deionized distilled water (a minimum of 1 L per rinse is recommended). Glass fiber filters are fragile and should be handled with care.

4.5 pH Meters: The meter should be accurate to ± 0.05 units at 25 °C.

4.6 ZHE Extract Collection Devices: TEDLAR®[2] bags or glass, stainless steel or PTFE gas-tight syringes are used to collect the initial liquid phase and the final extract of the waste when using the ZHE device. The devices listed are recommended for use under the following conditions:

4.6.1 If a waste contains an aqueous liquid phase or if a waste does not contain a significant amount of nonaqueous liquid (i.e., <1% of total waste), the TEDLAR® bag or a 600 mL syringe should be used to collect and combine the initial liquid and solid extract.

4.6.2 If a waste contains a significant amount of nonaqueous liquid in the initial liquid phase (i.e., >1% of total waste), the syringe or the TEDLAR® bag may be used for both the initial solid/liquid separation and the final extract filtration. However, analysts should use one or the other, not both.

4.6.3 If the waste contains no initial liquid phase (is 100% solid) or has no significant solid phase (is 100% liquid), either the TEDLAR® bag or the syringe may be used. If the syringe is used, discard the first 5 mL of liquid expressed from the device. The remaining aliquots are used for analysis.

4.7 ZHE Extraction Fluid Transfer Devices: Any device capable of transferring the extraction fluid into the ZHE without changing the nature of the extraction fluid is acceptable (e.g., a positive displacement or peristaltic pump, a gas tight syringe, pressure filtration unit (see Section 4.3.2), or other ZHE device).

4.8 Laboratory Balance: Any laboratory balance accurate to within ± 0.01 grams may be used (all weight measurements are to be within ± 0.1 grams).

4.9 Beaker or Erlenmeyer flask, glass, 500 mL.

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[2] TEDLAR® is a registered trademark of Du Pont.

4.10 Watchglass, appropriate diameter to cover beaker or Erlenmeyer flask.

4.11 Magnetic stirrer.

5.0 REAGENTS

5.1 Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available. Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

5.2 Reagent Water. Reagent water is defined as water in which an interferant is not observed at or above the method's detection limit of the analyte(s) of interest. For nonvolatile extractions, ASTM Type II water or equivalent meets the definition of reagent water. For volatile extractions, it is recommended that reagent water be generated by any of the following methods. Reagent water should be monitored periodically for impurities.

5.2.1 Reagent water for volatile extractions may be generated by passing tap water through a carbon filter bed containing about 500 grams of activated carbon (Calgon Corp., Filtrasorb-300 or equivalent).

5.2.2 A water purification system (Millipore Super-Q or equivalent) may also be used to generate reagent water for volatile extractions.

5.2.3 Reagent water for volatile extractions may also be prepared by boiling water for 15 minutes. Subsequently, while maintaining the water temperature at 90 $\pm$ 5 degrees C, bubble a contaminant-free inert gas (e.g. nitrogen) through the water for 1 hour. While still hot, transfer the water to a narrow mouth screw-cap bottle under zero-headspace and seal with a Teflon-lined septum and cap.

5.3 Hydrochloric acid (1N), HCl, made from ACS reagent grade.

5.4 Nitric acid (1N), HNO_3, made from ACS reagent grade.

5.5 Sodium hydroxide (1N), NaOH, made from ACS reagent grade.

5.6 Glacial acetic acid, CH_3CH_2OOH, ACS reagent grade.

5.7 Extraction fluid.

5.7.1 Extraction fluid # 1: Add 5.7 mL glacial CH_3CH_2OOH to 500 mL of reagent water (See Section 5.2), add 64.3 mL of 1N NaOH, and dilute to a volume of 1 liter. When correctly prepared, the pH of this fluid will be 4.93 $\pm$ 0.05.

5.7.2 Extraction fluid # 2: Dilute 5.7 mL glacial CH_3CH_2OOH with reagent water (See Section 5.2) to a volume of 1 liter. When correctly prepared, the pH of this fluid will be 2.88 $\pm$ 0.05.

NOTE: These extraction fluids should be monitored frequently for impurities. The pH should be checked prior to use to ensure that these fluids are made up accurately. If impurities are found or the pH is not within the above specifications, the fluid shall be discarded and fresh extraction fluid prepared.

5.8 Analytical standards shall be prepared according to the appropriate analytical method.

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

6.1 All samples shall be collected using an appropriate sampling plan.

6.2 The TCLP may place requirements on the minimal size of the field sample, depending upon the physical state or states of the waste and the analytes of concern. An aliquot is needed for preliminary evaluation of which extraction fluid is to be used for the nonvolatile analyte extraction procedure. Another aliquot may be needed to actually conduct the nonvolatile extraction (see Section 1.4 concerning the use of this extract for volatile organics). If volatile organics are of concern, another aliquot may be needed. Quality control measures may require additional aliquots. Further, it is always wise to collect more sample just in case something goes wrong with the initial attempt to conduct the test.

6.3 Preservatives shall not be added to samples before extraction.

6.4 Samples may be refrigerated unless refrigeration results in irreversible physical change to the waste. If precipitation occurs, the entire sample (including precipitate) should be extracted.

6.5 When the waste is to be evaluated for volatile analytes, care shall be taken to minimize the loss of volatiles. Samples shall be collected and stored in a manner intended to prevent the loss of volatile analytes (e.g., samples should be collected in Teflon-lined septum capped vials and stored at 4 °C. Samples should be opened only immediately prior to extraction).

6.6 TCLP extracts should be prepared for analysis and analyzed as soon as possible following extraction. Extracts or portions of extracts for metallic analyte determinations must be acidified with nitric acid to a pH < 2, unless precipitation occurs (see Section 7.2.14 if precipitation occurs). Extracts should be preserved for other analytes according to the guidance given in the individual analysis methods. Extracts or portions of extracts for organic analyte determinations shall not be allowed to come into contact with the atmosphere (i.e., no headspace) to prevent losses. See Section 8.0 (QA requirements) for acceptable sample and extract holding times.

7.0 PROCEDURE

7.1 Preliminary Evaluations

Perform preliminary TCLP evaluations on a minimum 100 gram aliquot of waste. This aliquot may not actually undergo TCLP extraction. These preliminary evaluations include: (1) determination of the percent solids (Section 7.1.1); (2) determination of whether the waste contains insignificant solids and is, therefore, its own extract after filtration (Section 7.1.2); (3) determination of whether the solid portion of the waste requires particle size reduction (Section 7.1.3); and (4) determination of which of the two extraction fluids are to be used for the nonvolatile TCLP extraction of the waste (Section 7.1.4).

7.1.1 Preliminary determination of percent solids: Percent solids is defined as that fraction of a waste sample (as a percentage of the total sample) from which no liquid may be forced out by an applied pressure, as described below.

7.1.1.1 If the waste will obviously yield no liquid when subjected to pressure filtration (i.e., is 100% solids) proceed to Section 7.1.3.

7.1.1.2 If the sample is liquid or multiphasic, liquid/solid separation to make a preliminary determination of percent solids is required. This involves the filtration device described in Section 4.3.2 and is outlined in Sections 7.1.1.3 through 7.1.1.9.

7.1.1.3 Pre-weigh the filter and the container that will receive the filtrate.

7.1.1.4 Assemble the filter holder and filter following the manufacturer's instructions. Place the filter on the support screen and secure.

7.1.1.5 Weigh out a subsample of the waste (100 gram minimum) and record the weight.

7.1.1.6 Allow slurries to stand to permit the solid phase to settle. Wastes that settle slowly may be centrifuged prior to filtration. Centrifugation is to be used only as an aid to filtration. If used, the liquid should be decanted and filtered followed by filtration of the solid portion of the waste through the same filtration system.

7.1.1.7 Quantitatively transfer the waste sample to the filter holder (liquid and solid phases). Spread the waste sample evenly over the surface of the filter. If filtration of the waste at 4 °C reduces the amount of expressed liquid over what would be expressed at room temperature then allow the sample to warm up to room temperature in the device before filtering.

NOTE: If waste material (>1% of original sample weight) has obviously adhered to the container used to transfer the sample to the filtration apparatus, determine the weight of this residue and subtract it from the sample weight determined in Section 7.1.1.5 to determine the weight of the waste sample that will be filtered.

Gradually apply vacuum or gentle pressure of 1-10 psi, until air or pressurizing gas moves through the filter. If this point is not reached under 10 psi, and if no additional liquid has passed through the filter in any 2 minute interval, slowly increase the pressure in 10 psi increments to a maximum of 50 psi. After each incremental increase of 10 psi, if the pressurizing gas has not moved through the filter, and if no additional liquid has passed through the filter in any 2 minute interval, proceed to the next 10 psi increment. When the pressurizing gas begins to move through the filter, or when liquid flow has ceased at 50 psi (i.e., filtration does not result in any additional filtrate within any 2 minute period), stop the filtration.

NOTE: Instantaneous application of high pressure can degrade the glass fiber filter and may cause premature plugging.

7.1.1.8 The material in the filter holder is defined as the solid phase of the waste, and the filtrate is defined as the liquid phase.

NOTE: Some wastes, such as oily wastes and some paint wastes, will obviously contain some material that appears to be a liquid. Even after applying vacuum or pressure filtration, as outlined in Section 7.1.1.7, this material may not filter. If this is the case, the material within the filtration device is defined as a solid. Do not replace the original filter with a fresh filter under any circumstances. Use only one filter.

7.1.1.9 Determine the weight of the liquid phase by subtracting the weight of the filtrate container (see Section 7.1.1.3) from the total weight of the filtrate-filled container. Determine the weight of the solid phase of the waste sample by subtracting the weight of the liquid phase from the weight of the total waste sample, as determined in Section 7.1.1.5 or 7.1.1.7.

Record the weight of the liquid and solid phases. Calculate the percent solids as follows:

$$\text{Percent solids} = \frac{\text{Weight of solid (Section 7.1.1.9)}}{\text{Total weight of waste (Section 7.1.1.5 or 7.1.1.7)}} \times 100$$

7.1.2 If the percent solids determined in Section 7.1.1.9 is equal to or greater than 0.5%, then proceed either to Section 7.1.3 to

determine whether the solid material requires particle size reduction or to Section 7.1.2.1 if it is noticed that a small amount of the filtrate is entrained in wetting of the filter. If the percent solids determined in Section 7.1.1.9 is less than 0.5%, then proceed to Section 7.2.9 if the nonvolatile TCLP is to be performed and to Section 7.3 with a fresh portion of the waste if the volatile TCLP is to be performed.

7.1.2.1 Remove the solid phase and filter from the filtration apparatus.

7.1.2.2 Dry the filter and solid phase at 100 ± 20 °C until two successive weighing yield the same value within ± 1%. Record the final weight.

NOTE: Caution should be taken to ensure that the subject solid will not flash upon heating. It is recommended that the drying oven be vented to a hood or other appropriate device.

7.1.2.3 Calculate the percent dry solids as follows:

$$\text{Percent dry solids} = \frac{\text{(Wt. of dry waste + filter) - tared wt. of filter}}{\text{Initial wt. of waste (Section 7.1.1.5 or 7.1.1.7)}} \times 100$$

7.1.2.4 If the percent dry solids is less than 0.5%, then proceed to Section 7.2.9 if the nonvolatile TCLP is to be performed, and to Section 7.3 if the volatile TCLP is to be performed. If the percent dry solids is greater than or equal to 0.5%, and if the nonvolatile TCLP is to be performed, return to the beginning of this Section (7.1) and, with a fresh portion of waste, determine whether particle size reduction is necessary (Section 7.1.3) and determine the appropriate extraction fluid (Section 7.1.4). If only the volatile TCLP is to be performed, see the note in Section 7.1.4.

7.1.3 Determination of whether the waste requires particle size reduction (particle size is reduced during this step): Using the solid portion of the waste, evaluate the solid for particle size. Particle size reduction is required, unless the solid has a surface area per gram of material equal to or greater than 3.1 cm^2, or is smaller than 1 cm in its narrowest dimension (i.e., is capable of passing through a 9.5 mm (0.375 inch) standard sieve). If the surface area is smaller or the particle size larger than described above, prepare the solid portion of the waste for extraction by crushing, cutting, or grinding the waste to a surface area or particle size as described above. If the solids are prepared for organic volatiles extraction, special precautions must be taken (see Section 7.3.6).

NOTE: Surface area criteria are meant for filamentous (e.g., paper, cloth, and similar) waste materials. Actual measurement of surface area is not required, nor is it recommended. For materials that do not obviously meet

the criteria, sample specific methods would need to be developed and employed to measure the surface area. Such methodology is currently not available.

7.1.4 Determination of appropriate extraction fluid: If the solid content of the waste is greater than or equal to 0.5% and if the sample will be extracted for nonvolatile constituents (Section 7.2), determine the appropriate fluid (Section 5.7) for the nonvolatiles extraction as follows:

NOTE: TCLP extraction for volatile constituents uses only extraction fluid #1 (Section 5.7.1). Therefore, if TCLP extraction for nonvolatiles is not required, proceed to Section 7.3.

7.1.4.1 Weigh out a small subsample of the solid phase of the waste, reduce the solid (if necessary) to a particle size of approximately 1 mm in diameter or less, and transfer 5.0 grams of the solid phase of the waste to a 500 mL beaker or Erlenmeyer flask.

7.1.4.2 Add 96.5 mL of reagent water to the beaker, cover with a watchglass, and stir vigorously for 5 minutes using a magnetic stirrer. Measure and record the pH. If the pH is <5.0, use extraction fluid #1. Proceed to Section 7.2.

7.1.4.3 If the pH from Section 7.1.4.2 is >5.0, add 3.5 mL 1N HCl, slurry briefly, cover with a watchglass, heat to 50 °C, and hold at 50 °C for 10 minutes.

7.1.4.4 Let the solution cool to room temperature and record the pH. If the pH is <5.0, use extraction fluid #1. If the pH is >5.0, use extraction fluid #2. Proceed to Section 7.2.

7.1.5 If the aliquot of the waste used for the preliminary evaluation (Sections 7.1.1 - 7.1.4) was determined to be 100% solid at Section 7.1.1.1, then it can be used for the Section 7.2 extraction (assuming at least 100 grams remain), and the Section 7.3 extraction (assuming at least 25 grams remain). If the aliquot was subjected to the procedure in Section 7.1.1.7, then another aliquot shall be used for the volatile extraction procedure in Section 7.3. The aliquot of the waste subjected to the procedure in Section 7.1.1.7 might be appropriate for use for the Section 7.2 extraction if an adequate amount of solid (as determined by Section 7.1.1.9) was obtained. The amount of solid necessary is dependent upon whether a sufficient amount of extract will be produced to support the analyses. If an adequate amount of solid remains, proceed to Section 7.2.10 of the nonvolatile TCLP extraction.

7.2 Procedure When Volatiles are not Involved

A minimum sample size of 100 grams (solid and liquid phases) is recommended. In some cases, a larger sample size may be appropriate, depending on the

solids content of the waste sample (percent solids, See Section 7.1.1), whether the initial liquid phase of the waste will be miscible with the aqueous extract of the solid, and whether inorganics, semivolatile organics, pesticides, and herbicides are all analytes of concern. Enough solids should be generated for extraction such that the volume of TCLP extract will be sufficient to support all of the analyses required. If the amount of extract generated by a single TCLP extraction will not be sufficient to perform all of the analyses, more than one extraction may be performed and the extracts from each combined and aliquoted for analysis.

7.2.1 If the waste will obviously yield no liquid when subjected to pressure filtration (i.e., is 100% solid, see Section 7.1.1), weigh out a subsample of the waste (100 gram minimum) and proceed to Section 7.2.9.

7.2.2 If the sample is liquid or multiphasic, liquid/solid separation is required. This involves the filtration device described in Section 4.3.2 and is outlined in Sections 7.2.3 to 7.2.8.

7.2.3 Pre-weigh the container that will receive the filtrate.

7.2.4 Assemble the filter holder and filter following the manufacturer's instructions. Place the filter on the support screen and secure. Acid wash the filter if evaluating the mobility of metals (see Section 4.4).

NOTE: Acid washed filters may be used for all nonvolatile extractions even when metals are not of concern.

7.2.5 Weigh out a subsample of the waste (100 gram minimum) and record the weight. If the waste contains <0.5% dry solids (Section 7.1.2), the liquid portion of the waste, after filtration, is defined as the TCLP extract. Therefore, enough of the sample should be filtered so that the amount of filtered liquid will support all of the analyses required of the TCLP extract. For wastes containing >0.5% dry solids (Sections 7.1.1 or 7.1.2), use the percent solids information obtained in Section 7.1.1 to determine the optimum sample size (100 gram minimum) for filtration. Enough solids should be generated by filtration to support the analyses to be performed on the TCLP extract.

7.2.6 Allow slurries to stand to permit the solid phase to settle. Wastes that settle slowly may be centrifuged prior to filtration. Use centrifugation only as an aid to filtration. If the waste is centrifuged, the liquid should be decanted and filtered followed by filtration of the solid portion of the waste through the same filtration system.

7.2.7 Quantitatively transfer the waste sample (liquid and solid phases) to the filter holder (see Section 4.3.2). Spread the waste sample evenly over the surface of the filter. If filtration of the waste at 4 °C reduces the amount of expressed liquid over what would be expressed at

room temperature, then allow the sample to warm up to room temperature in the device before filtering.

NOTE: If waste material (>1% of the original sample weight) has obviously adhered to the container used to transfer the sample to the filtration apparatus, determine the weight of this residue and subtract it from the sample weight determined in Section 7.2.5, to determine the weight of the waste sample that will be filtered.

Gradually apply vacuum or gentle pressure of 1-10 psi, until air or pressurizing gas moves through the filter. If this point is not reached under 10 psi, and if no additional liquid has passed through the filter in any 2 minute interval, slowly increase the pressure in 10 psi increments to a maximum of 50 psi. After each incremental increase of 10 psi, if the pressurizing gas has not moved through the filter, and if no additional liquid has passed through the filter in any 2 minute interval, proceed to the next 10 psi increment. When the pressurizing gas begins to move through the filter, or when the liquid flow has ceased at 50 psi (i.e., filtration does not result in any additional filtrate within a 2 minute period), stop the filtration.

NOTE: Instantaneous application of high pressure can degrade the glass fiber filter and may cause premature plugging.

7.2.8 The material in the filter holder is defined as the solid phase of the waste, and the filtrate is defined as the liquid phase. Weigh the filtrate. The liquid phase may now be either analyzed (See Section 7.2.12) or stored at 4 °C until time of analysis.

NOTE: Some wastes, such as oily wastes and some paint wastes, will obviously contain some material that appears to be a liquid. Even after applying vacuum or pressure filtration, as outlined in Section 7.2.7, this material may not filter. If this is the case, the material within the filtration device is defined as a solid and is carried through the extraction as a solid. Do not replace the original filter with a fresh filter under any circumstances. Use only one filter.

7.2.9 If the waste contains <0.5% dry solids (see Section 7.1.2), proceed to Section 7.2.13. If the waste contains >0.5% dry solids (see Section 7.1.1 or 7.1.2), and if particle size reduction of the solid was needed in Section 7.1.3, proceed to Section 7.2.10. If the waste as received passes a 9.5 mm sieve, quantitatively transfer the solid material into the extractor bottle along with the filter used to separate the initial liquid from the solid phase, and proceed to Section 7.2.11.

7.2.10 Prepare the solid portion of the waste for extraction by crushing, cutting, or grinding the waste to a surface area or particle size as described in Section 7.1.3. When the surface area or particle size has been appropriately altered, quantitatively transfer the solid

material into an extractor bottle. Include the filter used to separate the initial liquid from the solid phase.

NOTE: Sieving of the waste is not normally required. Surface area requirements are meant for filamentous (e.g., paper, cloth) and similar waste materials. Actual measurement of surface area is not recommended. If sieving is necessary, a Teflon coated sieve should be used to avoid contamination of the sample.

7.2.11 Determine the amount of extraction fluid to add to the extractor vessel as follows:

$$\text{Weight of extraction fluid} = \frac{20 \times \text{percent solids (Section 7.1.1)} \times \text{weight of waste filtered (Section 7.2.5 or 7.2.7)}}{100}$$

Slowly add this amount of appropriate extraction fluid (see Section 7.1.4) to the extractor vessel. Close the extractor bottle tightly (it is recommended that Teflon tape be used to ensure a tight seal), secure in rotary agitation device, and rotate at 30 ± 2 rpm for 18 ± 2 hours. Ambient temperature (i.e., temperature of room in which extraction takes place) shall be maintained at 23 ± 2 °C during the extraction period.

NOTE: As agitation continues, pressure may build up within the extractor bottle for some types of wastes (e.g., limed or calcium carbonate containing waste may evolve gases such as carbon dioxide). To relieve excess pressure, the extractor bottle may be periodically opened (e.g., after 15 minutes, 30 minutes, and 1 hour) and vented into a hood.

7.2.12 Following the 18 ± 2 hour extraction, separate the material in the extractor vessel into its component liquid and solid phases by filtering through a new glass fiber filter, as outlined in Section 7.2.7. For final filtration of the TCLP extract, the glass fiber filter may be changed, if necessary, to facilitate filtration. Filter(s) shall be acid-washed (see Section 4.4) if evaluating the mobility of metals.

7.2.13 Prepare the TCLP extract as follows:

7.2.13.1 If the waste contained no initial liquid phase, the filtered liquid material obtained from Section 7.2.12 is defined as the TCLP extract. Proceed to Section 7.2.14.

7.2.13.2 If compatible (e.g., multiple phases will not result on combination), combine the filtered liquid resulting from Section 7.2.12 with the initial liquid phase of the waste obtained in Section 7.2.7. This combined liquid is defined as the TCLP extract. Proceed to Section 7.2.14.

7.2.13.3 If the initial liquid phase of the waste, as obtained from Section 7.2.7, is not or may not be compatible with the filtered liquid resulting from Section 7.2.12, do not combine these liquids. Analyze these liquids, collectively defined as the TCLP extract, and combine the results mathematically, as described in Section 7.2.14.

7.2.14 Following collection of the TCLP extract, the pH of the extract should be recorded. Immediately aliquot and preserve the extract for analysis. Metals aliquots must be acidified with nitric acid to pH <2. If precipitation is observed upon addition of nitric acid to a small aliquot of the extract, then the remaining portion of the extract for metals analyses shall not be acidified and the extract shall be analyzed as soon as possible. All other aliquots must be stored under refrigeration (4 °C) until analyzed. The TCLP extract shall be prepared and analyzed according to appropriate analytical methods. TCLP extracts to be analyzed for metals shall be acid digested except in those instances where digestion causes loss of metallic analytes. If an analysis of the undigested extract shows that the concentration of any regulated metallic analyte exceeds the regulatory level, then the waste is hazardous and digestion of the extract is not necessary. However, data on undigested extracts alone cannot be used to demonstrate that the waste is not hazardous. If the individual phases are to be analyzed separately, determine the volume of the individual phases (to $\pm$ 0.5%), conduct the appropriate analyses, and combine the results mathematically by using a simple volume-weighted average:

$$\text{Final Analyte Concentration} = \frac{(V_1)\ (C_1) + (V_2)\ (C_2)}{V_1 + V_2}$$

where:

V_1 = The volume of the first phase (L).
C_1 = The concentration of the analyte of concern in the first phase (mg/L).
V_2 = The volume of the second phase (L).
C_2 = The concentration of the analyte of concern in the second phase (mg/L).

7.2.15 Compare the analyte concentrations in the TCLP extract with the levels identified in the appropriate regulations. Refer to Section 8.0 for quality assurance requirements.

7.3 Procedure When Volatiles are Involved

Use the ZHE device to obtain TCLP extract for analysis of volatile compounds only. Extract resulting from the use of the ZHE shall not be used to evaluate the mobility of nonvolatile analytes (e.g., metals, pesticides, etc.).

The ZHE device has approximately a 500 mL internal capacity. The ZHE can thus accommodate a maximum of 25 grams of solid (defined as that fraction of a

sample from which no additional liquid may be forced out by an applied pressure of 50 psi), due to the need to add an amount of extraction fluid equal to 20 times the weight of the solid phase.

Charge the ZHE with sample only once and do not open the device until the final extract (of the solid) has been collected. Repeated filling of the ZHE to obtain 25 grams of solid is not permitted.

Do not allow the waste, the initial liquid phase, or the extract to be exposed to the atmosphere for any more time than is absolutely necessary. Any manipulation of these materials should be done when cold (4 °C) to minimize loss of volatiles.

7.3.1 Pre-weigh the (evacuated) filtrate collection container (See Section 4.6) and set aside. If using a TEDLAR® bag, express all liquid from the ZHE device into the bag, whether for the initial or final liquid/solid separation, and take an aliquot from the liquid in the bag for analysis. The containers listed in Section 4.6 are recommended for use under the conditions stated in Sections 4.6.1 - 4.6.3.

7.3.2 Place the ZHE piston within the body of the ZHE (it may be helpful first to moisten the piston O-rings slightly with extraction fluid). Adjust the piston within the ZHE body to a height that will minimize the distance the piston will have to move once the ZHE is charged with sample (based upon sample size requirements determined from Section 7.3, Section 7.1.1 and/or 7.1.2). Secure the gas inlet/outlet flange (bottom flange) onto the ZHE body in accordance with the manufacturer's instructions. Secure the glass fiber filter between the support screens and set aside. Set liquid inlet/outlet flange (top flange) aside.

7.3.3 If the waste is 100% solid (see Section 7.1.1), weigh out a subsample (25 gram maximum) of the waste, record weight, and proceed to Section 7.3.5.

7.3.4 If the waste contains < 0.5% dry solids (Section 7.1.2), the liquid portion of waste, after filtration, is defined as the TCLP extract. Filter enough of the sample so that the amount of filtered liquid will support all of the volatile analyses required. For wastes containing $\geq$ 0.5% dry solids (Sections 7.1.1 and/or 7.1.2), use the percent solids information obtained in Section 7.1.1 to determine the optimum sample size to charge into the ZHE. The recommended sample size is as follows:

7.3.4.1 For wastes containing < 5% solids (see Section 7.1.1), weigh out a 500 gram subsample of waste and record the weight.

7.3.4.2 For wastes containing $\geq$ 5% solids (see Section 7.1.1), determine the amount of waste to charge into the ZHE as follows:

$$\text{Weight of waste to charge ZHE} = \frac{25}{\text{percent solids (Section 7.1.1)}} \times 100$$

Weigh out a subsample of the waste of the appropriate size and record the weight.

7.3.5 If particle size reduction of the solid portion of the waste was required in Section 7.1.3, proceed to Section 7.3.6. If particle size reduction was not required in Section 7.1.3, proceed to Section 7.3.7.

7.3.6 Prepare the waste for extraction by crushing, cutting, or grinding the solid portion of the waste to a surface area or particle size as described in Section 7.1.3. Wastes and appropriate reduction equipment should be refrigerated, if possible, to 4 °C prior to particle size reduction. The means used to effect particle size reduction must not generate heat in and of itself. If reduction of the solid phase of the waste is necessary, exposure of the waste to the atmosphere should be avoided to the extent possible.

NOTE: Sieving of the waste is not recommended due to the possibility that volatiles may be lost. The use of an appropriately graduated ruler is recommended as an acceptable alternative. Surface area requirements are meant for filamentous (e.g., paper, cloth) and similar waste materials. Actual measurement of surface area is not recommended.

When the surface area or particle size has been appropriately altered, proceed to Section 7.3.7.

7.3.7 Waste slurries need not be allowed to stand to permit the solid phase to settle. Do not centrifuge wastes prior to filtration.

7.3.8 Quantitatively transfer the entire sample (liquid and solid phases) quickly to the ZHE. Secure the filter and support screens onto the top flange of the device and secure the top flange to the ZHE body in accordance with the manufacturer's instructions. Tighten all ZHE fittings and place the device in the vertical position (gas inlet/outlet flange on the bottom). Do not attach the extract collection device to the top plate.

NOTE: If waste material (>1% of original sample weight) has obviously adhered to the container used to transfer the sample to the ZHE, determine the weight of this residue and subtract it from the sample weight determined in Section 7.3.4 to determine the weight of the waste sample that will be filtered.

Attach a gas line to the gas inlet/outlet valve (bottom flange) and, with the liquid inlet/outlet valve (top flange) open, begin applying gentle pressure of 1-10 psi (or more if necessary) to force all headspace

slowly out of the ZHE device into a hood. At the first appearance of liquid from the liquid inlet/outlet valve, quickly close the valve and discontinue pressure. If filtration of the waste at 4 °C reduces the amount of expressed liquid over what would be expressed at room temperature, then allow the sample to warm up to room temperature in the device before filtering. If the waste is 100% solid (see Section 7.1.1), slowly increase the pressure to a maximum of 50 psi to force most of the headspace out of the device and proceed to Section 7.3.12.

7.3.9 Attach the evacuated pre-weighed filtrate collection container to the liquid inlet/outlet valve and open the valve. Begin applying gentle pressure of 1-10 psi to force the liquid phase of the sample into the filtrate collection container. If no additional liquid has passed through the filter in any 2 minute interval, slowly increase the pressure in 10 psi increments to a maximum of 50 psi. After each incremental increase of 10 psi, if no additional liquid has passed through the filter in any 2 minute interval, proceed to the next 10 psi increment. When liquid flow has ceased such that continued pressure filtration at 50 psi does not result in any additional filtrate within a 2 minute period, stop the filtration. Close the liquid inlet/outlet valve, discontinue pressure to the piston, and disconnect and weigh the filtrate collection container.

NOTE: Instantaneous application of high pressure can degrade the glass fiber filter and may cause premature plugging.

7.3.10 The material in the ZHE is defined as the solid phase of the waste and the filtrate is defined as the liquid phase.

NOTE: Some wastes, such as oily wastes and some paint wastes, will obviously contain some material that appears to be a liquid. Even after applying pressure filtration, this material will not filter. If this is the case, the material within the filtration device is defined as a solid and is carried through the TCLP extraction as a solid.

If the original waste contained <0.5% dry solids (see Section 7.1.2), this filtrate is defined as the TCLP extract and is analyzed directly. Proceed to Section 7.3.15.

7.3.11 The liquid phase may now be either analyzed immediately (See Sections 7.3.13 through 7.3.15) or stored at 4 °C under minimal headspace conditions until time of analysis. Determine the weight of extraction fluid #1 to add to the ZHE as follows:

$$\text{Weight of extraction fluid} = \frac{20 \times \text{percent solids (Section 7.1.1)} \times \text{weight of waste filtered (Section 7.3.4 or 7.3.8)}}{100}$$

7.3.12 The following Sections detail how to add the appropriate amount of extraction fluid to the solid material within the ZHE and agitation of the ZHE vessel. Extraction fluid #1 is used in all cases (See Section 5.7).

7.3.12.1 With the ZHE in the vertical position, attach a line from the extraction fluid reservoir to the liquid inlet/outlet valve. The line used shall contain fresh extraction fluid and should be preflushed with fluid to eliminate any air pockets in the line. Release gas pressure on the ZHE piston (from the gas inlet/outlet valve), open the liquid inlet/outlet valve, and begin transferring extraction fluid (by pumping or similar means) into the ZHE. Continue pumping extraction fluid into the ZHE until the appropriate amount of fluid has been introduced into the device.

7.3.12.2 After the extraction fluid has been added, immediately close the liquid inlet/outlet valve and disconnect the extraction fluid line. Check the ZHE to ensure that all valves are in their closed positions. Manually rotate the device in an end-over-end fashion 2 or 3 times. Reposition the ZHE in the vertical position with the liquid inlet/outlet valve on top. Pressurize the ZHE to 5-10 psi (if necessary) and slowly open the liquid inlet/outlet valve to bleed out any headspace (into a hood) that may have been introduced due to the addition of extraction fluid. This bleeding shall be done quickly and shall be stopped at the first appearance of liquid from the valve. Re-pressurize the ZHE with 5-10 psi and check all ZHE fittings to ensure that they are closed.

7.3.12.3 Place the ZHE in the rotary agitation apparatus (if it is not already there) and rotate at 30 $\pm$ 2 rpm for 18 $\pm$ 2 hours. Ambient temperature (i.e., temperature of room in which extraction occurs) shall be maintained at 23 $\pm$ 2 °C during agitation.

7.3.13 Following the 18 $\pm$ 2 hour agitation period, check the pressure behind the ZHE piston by quickly opening and closing the gas inlet/outlet valve and noting the escape of gas. If the pressure has not been maintained (i.e., no gas release observed), the device is leaking. Check the ZHE for leaking as specified in Section 4.2.1, and perform the extraction again with a new sample of waste. If the pressure within the device has been maintained, the material in the extractor vessel is once again separated into its component liquid and solid phases. If the waste contained an initial liquid phase, the liquid may be filtered directly into the same filtrate collection container (i.e., TEDLAR® bag) holding the initial liquid phase of the waste. A separate filtrate collection container must be used if combining would create multiple phases, or there is not enough volume left within the filtrate collection container. Filter through the glass fiber filter, using the ZHE device as discussed in Section 7.3.9. All extract shall be filtered and collected if the

TEDLAR® bag is used, if the extract is multiphasic, or if the waste contained an initial liquid phase (see Sections 4.6 and 7.3.1).

NOTE: An in-line glass fiber filter may be used to filter the material within the ZHE if it is suspected that the glass fiber filter has been ruptured.

7.3.14 If the original waste contained no initial liquid phase, the filtered liquid material obtained from Section 7.3.13 is defined as the TCLP extract. If the waste contained an initial liquid phase, the filtered liquid material obtained from Section 7.3.13 and the initial liquid phase (Section 7.3.9) are collectively defined as the TCLP extract.

7.3.15 Following collection of the TCLP extract, immediately prepare the extract for analysis and store with minimal headspace at 4 °C until analyzed. Analyze the TCLP extract according to the appropriate analytical methods. If the individual phases are to be analyzed separately (i.e., are not miscible), determine the volume of the individual phases (to 0.5%), conduct the appropriate analyses, and combine the results mathematically by using a simple volume-weighted average:

$$\text{Final Analyte Concentration} = \frac{(V_1)\,(C_1) + (V_2)\,(C_2)}{V_1 + V_2}$$

where:

V_1 = The volume of the first phases (L).
C_1 = The concentration of the analyte of concern in the first phase (mg/L).
V_2 = The volume of the second phase (L).
C_2 = The concentration of the analyte of concern in the second phase (mg/L).

7.3.16 Compare the analyte concentrations in the TCLP extract with the levels identified in the appropriate regulations. Refer to Section 8.0 for quality assurance requirements.

8.0 QUALITY ASSURANCE

8.1 A minimum of one blank (using the same extraction fluid as used for the samples) must be analyzed for every 20 extractions that have been conducted in an extraction vessel.

8.2 A matrix spike shall be performed for each waste type (e.g., wastewater treatment sludge, contaminated soil, etc.) unless the result exceeds the regulatory level and the data are being used solely to demonstrate that the waste property exceeds the regulatory level. A minimum of one matrix spike must be analyzed for each analytical batch. As a minimum, follow the matrix spike addition guidance provided in each analytical method.

8.2.1 Matrix spikes are to be added after filtration of the TCLP extract and before preservation. Matrix spikes should not be added prior to TCLP extraction of the sample.

8.2.2 In most cases, matrix spikes should be added at a concentration equivalent to the corresponding regulatory level. If the analyte concentration is less than one half the regulatory level, the spike concentration may be as low as one half of the analyte concentration, but may not be not less than five times the method detection limit. In order to avoid differences in matrix effects, the matrix spikes must be added to the same nominal volume of TCLP extract as that which was analyzed for the unspiked sample.

8.2.3 The purpose of the matrix spike is to monitor the performance of the analytical methods used, and to determine whether matrix interferences exist. Use of other internal calibration methods, modification of the analytical methods, or use of alternate analytical methods may be needed to accurately measure the analyte concentration in the TCLP extract when the recovery of the matrix spike is below the expected analytical method performance.

8.2.4 Matrix spike recoveries are calculated by the following formula:

$$\%R\ (\%Recovery) = 100\ (X_s - X_u)/K$$

where:
X_s = measured value for the spiked sample,
X_u = measured value for the unspiked sample, and
K = known value of the spike in the sample.

8.3 All quality control measures described in the appropriate analytical methods shall be followed.

8.4 The use of internal calibration quantitation methods shall be employed for a metallic contaminant if: (1) Recovery of the contaminant from the TCLP extract is not at least 50% and the concentration does not exceed the regulatory level, and (2) The concentration of the contaminant measured in the extract is within 20% of the appropriate regulatory level.

8.4.1. The method of standard additions shall be employed as the internal calibration quantitation method for each metallic contaminant.

8.4.2 The method of standard additions requires preparing calibration standards in the sample matrix rather than reagent water or blank solution. It requires taking four identical aliquots of the solution and adding known amounts of standard to three of these aliquots. The forth aliquot is the unknown. Preferably, the first addition should be prepared so that the resulting concentration is approximately 50% of the expected concentration of the sample. The second and third additions should be prepared so that the concentrations are approximately 100% and

150% of the expected concentration of the sample. All four aliquots are maintained at the same final volume by adding reagent water or a blank solution, and may need dilution adjustment to maintain the signals in the linear range of the instrument technique. All four aliquots are analyzed.

8.4.3 Prepare a plot, or subject data to linear regression, of instrument signals or external-calibration-derived concentrations as the dependant variable (y-axis) versus concentrations of the additions of standard as the independent variable (x-axis). Solve for the intercept of the abscissa (the independent variable, x-axis) which is the concentration in the unknown.

8.4.4 Alternately, subtract the instrumental signal or external-calibration-derived concentration of the unknown (unspiked) sample from the instrumental signals or external-calibration-derived concentrations of the standard additions. Plot or subject to linear regression of the corrected instrument signals or external-calibration-derived concentrations as the dependant variable versus the independent variable. Derive concentrations for unknowns using the internal calibration curve as if it were an external calibration curve.

8.5 Samples must undergo TCLP extraction within the following time periods:

SAMPLE MAXIMUM HOLDING TIMES [DAYS]				
	From: Field collection To: TCLP extraction	From: TCLP extraction To: Preparative extraction	From: Preparative extraction To: Determinative analysis	Total elapsed time
Volatiles	14	NA	14	28
Semi-volatiles	14	7	40	61
Mercury	28	NA	28	56
Metals, except mercury	180	NA	180	360

NA = Not applicable

If sample holding times are exceeded, the values obtained will be considered minimal concentrations. Exceeding the holding time is not acceptable in establishing that a waste does not exceed the regulatory level. Exceeding the holding time will not invalidate characterization if the waste exceeds the regulatory level.

9.0 METHOD PERFORMANCE

9.1 Ruggedness. Two ruggedness studies have been performed to determine the effect of various perturbations on specific elements of the TCLP protocol. Ruggedness testing determines the sensitivity of small procedural variations which might be expected to occur during routine laboratory application.

9.1.1 Metals - The following conditions were used when leaching a waste for metals analysis:

Varying Conditions	
Liquid/Solid ratio	19:1 vs. 21:1
Extraction time	16 hours vs. 18 hours
Headspace	20% vs. 60%
Buffer #2 acidity	190 meq vs. 210 meq
Acid-washed filters	yes vs. no
Filter type	0.7 µm glass fiber vs. 0.45 µm vs. polycarbonate
Bottle type	borosilicate vs. flint glass

Of the seven method variations examined, acidity of the extraction fluid had the greatest impact on the results. Four of 13 metals from an API separator sludge/electroplating waste (API/EW) mixture and two of three metals from an ammonia lime still bottom waste were extracted at higher levels by the more acidic buffer. Because of the sensitivity to pH changes, the method requires that the extraction fluids be prepared so that the final pH is within $\pm$ 0.05 units as specified.

9.1.2 Volatile Organic Compounds - The following conditions were used when leaching a waste for VOC analysis:

Varying Conditions	
Liquid/Solid ratio	19:1 vs. 21:1
Headspace	0% vs. 5%
Buffer #1 acidity	60 meq vs. 80 meq
Method of storing extract	Syringe vs. Tedlar® bag
Aliquotting	yes vs. no
Pressure behind piston	0 psi vs. 20 psi

None of the parameters had a significant effect on the results of the ruggedness test.

9.2 Precision. Many TCLP precision (reproducibility) studies have been performed, and have shown that, in general, the precision of the TCLP is comparable to or exceeds that of the EP toxicity test and that method precision is adequate. One of the more significant contributions to poor precision appears to be related to sample homogeneity and inter-laboratory variation (due to the nature of waste materials).

9.2.1 Metals - The results of a multi-laboratory study are shown in Table 6, and indicate that a single analysis of a waste may not be adequate for waste characterization and identification requirements.

9.2.2 Semi-Volatile Organic Compounds - The results of two studies are shown in Tables 7 and 8. Single laboratory precision was excellent with greater than 90 percent of the results exhibiting an RSD less than 25 percent. Over 85 percent of all individual compounds in the multi-laboratory study fell in the RSD range of 20 - 120 percent. Both studies concluded that the TCLP provides adequate precision. It was also determined that the high acetate content of the extraction fluid did not present problems (i.e., column degradation of the gas chromatograph) for the analytical conditions used.

9.2.3 Volatile Organic Compounds - Eleven laboratories participated in a collaborative study of the use of the ZHE with two waste types which were fortified with a mixture of VOCs. The results of the collaborative study are shown in Table 9. Precision results for VOCs tend to occur over a considerable range. However, the range and mean RSD compared very closely to the same collaborative study metals results in Table 6. Blackburn and Show concluded that at the 95% level of significance: 1) recoveries among laboratories were statistically similar, 2) recoveries did not vary significantly between the two sample types, and 3) each laboratory showed the same pattern of recovery for each of the two samples.

10.0 REFERENCES

1. Blackburn, W.B. and Show, I. "Collaborative Study of the Toxicity Characteristics Leaching Procedure (TCLP)." Draft Final Report, Contract No. 68-03-1958, S-Cubed, November 1986.

2. Newcomer, L.R., Blackburn, W.B., Kimmell, T.A. "Performance of the Toxicity Characteristic Leaching Procedure." Wilson Laboratories, S-Cubed, U.S. EPA, December 1986.

3. Williams, L.R., Francis, C.W.; Maskarinec, M.P., Taylor D.R., and Rothman, N. "Single-Laboratory Evaluation of Mobility Procedure for Solid Waste." EMSL, ORNL, S-Cubed, ENSECO.

Table 1.
Volatile Analytes[1,2]

Compound	CAS No.
Acetone	67-64-1
Benzene	71-43-2
n-Butyl alcohol	71-36-3
Carbon disulfide	75-15-0
Carbon tetrachloride	56-23-5
Chlorobenzene	108-90-7
Chloroform	67-66-3
1,2-Dichloroethane	107-06-2
1,1-Dichloroethylene	75-35-4
Ethyl acetate	141-78-6
Ethyl benzene	100-41-4
Ethyl ether	60-29-7
Isobutanol	78-83-1
Methanol	67-56-1
Methylene chloride	75-09-2
Methyl ethyl ketone	78-93-3
Methyl isobutyl ketone	108-10-1
Tetrachloroethylene	127-18-4
Toluene	108-88-3
1,1,1,-Trichloroethane	71-55-6
Trichloroethylene	79-01-6
Trichlorofluoromethane	75-69-4
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1
Vinyl chloride	75-01-4
Xylene	1330-20-7

[1] When testing for any or all of these analytes, the zero-headspace extractor vessel shall be used instead of the bottle extractor.

[2] Benzene, carbon tetrachloride, chlorobenzene, chloroform, 1,2-dichloroethane, 1,1-dichloroethylene, methyl ethyl ketone, tetrachloroethylene, and vinyl chloride are toxicity characteristic constituents.

Table 2.
Suitable Rotary Agitation Apparatus[1]

Company	Location	Model No.
Analytical Testing and Consulting Services, Inc.	Warrington, PA (215) 343-4490	4-vessel extractor (DC20S) 8-vessel extractor (DC20) 12-vessel extractor (DC20B) 24-vessel extractor (DC24C)
Associated Design and Manufacturing Company	Alexandria, VA (703) 549-5999	2-vessel (3740-2-BRE) 4-vessel (3740-4-BRE) 6-vessel (3740-6-BRE) 8-vessel (3740-8-BRE) 12-vessel (3740-12-BRE) 24-vessel (3740-24-BRE)
Environmental Machine and Design, Inc.	Lynchburg, VA (804) 845-6424	8-vessel (08-00-00) 4-vessel (04-00-00)
IRA Machine Shop and Laboratory	Santurce, PR (809) 752-4004	8-vessel (011001)
Lars Lande Manufacturing	Whitmore Lake, MI (313) 449-4116	10-vessel (10VRE) 5-vessel (5VRE) 6-vessel (6VRE)
Millipore Corp.	Bedford, MA (800) 225-3384	4-ZHE or 4 2-liter bottle extractor (YT310RAHW)

[1] Any device that rotates the extraction vessel in an end-over-end fashion at 30 $\pm$ 2 rpm is acceptable.

Table 3.
Suitable Zero-Headspace Extractor Vessels[1]

Company	Location	Model No.
Analytical Testing & Consulting Services, Inc.	Warrington, PA (215) 343-4490	C1O2, Mechanical Pressure Device
Associated Design and Manufacturing Company	Alexandria, VA (703) 549-5999	3745-ZHE, Gas Pressure Device
Lars Lande Manufacturing[2]	Whitmore Lake, MI (313) 449-4116	ZHE-11, Gas Pressure Device
Millipore Corporation	Bedford, MA (800) 225-3384	YT30O9OHW, Gas Pressure Device
Environmental Machine and Design, Inc.	Lynchburg, VA (804) 845-6424	VOLA-TOX1, Gas Pressure Device
Gelman Science	Ann Arbor, MI (800) 521-1520	15400 Gas Pressure Device

[1] Any device that meets the specifications listed in Section 4.2.1 of the method is suitable.

[2] This device uses a 110 mm filter.

Table 4.
Suitable Filter Holders[1]

Company	Location	Model/ Catalogue No.	Size
Nucleopore Corporation	Pleasanton, CA (800) 882-7711	425910 410400	142 mm 47 mm
Micro Filtration Systems	Dublin, CA (800) 334-7132 (415) 828-6010	302400 311400	142 mm 47 mm
Millipore Corporation	Bedford, MA (800) 225-3384	YT30142HW XX1004700	142 mm 47 mm

[1] Any device capable of separating the liquid from the solid phase of the waste is suitable, providing that it is chemically compatible with the waste and the constituents to be analyzed. Plastic devices (not listed above) may be used when only inorganic analytes are of concern. The 142 mm size filter holder is recommended.

Table 5.
Suitable Filter Media[1]

Company	Location	Model	Pore Size (μm)
Millipore Corporation	Bedford, MA (800) 225-3384	AP40	0.7
Nucleopore Corporation	Pleasanton, CA (415) 463-2530	211625	0.7
Whatman Laboratory Products, Inc.	Clifton, NJ (201) 773-5800	GFF	0.7
Micro Filtration Systems	Dublin, CA (800) 334-7132 (415) 828-6010	GF75	0.7
Gelman Science	Ann Arbor, MI (800) 521-1520	66256 (90mm) 66257 (142mm)	0.7

[1] Any filter that meets the specifications in Section 4.4 of the Method is suitable.

Table 6. Multi-Laboratory TCLP Metals, Precision

Waste	Extraction Fluid	Metal	$\bar{X}$	S	%RSD
Ammonia Lime Still Bottoms	#1	Cadmium	0.053	0.031	60
	#2		0.023	0.017	76
	#1	Chromium	0.015	0.0014	93
	#2		0.0032	0.0037	118
	#1	Lead	0.0030	0.0027	90
	#2		0.0032	0.0028	87
API/EW Mixture	#1	Cadmium	0.0046	0.0028	61
	#2		0.0005	0.0004	77
	#1	Chromium	0.0561	0.0227	40
	#2		0.105	0.018	17
	#1	Lead	0.0031	0.0031	100
	#2		0.0124	0.0136	110
Fossil Fuel Fly Ash	#1	Cadmium	0.080	0.069	86
	#2		0.093	0.067	72
	#1	Chromium	0.017	0.014	85
	#2		0.070	0.040	57
	#1	Lead	0.0087	0.0074	85
	#2		0.0457	0.0083	18
				%RSD Range = 17 - 118 Mean %RSD = 74	

NOTE: $\bar{X}$ = Mean results from 6 - 12 different laboratories
Units = mg/L
Extraction Fluid #1 = pH 4.9
#2 = pH 2.9

Table 7. Single-Laboratory Semi-Volatiles, Precision

Waste	Compound	Extraction Fluid	$\bar{X}$	S	%RSD
Ammonia Lime Still Bottoms	Phenol	#1	19000	2230	11.6
		#2	19400	929	4.8
	2-Methylphenol	#1	2000	297	14.9
		#2	1860	52.9	2.8
	4-Methylphenol	#1	7940	1380	17.4
		#2	7490	200	2.7
	2,4-Dimethylphenol	#1	321	46.8	14.6
		#2	307	45.8	14.9
	Naphthalene	#1	3920	413	10.5
		#2	3827	176	4.6
	2-Methylnaphthalene	#1	290	44.8	15.5
		#2	273	19.3	7.1
	Dibenzofuran	#1	187	22.7	12.1
		#2	187	7.2	3.9
	Acenaphthylene	#1	703	89.2	12.7
		#2	663	20.1	3.0
	Fluorene	#1	151	17.6	11.7
		#2	156	2.1	1.3
	Phenanthrene	#1	241	22.7	9.4
		#2	243	7.9	3.3
	Anthracene	#1	33.2	6.19	18.6
		#2	34.6	1.55	4.5
	Fluoranthrene	#1	25.3	1.8	7.1
		#2	26.0	1.8	7.1
API/EW Mixture	Phenol	#1	40.7	13.5	33.0
		#2	19.0	1.76	9.3
	2,4-Dimethylphenol	#1	33.0	9.35	28.3
		#2	43.3	8.61	19.9
	Naphthalene	#1	185	29.4	15.8
		#2	165	24.8	15.0
	2-Methylnaphthalene	#1	265	61.2	23.1
		#2	200	18.9	9.5
				%RSD Range = 1 - 33	
				Mean %RSD = 12	

NOTE: Units = µg/L
Extractions were performed in triplicate
All results were at least 2x the detection limit
Extraction Fluid #1 = pH 4.9
#2 = pH 2.9

Table 8. Multi-Laboratory Semi-Volatiles, Precision

Waste	Compound	Extraction Fluid	$\bar{X}$	S	%RSD
Ammonia Lime	BNAs	#1	10043	7680	76.5
Still Bottoms (A)		#2	10376	6552	63.1
API/EW	BNAs	#1	1624	675	41.6
Mixture (B)		#2	2074	1463	70.5
Fossil Fuel	BNAs	#1	750	175	23.4
Fly Ash (C)		#2	739	342	46.3
					Mean %RSD = 54

NOTE: Units = µg/L
X = Mean results from 3 - 10 labs
Extraction Fluid #1 = pH 4.9
#2 = pH 2.9

%RSD Range for Individual Compounds

A, #1	0 - 113
A, #2	28 - 108
B, #1	20 - 156
B, #2	49 - 128
C, #1	36 - 143
C, #2	61 - 164

Table 9. Multi-Laboratory (11 Labs) VOCs, Precision

Waste	Compound	$\bar{X}$	S	%RSD
Mine Tailings	Vinyl chloride	6.36	6.36	100
	Methylene chloride	12.1	11.8	98
	Carbon disulfide	5.57	2.83	51
	1,1-Dichloroethene	21.9	27.7	127
	1,1-Dichloroethane	31.4	25.4	81
	Chloroform	46.6	29.2	63
	1,2-Dichloroethane	47.8	33.6	70
	2-Butanone	43.5	36.9	85
	1,1,1-Trichloroethane	20.9	20.9	100
	Carbon tetrachloride	12.0	8.2	68
	Trichloroethene	24.7	21.2	86
	1,1,2-Trichloroethene	19.6	10.9	56
	Benzene	37.9	28.7	76
	1,1,2,2-Tetrachloroethane	34.9	25.6	73
	Toluene	29.3	11.2	38
	Chlorobenzene	35.6	19.3	54
	Ethylbenzene	4.27	2.80	66
	Trichlorofluoromethane	3.82	4.40	115
	Acrylonitrile	76.7	110.8	144
Ammonia Lime Still Bottoms	Vinyl chloride	5.00	4.71	94
	Methylene chloride	14.3	13.1	92
	Carbon disulfide	3.37	2.07	61
	1,1-Dichloroethene	52.1	38.8	75
	1,1-Dichloroethane	52.8	25.6	49
	Chloroform	64.7	28.4	44
	1,2-Dichloroethane	43.1	31.5	73
	2-Butanone	59.0	39.6	67
	1,1,1-Trichloroethane	53.6	40.9	76
	Carbon tetrachloride	7.10	6.1	86
	Trichloroethene	57.3	34.2	60
	1,1,2-Trichloroethene	6.7	4.7	70
	Benzene	61.3	26.8	44
	1,1,2,2-Tetrachloroethane	3.16	2.1	66
	Toluene	69.0	18.5	27
	Chlorobenzene	71.8	12.0	17
	Ethylbenzene	3.70	2.2	58
	Trichlorofluoromethane	4.05	4.8	119
	Acrylonitrile	29.4	34.8	118
				%RSD Range = 17 - 144 Mean %RSD = 75

NOTE: Units = µg/L

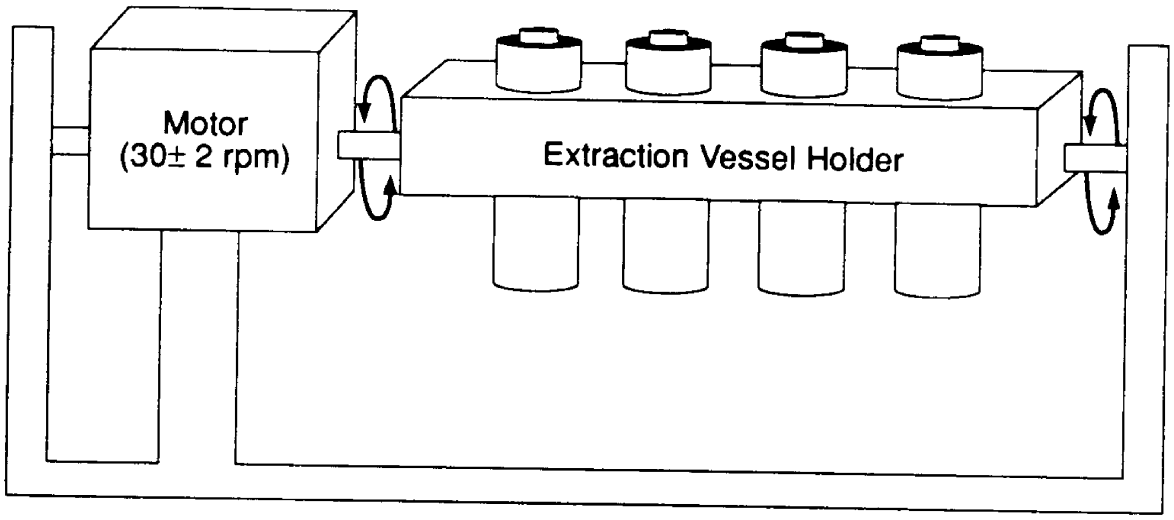


Figure 1. Rotary Agitation Apparatus

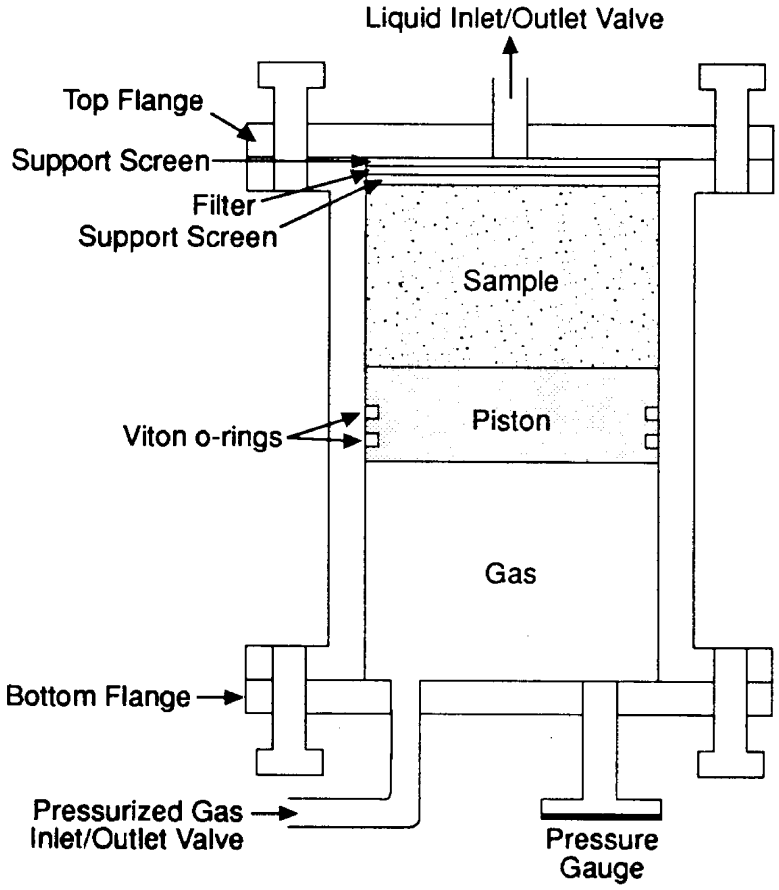
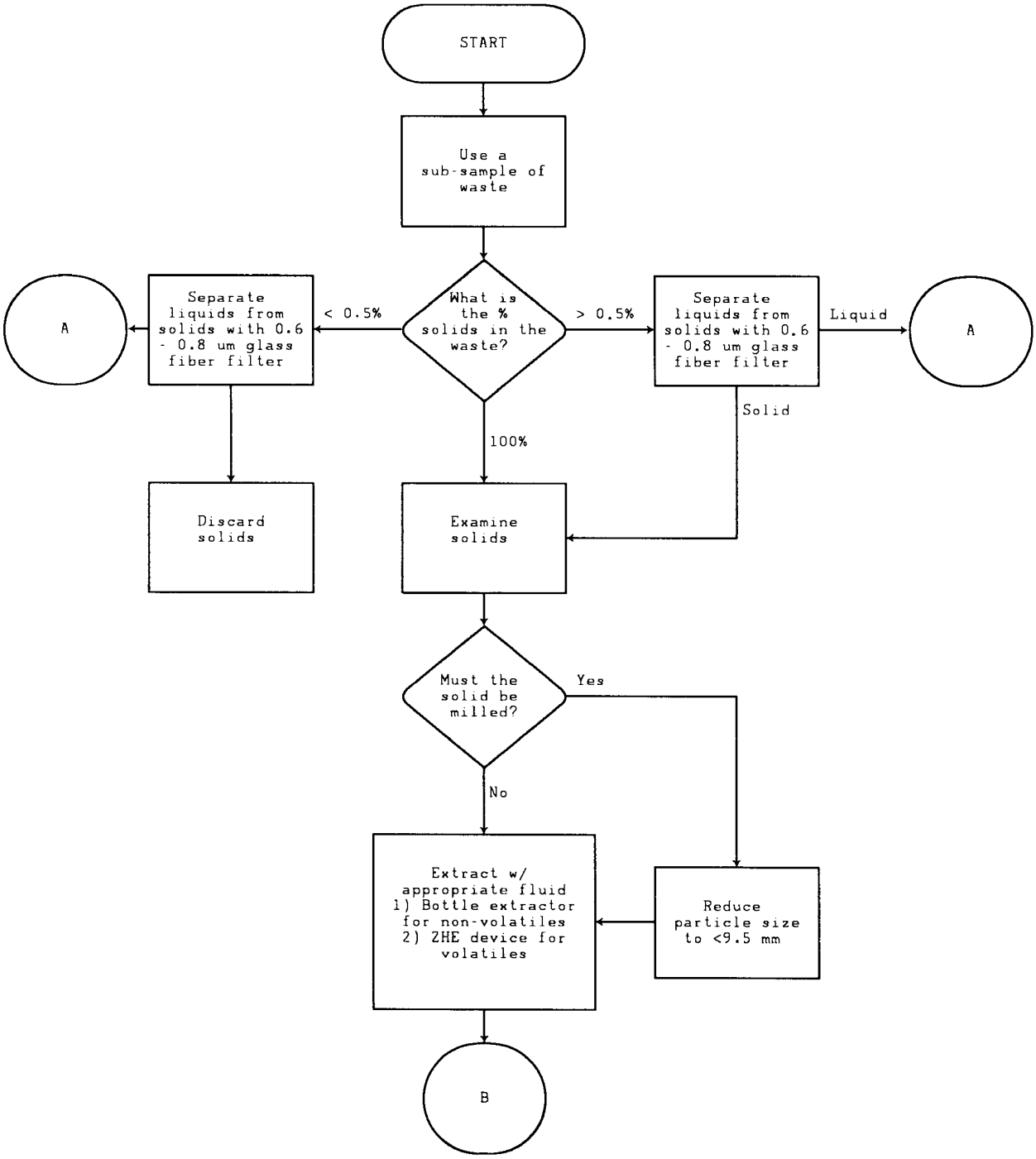
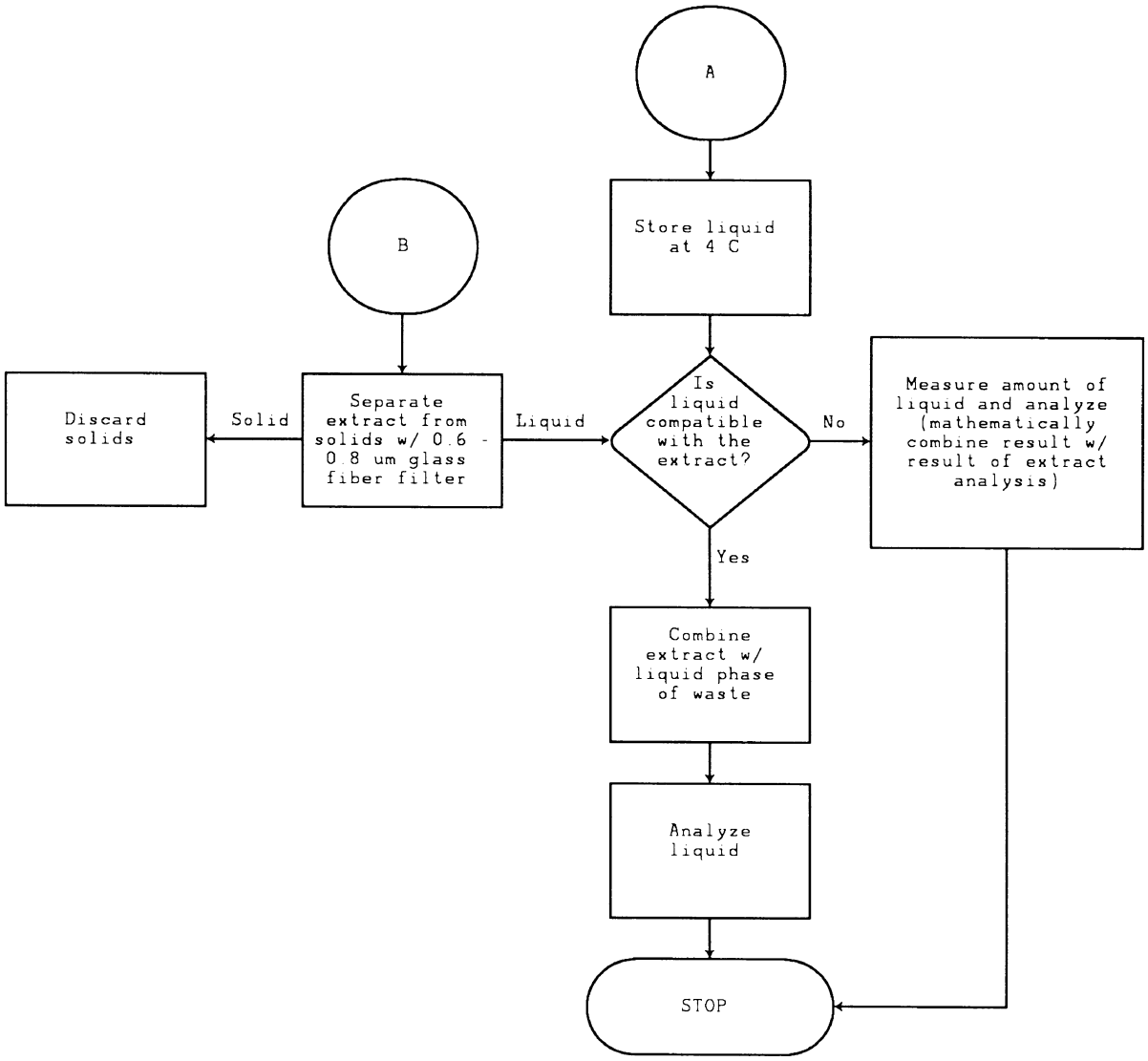


Figure 2. Zero-Headspace Extractor (ZHE)

TOXICITY CHARACTERISTIC LEACHATE PROCEDURE



TOXICITY CHARACTERISTIC LEACHATE PROCEDURE



ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

ALS TECHNICHEM (HK) Pty Ltd
Environmental Division

CERTIFICATE OF ANALYSIS

CONTACT:	MR LI PEI FENG	**Batch:**	HK0813556
CLIENT:	CHINA INTERNATIONAL WATER & ELECTRIC CORP.	**LABORATORY:**	HONG KONG
ADDRESS:	RM 1508, 15/F., FORTRESS TOWER, 250 KING'S ROAD, NORTH POINT, HONG KONG	**DATE RECEIVED:**	13/08/2008
		DATE OF ISSUE:	22/09/2008
		SAMPLE TYPE:	Concrete Cube
PROJECT:	KWAI CHUNG INCINERATION PLANT DEMOLITION AND DECONTAMINATION WORKS	**No. of SAMPLES:**	9

INTRODUCTION

Project:CV/2007/06: Kwai Chung Incineration Plant Demolition and Decontamination Works Pilot Test for Dioxin Contaminated Material of Ash Samples.
Ash samples were collected and casted to Concrete Cubes (70mm x 70mm x 70mm) by the client.
Batch HK0813556 consisted of 9 Concrete Cubes.

LEACHING PROCEDURES (TCLP)

The TCLP leachate was prepared as per USEPA 1311.
Extraction fluid of pH 4.88 - 4.98 was used for leaching on sample HK0813556 - 1 to 7 and 9.
Extraction fluid of pH 2.83 - 2.93 was used for leaching on sample HK0813556 - 8.

ANALYSIS OF SAMPLES

All samples collected were kept in chilled cooler boxes and sent to ALS Prague laboratory for High resolution Gas Chromatograph-Mass Spectrometry (HRGC/HRMS) analysis.
The Dioxin concentrations reported are those determined on the TCLP leachate.

ISSUING LABORATORY: HONG KONG

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General Manager - Hong Kong

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Brisbane	*Hong Kong*	*Vancouver*
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Sydney	*Kuala Lumpur*	*Amtofagasta*
Newcastle	*Bogor*	*Lima*

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A Campbell Brothers Limited Company

CERTIFICATE OF ANALYSIS

Batch: HK0813556
Date of Issue: 22/09/2008
Client: CHINA INTERNATIONAL WATER & ELECTRIC CORP.
Client Reference: KWAI CHUNG INCINERATION PLANT DEMOLITION AND DECONTAMINATION WORKS

ANALYSIS DESCRIPTION			I-TEQ(PCDD/F) lowerbound	I-TEQ(PCDD/F) upperbound
UNIT			pg/L	pg/L
SAMPLE IDENTIFICATION				
ALS Lab ID	Sample ID	Date of Sampling		
HK0813556-1	D1 A	8/8/2008	0	4.0
HK0813556-2	D1 B	8/8/2008	0	4.0
HK0813556-3	D1 C	8/8/2008	0	4.0
HK0813556-4	D11 A	4/08/2008	0	3.5
HK0813556-5	D11 B	4/08/2008	0	3.9
HK0813556-6	D11 C	4/08/2008	0	3.8
HK0813556-7	P2 A	8/08/2008	0	3.6
HK0813556-8	P2 B	8/08/2008	0	3.7
HK0813556-9	P2 C	8/08/2008	0	4.1

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

ALS TECHNICHEM (HK) Pty Ltd
Environmental Division

APPENDIX I

CONTACT:	MR LI PEI FENG	**Batch:**	HK0813556
CLIENT:	CHINA INTERNATIONAL WATER & ELECTRIC CORP.	**LABORATORY:**	HONG KONG
ADDRESS:	RM 1508, 15/F., FORTRESS TOWER, 250 KING'S ROAD, NORTH POINT, HONG KONG	**DATE RECEIVED:**	13/08/2008
		DATE OF ISSUE:	22/09/2008
		SAMPLE TYPE:	Concrete Cube
PROJECT:	KWAI CHUNG INCINERATION PLANT DEMOLITION AND DECONTAMINATION WORKS	**No. of SAMPLES:**	9

DETAILS

LS Czech Republic details report was attached. The attached report contains a total of 11 pages.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

L 1163

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ALS Technichem (HK) Pty Ltd
11/F, Chung Shun Knitting Centre
Richard Fung
1-3 Wing Yip Street
Kwai Chung
Hong Kong

Test Report No. 18563 / 1 / 2008

Prague : 12.9.2008

Project: 0330-V2-08-200 Shipment No.: 941708523937
Date of sampling: -
Date of receipt: 4.9.2008
Sampling procedure: Sampling was performed by the client
Date of test performance: 4.9. - 11.9.2008
Place of test performance: ALS Czech Republic, s.r.o., Laboratoř HRMS, V Ráji 906, 530 02 Pardubice
Test specification, deviations, additions to or exclusions from the test specification and any other information:
D06_06_175 Determination of polychlorinated dibenzo-p-dioxins and dibenzofurans according to US EPA 1613. Analysed by technique: HRGC/HRMS system - Agilent 6890N/Finnigan MAT 95XP resp. Trace GC Ultra/DFS. Resolution HRMS: 10000

Measurement results

sample name	D1 A		D1 B		D1 C		D11 A				
matrix	TCLP		TCLP		TCLP		TCLP				
parameter	result	MU	result	MU	result	MU	result	MU	unit	test specification	
I-TEQ (PCDD/F) lowerbound	0	±20	0	±20	0	±20	0	±20	pg/L	D06_06_175	A
I-TEQ (PCDD/F) upperbound	4,0		4,0		4,0		3,5		pg/L	D06_06_175	A

sample name	D11 B		D11 C		P2 A		P2 B				
matrix	TCLP		TCLP		TCLP		TCLP				
parameter	result	MU	result	MU	result	MU	result	MU	unit	test specification	
I-TEQ (PCDD/F) lowerbound	0	±20	0	±20	0	±20	0	±20	pg/L	D06_06_175	A
I-TEQ (PCDD/F) upperbound	3,9		3,8		3,6		3,7		pg/L	D06_06_175	A

TESTING LABORATORY ACCREDITED BY CAI ALS Czech Republic s.r.o. 1 č. 1163

Ing. Emilie Pokorna
Quality Manager

sample name	P2 C				
matrix	TCLP				
parameter	result	MU	unit	test specification	
I-TEQ (PCDD/F) lowerbound	0	±20	pg/L	D06_06_175	A
I-TEQ (PCDD/F) upperbound	4,1		pg/L	D06_06_175	A

Measurement uncertainty (MU [%]) is expressed as expanded measurement uncertainty with coverage factor k = 2, representing of 95 % significance level.
Parameters indexed by 'A' in the last column of the table are accredited, parameters indexed by 'N' are not accredited.

Annex No. 1 to test Report No. 18563/1/2008

Sample: D1 A

Measurement results:

Sample:	D1 A				
			Final extract [µl]:		40
Sample volume [ml]:	1072		Injection volume [µl]:		4
			Acquisition date [d.m.y h:m]:		10.9.08 17:52
2,3,7,8-PCDD/Fs	Content [pg/l]	Limit of Detection [pg/l]	Limit of Quantification [pg/l]	[1]I-TEFs	I-TEQ [pg/l]
2,3,7,8-TCDD	n.d.	1.3	2.6	1	0
1,2,3,7,8-PeCDD	n.d.	1.5	3.0	0.5	0
1,2,3,4,7,8-HxCDD	n.d.	2.0	4.0	0.1	0
1,2,3,6,7,8-HxCDD	n.d.	2.0	4.0	0.1	0
1,2,3,7,8,9-HxCDD	n.d.	2.0	4.0	0.1	0
1,2,3,4,6,7,8-HpCDD	n.d.	2.7	5.4	0.01	0
OCDD	n.d.	4.1	8.1	0.001	0
2,3,7,8-TCDF	n.d.	1.0	2.1	0.1	0
1,2,3,7,8-PeCDF	n.d.	1.1	2.2	0.05	0
2,3,4,7,8-PeCDF	n.d.	1.1	2.2	0.5	0
1,2,3,4,7,8-HxCDF	n.d.	1.5	3.0	0.1	0
1,2,3,6,7,8-HxCDF	n.d.	1.5	3.0	0.1	0
1,2,3,7,8,9-HxCDF	n.d.	1.5	3.0	0.1	0
2,3,4,6,7,8-HxCDF	n.d.	1.5	3.0	0.1	0
1,2,3,4,6,7,8-HpCDF	n.d.	1.7	3.4	0.01	0
1,2,3,4,7,8,9-HpCDF	n.d.	1.7	3.4	0.01	0
OCDF	n.d.	3.4	6.9	0.001	0
I-TEQ from quantified 2,3,7,8-PCDD/Fs [pg 2,3,7,8-TCDD/l]-"Lowerbound"					**0**
I-TEQ from quantified 2,3,7,8-PCDDs [pg 2,3,7,8-TCDD/l]					0
I-TEQ from quantified 2,3,7,8-PCDFs [pg 2,3,7,8-TCDD/l]					0
I-TEQ from n.d. and non quantified 2,3,7,8-PCDD/Fs [pg 2,3,7,8-TCDD/l]					4.0
Maximum possible I-TEQ [pg 2,3,7,8-TCDD/l]-"Upperbound"					**4.0**

PCDDs	Content [pg/l]	**PCDFs**	Content [pg/l]
Tetra-CDDs	n.d.	Tetra-CDFs	n.d.
Penta-CDDs	n.d.	Penta-CDFs	n.d.
Hexa-CDDs	n.d.	Hexa-CDFs	n.d.
Hepta-CDDs	n.d.	Hepta-CDFs	n.d.
OCDD	n.d.	OCDF	n.d.
Total PCDDs	**n.d.**	**Total PCDFs**	**n.d.**

[1]I-TEF according to NATO.

The limits of quantification are defined as the double of the detection limits.

The limit of detection is defined as the amount of analyte producing a signal with S/N≥3.

The value of the detection limit is mentioned as the actual value at the acquisition date.

Measurement uncertainty is expressed as a double (k=2) relative standard deviation (RSD%), and corresponds to 95% interval of reliability.

Estimation of uncertainty of each 2,3,7,8-PCDD/F congener is 30% and total I-TEQ is 20%.

These values were ensured by analyses of certified reference material under conditions of internal reproducibility. Results marked "<" are situated in the interval of the limit of detection and the limit of quantification and are not quantified.

Results marked "n.d." are lower than the limit of detection.

"Lowerbound" and "Upperbound" are levels defined in Directive 2006/1883/EC a CEN/TS 1948-4:2007.

Annex No. 1 to test Report No. 18563/1/2008

Sample: D1 B

Measurement results:

Sample:	D1 B				
			Final extract [µl]:		40
Sample volume [ml]:	1066		Injection volume [µl]:		4
			Acquisition date [d.m.y h:m]:		10.9.08 18:47
2,3,7,8-PCDD/Fs	Content [pg/l]	Limit of Detection [pg/l]	Limit of Quantification [pg/l]	[1]I-TEFs	I-TEQ [pg/l]
2,3,7,8-TCDD	n.d.	1.2	2.4	1	0
1,2,3,7,8-PeCDD	n.d.	0.97	1.9	0.5	0
1,2,3,4,7,8-HxCDD	n.d.	3.4	6.7	0.1	0
1,2,3,6,7,8-HxCDD	n.d.	3.4	6.7	0.1	0
1,2,3,7,8,9-HxCDD	n.d.	3.4	6.7	0.1	0
1,2,3,4,6,7,8-HpCDD	n.d.	2.5	5.0	0.01	0
OCDD	n.d.	1.9	3.8	0.001	0
2,3,7,8-TCDF	n.d.	1.0	2.0	0.1	0
1,2,3,7,8-PeCDF	n.d.	0.74	1.5	0.05	0
2,3,4,7,8-PeCDF	n.d.	0.74	1.5	0.5	0
1,2,3,4,7,8-HxCDF	n.d.	1.8	3.6	0.1	0
1,2,3,6,7,8-HxCDF	n.d.	1.8	3.6	0.1	0
1,2,3,7,8,9-HxCDF	n.d.	1.8	3.6	0.1	0
2,3,4,6,7,8-HxCDF	n.d.	1.8	3.6	0.1	0
1,2,3,4,6,7,8-HpCDF	n.d.	2.0	4.0	0.01	0
1,2,3,4,7,8,9-HpCDF	n.d.	2.0	4.0	0.01	0
OCDF	n.d.	1.3	2.7	0.001	0
I-TEQ from quantified 2,3,7,8-PCDD/Fs [pg 2,3,7,8-TCDD/l]-"Lowerbound"					**0**
I-TEQ from quantified 2,3,7,8-PCDDs [pg 2,3,7,8-TCDD/l]					0
I-TEQ from quantified 2,3,7,8-PCDFs [pg 2,3,7,8-TCDD/l]					0
I-TEQ from n.d. and non quantified 2,3,7,8-PCDD/Fs [pg 2,3,7,8-TCDD/l]					4.0
Maximum possible I-TEQ [pg 2,3,7,8-TCDD/l]-"Upperbound"					**4.0**

PCDDs	Content [pg/l]	**PCDFs**	Content [pg/l]
Tetra-CDDs	n.d.	Tetra-CDFs	n.d.
Penta-CDDs	n.d.	Penta-CDFs	n.d.
Hexa-CDDs	n.d.	Hexa-CDFs	n.d.
Hepta-CDDs	n.d.	Hepta-CDFs	n.d.
OCDD	n.d.	OCDF	n.d.
Total PCDDs	**n.d.**	**Total PCDFs**	**n.d.**

[1]I-TEF according to NATO.

The limits of quantification are defined as the double of the detection limits.

The limit of detection is defined as the amount of analyte producing a signal with S/N≥3.

The value of the detection limit is mentioned as the actual value at the acquisition date.

Measurement uncertainty is expressed as a double (k=2) relative standard deviation (RSD%), and corresponds to 95% interval of reliability.

Estimation of uncertainty of each 2,3,7,8-PCDD/F congener is 30% and total I-TEQ is 20%.

These values were ensured by analyses of certified reference material under conditions of internal reproducibility. Results marked "<" are situated in the interval of the limit of detection and the limit of quantification and are not quantified.

Results marked "n.d." are lower than the limit of detection.

"Lowerbound" and "Upperbound" are levels defined in Directive 2006/1883/EC a CEN/TS 1948-4:2007.

Annex No. 1 to test Report No. 18563/1/2008

Sample: D1 C

Measurement results:

Sample:	D1 C				
			Final extract [µl]:		40
Sample volume [ml]:	1057		Injection volume [µl]:		4
			Acquisition date [d.m.y h:m]:		10.9.08 19:42
2,3,7,8-PCDD/Fs	Content [pg/l]	Limit of Detection [pg/l]	Limit of Quantification [pg/l]	[1]I-TEFs	I-TEQ [pg/l]
2,3,7,8-TCDD	n.d.	1.1	2.3	1	0
1,2,3,7,8-PeCDD	n.d.	1.5	3.1	0.5	0
1,2,3,4,7,8-HxCDD	n.d.	2.4	4.8	0.1	0
1,2,3,6,7,8-HxCDD	n.d.	2.4	4.8	0.1	0
1,2,3,7,8,9-HxCDD	n.d.	2.4	4.8	0.1	0
1,2,3,4,6,7,8-HpCDD	n.d.	2.9	5.9	0.01	0
OCDD	n.d.	3.1	6.2	0.001	0
2,3,7,8-TCDF	n.d.	2.0	3.9	0.1	0
1,2,3,7,8-PeCDF	n.d.	1.0	2.1	0.05	0
2,3,4,7,8-PeCDF	n.d.	1.0	2.1	0.5	0
1,2,3,4,7,8-HxCDF	n.d.	1.3	2.6	0.1	0
1,2,3,6,7,8-HxCDF	n.d.	1.3	2.6	0.1	0
1,2,3,7,8,9-HxCDF	n.d.	1.3	2.6	0.1	0
2,3,4,6,7,8-HxCDF	n.d.	1.3	2.6	0.1	0
1,2,3,4,6,7,8-HpCDF	n.d.	2.8	5.6	0.01	0
1,2,3,4,7,8,9-HpCDF	n.d.	2.8	5.6	0.01	0
OCDF	n.d.	2.6	5.3	0.001	0
I-TEQ from quantified 2,3,7,8-PCDD/Fs [pg 2,3,7,8-TCDD/l]-"Lowerbound"					**0**
I-TEQ from quantified 2,3,7,8-PCDDs [pg 2,3,7,8-TCDD/l]					0
I-TEQ from quantified 2,3,7,8-PCDFs [pg 2,3,7,8-TCDD/l]					0
I-TEQ from n.d. and non quantified 2,3,7,8-PCDD/Fs [pg 2,3,7,8-TCDD/l]					4.0
Maximum possible I-TEQ [pg 2,3,7,8-TCDD/l]-"Upperbound"					**4.0**

PCDDs	Content [pg/l]	**PCDFs**	Content [pg/l]
Tetra-CDDs	n.d.	Tetra-CDFs	n.d.
Penta-CDDs	n.d.	Penta-CDFs	n.d.
Hexa-CDDs	n.d.	Hexa-CDFs	n.d.
Hepta-CDDs	n.d.	Hepta-CDFs	n.d.
OCDD	n.d.	OCDF	n.d.
Total PCDDs	**n.d.**	**Total PCDFs**	**n.d.**

[1]I-TEF according to NATO.

The limits of quantification are defined as the double of the detection limits.

The limit of detection is defined as the amount of analyte producing a signal with S/N≥3.

The value of the detection limit is mentioned as the actual value at the acquisition date.

Measurement uncertainty is expressed as a double (k=2) relative standard deviation (RSD%), and corresponds to 95% interval of reliability.

Estimation of uncertainty of each 2,3,7,8-PCDD/F congener is 30% and total I-TEQ is 20%.

These values were ensured by analyses of certified reference material under conditions of internal reproducibility. Results marked "<" are situated in the interval of the limit of detection and the limit of quantification and are not quantified.

Results marked "n.d." are lower than the limit of detection.

"Lowerbound" and "Upperbound" are levels defined in Directive 2006/1883/EC a CEN/TS 1948-4:2007.

Annex No. 1 to test Report No. 18563/1/2008

Sample: D11 A

Measurement results:

Sample:	D11 A				
			Final extract [µl]:		40
Sample volume [ml]:	1036		Injection volume [µl]:		4
			Acquisition date [d.m.y h:m]:		10.9.08 20:36
2,3,7,8-PCDD/Fs	Content [pg/l]	Limit of Detection [pg/l]	Limit of Quantification [pg/l]	[1]I-TEFs	I-TEQ [pg/l]
2,3,7,8-TCDD	n.d.	1.1	2.2	1	0
1,2,3,7,8-PeCDD	n.d.	1.8	3.6	0.5	0
1,2,3,4,7,8-HxCDD	n.d.	1.9	3.7	0.1	0
1,2,3,6,7,8-HxCDD	n.d.	1.9	3.7	0.1	0
1,2,3,7,8,9-HxCDD	n.d.	1.9	3.7	0.1	0
1,2,3,4,6,7,8-HpCDD	n.d.	2.0	3.9	0.01	0
OCDD	n.d.	7.3	15	0.001	0
2,3,7,8-TCDF	n.d.	1.5	2.9	0.1	0
1,2,3,7,8-PeCDF	n.d.	0.76	1.5	0.05	0
2,3,4,7,8-PeCDF	n.d.	0.76	1.5	0.5	0
1,2,3,4,7,8-HxCDF	n.d.	0.86	1.7	0.1	0
1,2,3,6,7,8-HxCDF	n.d.	0.86	1.7	0.1	0
1,2,3,7,8,9-HxCDF	n.d.	0.86	1.7	0.1	0
2,3,4,6,7,8-HxCDF	n.d.	0.86	1.7	0.1	0
1,2,3,4,6,7,8-HpCDF	n.d.	2.0	3.9	0.01	0
1,2,3,4,7,8,9-HpCDF	n.d.	2.0	3.9	0.01	0
OCDF	n.d.	6.2	12	0.001	0
I-TEQ from quantified 2,3,7,8-PCDD/Fs [pg 2,3,7,8-TCDD/l]-"Lowerbound"					**0**
I-TEQ from quantified 2,3,7,8-PCDDs [pg 2,3,7,8-TCDD/l]					0
I-TEQ from quantified 2,3,7,8-PCDFs [pg 2,3,7,8-TCDD/l]					0
I-TEQ from n.d. and non quantified 2,3,7,8-PCDD/Fs [pg 2,3,7,8-TCDD/l]					3.5
Maximum possible I-TEQ [pg 2,3,7,8-TCDD/l]-"Upperbound"					**3.5**

PCDDs	Content [pg/l]	**PCDFs**	Content [pg/l]
Tetra-CDDs	n.d.	Tetra-CDFs	n.d.
Penta-CDDs	n.d.	Penta-CDFs	n.d.
Hexa-CDDs	n.d.	Hexa-CDFs	n.d.
Hepta-CDDs	n.d.	Hepta-CDFs	n.d.
OCDD	n.d.	OCDF	n.d.
Total PCDDs	**n.d.**	**Total PCDFs**	**n.d.**

[1]I-TEF according to NATO.

The limits of quantification are defined as the double of the detection limits.

The limit of detection is defined as the amount of analyte producing a signal with S/N≥3.

The value of the detection limit is mentioned as the actual value at the acquisition date.

Measurement uncertainty is expressed as a double (k=2) relative standard deviation (RSD%), and corresponds to 95% interval of reliability.

Estimation of uncertainty of each 2,3,7,8-PCDD/F congener is 30% and total I-TEQ is 20%.

These values were ensured by analyses of certified reference material under conditions of internal reproducibility. Results marked "<" are situated in the interval of the limit of detection and the limit of quantification and are not quantified.

Results marked "n.d." are lower than the limit of detection.

"Lowerbound" and "Upperbound" are levels defined in Directive 2006/1883/EC a CEN/TS 1948-4:2007.

Annex No. 1 to test Report No. 18563/1/2008

Sample: D11 B

Measurement results:

Sample:	D11 B				
			Final extract [µl]:		40
Sample volume [ml]:	1007		Injection volume [µl]:		4
			Acquisition date [d.m.y h:m]:		10.9.08 21:31
2,3,7,8-PCDD/Fs	Content [pg/l]	Limit of Detection [pg/l]	Limit of Quantification [pg/l]	[1]I-TEFs	I-TEQ [pg/l]
2,3,7,8-TCDD	n.d.	1.2	2.5	1	0
1,2,3,7,8-PeCDD	n.d.	1.5	3.0	0.5	0
1,2,3,4,7,8-HxCDD	n.d.	1.8	3.5	0.1	0
1,2,3,6,7,8-HxCDD	n.d.	1.8	3.5	0.1	0
1,2,3,7,8,9-HxCDD	n.d.	1.8	3.5	0.1	0
1,2,3,4,6,7,8-HpCDD	n.d.	2.2	4.4	0.01	0
OCDD	n.d.	3.2	6.3	0.001	0
2,3,7,8-TCDF	n.d.	1.7	3.4	0.1	0
1,2,3,7,8-PeCDF	n.d.	1.1	2.2	0.05	0
2,3,4,7,8-PeCDF	n.d.	1.1	2.2	0.5	0
1,2,3,4,7,8-HxCDF	n.d.	1.4	2.7	0.1	0
1,2,3,6,7,8-HxCDF	n.d.	1.4	2.7	0.1	0
1,2,3,7,8,9-HxCDF	n.d.	1.4	2.7	0.1	0
2,3,4,6,7,8-HxCDF	n.d.	1.4	2.7	0.1	0
1,2,3,4,6,7,8-HpCDF	n.d.	1.1	2.3	0.01	0
1,2,3,4,7,8,9-HpCDF	n.d.	1.1	2.3	0.01	0
OCDF	n.d.	2.7	5.4	0.001	0
I-TEQ from quantified 2,3,7,8-PCDD/Fs [pg 2,3,7,8-TCDD/l]-"Lowerbound"					**0**
I-TEQ from quantified 2,3,7,8-PCDDs [pg 2,3,7,8-TCDD/l]					0
I-TEQ from quantified 2,3,7,8-PCDFs [pg 2,3,7,8-TCDD/l]					0
I-TEQ from n.d. and non quantified 2,3,7,8-PCDD/Fs [pg 2,3,7,8-TCDD/l]					3.9
Maximum possible I-TEQ [pg 2,3,7,8-TCDD/l]-"Upperbound"					**3.9**

PCDDs	Content [pg/l]	**PCDFs**	Content [pg/l]
Tetra-CDDs	n.d.	Tetra-CDFs	n.d.
Penta-CDDs	n.d.	Penta-CDFs	n.d.
Hexa-CDDs	n.d.	Hexa-CDFs	n.d.
Hepta-CDDs	n.d.	Hepta-CDFs	n.d.
OCDD	n.d.	OCDF	n.d.
Total PCDDs	**n.d.**	**Total PCDFs**	**n.d.**

[1]I-TEF according to NATO.

The limits of quantification are defined as the double of the detection limits.

The limit of detection is defined as the amount of analyte producing a signal with S/N≥3.

The value of the detection limit is mentioned as the actual value at the acquisition date.

Measurement uncertainty is expressed as a double (k=2) relative standard deviation (RSD%), and corresponds to 95% interval of reliability.

Estimation of uncertainty of each 2,3,7,8-PCDD/F congener is 30% and total I-TEQ is 20%.

These values were ensured by analyses of certified reference material under conditions of internal reproducibility. Results marked "<" are situated in the interval of the limit of detection and the limit of quantification and are not quantified.

Results marked "n.d." are lower than the limit of detection.

"Lowerbound" and "Upperbound" are levels defined in Directive 2006/1883/EC a CEN/TS 1948-4:2007.

Annex No. 1 to test Report No. 18563/1/2008

Sample: D11 C

Measurement results:

Sample:	D11C				
			Final extract [µl]:		40
Sample volume [ml]:	1017		Injection volume [µl]:		4
			Acquisition date [d.m.y h:m]:		10.9.08 22:26
2,3,7,8-PCDD/Fs	Content [pg/l]	Limit of Detection [pg/l]	Limit of Quantification [pg/l]	[1]I-TEFs	I-TEQ [pg/l]
2,3,7,8-TCDD	n.d.	1.1	2.2	1	0
1,2,3,7,8-PeCDD	n.d.	1.9	3.9	0.5	0
1,2,3,4,7,8-HxCDD	n.d.	1.6	3.2	0.1	0
1,2,3,6,7,8-HxCDD	n.d.	1.6	3.2	0.1	0
1,2,3,7,8,9-HxCDD	n.d.	1.6	3.2	0.1	0
1,2,3,4,6,7,8-HpCDD	n.d.	1.8	3.7	0.01	0
OCDD	n.d.	2.1	4.3	0.001	0
2,3,7,8-TCDF	n.d.	1.8	3.6	0.1	0
1,2,3,7,8-PeCDF	n.d.	1.0	1.9	0.05	0
2,3,4,7,8-PeCDF	n.d.	1.0	1.9	0.5	0
1,2,3,4,7,8-HxCDF	n.d.	1.2	2.4	0.1	0
1,2,3,6,7,8-HxCDF	n.d.	1.2	2.4	0.1	0
1,2,3,7,8,9-HxCDF	n.d.	1.2	2.4	0.1	0
2,3,4,6,7,8-HxCDF	n.d.	1.2	2.4	0.1	0
1,2,3,4,6,7,8-HpCDF	n.d.	1.4	2.8	0.01	0
1,2,3,4,7,8,9-HpCDF	n.d.	1.4	2.8	0.01	0
OCDF	n.d.	1.8	3.6	0.001	0
I-TEQ from quantified 2,3,7,8-PCDD/Fs [pg 2,3,7,8-TCDD/l]-"Lowerbound"					**0**
I-TEQ from quantified 2,3,7,8-PCDDs [pg 2,3,7,8-TCDD/l]					0
I-TEQ from quantified 2,3,7,8-PCDFs [pg 2,3,7,8-TCDD/l]					0
I-TEQ from n.d. and non quantified 2,3,7,8-PCDD/Fs [pg 2,3,7,8-TCDD/l]					3.8
Maximum possible I-TEQ [pg 2,3,7,8-TCDD/l]-"Upperbound"					**3.8**

PCDDs	Content [pg/l]	**PCDFs**	Content [pg/l]
Tetra-CDDs	n.d.	Tetra-CDFs	n.d.
Penta-CDDs	n.d.	Penta-CDFs	n.d.
Hexa-CDDs	n.d.	Hexa-CDFs	n.d.
Hepta-CDDs	n.d.	Hepta-CDFs	n.d.
OCDD	n.d.	OCDF	n.d.
Total PCDDs	**n.d.**	**Total PCDFs**	**n.d.**

[1]I-TEF according to NATO.

The limits of quantification are defined as the double of the detection limits.

The limit of detection is defined as the amount of analyte producing a signal with S/N≥3.

The value of the detection limit is mentioned as the actual value at the acquisition date.

Measurement uncertainty is expressed as a double (k=2) relative standard deviation (RSD%), and corresponds to 95% interval of reliability.

Estimation of uncertainty of each 2,3,7,8-PCDD/F congener is 30% and total I-TEQ is 20%.

These values were ensured by analyses of certified reference material under conditions of internal reproducibility. Results marked "<" are situated in the interval of the limit of detection and the limit of quantification and are not quantified.

Results marked "n.d." are lower than the limit of detection.

"Lowerbound" and "Upperbound" are levels defined in Directive 2006/1883/EC a CEN/TS 1948-4:2007.

Annex No. 1 to test Report No. 18563/1/2008

Sample: P2 A

Measurement results:

Sample:	P2 A				
			Final extract [µl]:		40
Sample volume [ml]:	1046		Injection volume [µl]:		4
			Acquisition date [d.m.y h:m]:		10.9.08 23:21
2,3,7,8-PCDD/Fs	Content [pg/l]	Limit of Detection [pg/l]	Limit of Quantification [pg/l]	[1]I-TEFs	I-TEQ [pg/l]
2,3,7,8-TCDD	n.d.	1.1	2.2	1	0
1,2,3,7,8-PeCDD	n.d.	1.5	2.9	0.5	0
1,2,3,4,7,8-HxCDD	n.d.	1.4	2.8	0.1	0
1,2,3,6,7,8-HxCDD	n.d.	1.4	2.8	0.1	0
1,2,3,7,8,9-HxCDD	n.d.	1.4	2.8	0.1	0
1,2,3,4,6,7,8-HpCDD	n.d.	2.0	3.9	0.01	0
OCDD	n.d.	3.3	6.6	0.001	0
2,3,7,8-TCDF	n.d.	1.2	2.3	0.1	0
1,2,3,7,8-PeCDF	n.d.	1.3	2.5	0.05	0
2,3,4,7,8-PeCDF	n.d.	1.3	2.5	0.5	0
1,2,3,4,7,8-HxCDF	n.d.	1.1	2.3	0.1	0
1,2,3,6,7,8-HxCDF	n.d.	1.1	2.3	0.1	0
1,2,3,7,8,9-HxCDF	n.d.	1.1	2.3	0.1	0
2,3,4,6,7,8-HxCDF	n.d.	1.1	2.3	0.1	0
1,2,3,4,6,7,8-HpCDF	n.d.	1.5	2.9	0.01	0
1,2,3,4,7,8,9-HpCDF	n.d.	1.5	2.9	0.01	0
OCDF	n.d.	2.8	5.6	0.001	0
I-TEQ from quantified 2,3,7,8-PCDD/Fs [pg 2,3,7,8-TCDD/l]-"Lowerbound"					**0**
I-TEQ from quantified 2,3,7,8-PCDDs [pg 2,3,7,8-TCDD/l]					0
I-TEQ from quantified 2,3,7,8-PCDFs [pg 2,3,7,8-TCDD/l]					0
I-TEQ from n.d. and non quantified 2,3,7,8-PCDD/Fs [pg 2,3,7,8-TCDD/l]					3.6
Maximum possible I-TEQ [pg 2,3,7,8-TCDD/l]-"Upperbound"					**3.6**

PCDDs	Content [pg/l]	**PCDFs**	Content [pg/l]
Tetra-CDDs	n.d.	Tetra-CDFs	n.d.
Penta-CDDs	n.d.	Penta-CDFs	n.d.
Hexa-CDDs	n.d.	Hexa-CDFs	n.d.
Hepta-CDDs	n.d.	Hepta-CDFs	n.d.
OCDD	n.d.	OCDF	n.d.
Total PCDDs	**n.d.**	**Total PCDFs**	**n.d.**

[1]I-TEF according to NATO.

The limits of quantification are defined as the double of the detection limits.

The limit of detection is defined as the amount of analyte producing a signal with S/N≥3.

The value of the detection limit is mentioned as the actual value at the acquisition date.

Measurement uncertainty is expressed as a double (k=2) relative standard deviation (RSD%), and corresponds to 95% interval of reliability.

Estimation of uncertainty of each 2,3,7,8-PCDD/F congener is 30% and total I-TEQ is 20%.

These values were ensured by analyses of certified reference material under conditions of internal reproducibility. Results marked "<" are situated in the interval of the limit of detection and the limit of quantification and are not quantified.

Results marked "n.d." are lower than the limit of detection.

"Lowerbound" and "Upperbound" are levels defined in Directive 2006/1883/EC a CEN/TS 1948-4:2007.

Annex No. 1 to test Report No. 18563/1/2008

Sample: P2 B

Measurement results:

Sample:	P2 B				
			Final extract [µl]:		40
Sample volume [ml]:	1029		Injection volume [µl]:		4
			Acquisition date [d.m.y h:m]:		11.9.08 0:16
2,3,7,8-PCDD/Fs	Content [pg/l]	Limit of Detection [pg/l]	Limit of Quantification [pg/l]	[1]I-TEFs	I-TEQ [pg/l]
2,3,7,8-TCDD	n.d.	0.87	1.7	1	0
1,2,3,7,8-PeCDD	n.d.	1.4	2.8	0.5	0
1,2,3,4,7,8-HxCDD	n.d.	2.0	4.0	0.1	0
1,2,3,6,7,8-HxCDD	n.d.	2.0	4.0	0.1	0
1,2,3,7,8,9-HxCDD	n.d.	2.0	4.0	0.1	0
1,2,3,4,6,7,8-HpCDD	n.d.	2.7	5.3	0.01	0
OCDD	n.d.	4.5	9.0	0.001	0
2,3,7,8-TCDF	n.d.	1.2	2.5	0.1	0
1,2,3,7,8-PeCDF	n.d.	1.1	2.2	0.05	0
2,3,4,7,8-PeCDF	n.d.	1.1	2.2	0.5	0
1,2,3,4,7,8-HxCDF	n.d.	1.7	3.5	0.1	0
1,2,3,6,7,8-HxCDF	n.d.	1.7	3.5	0.1	0
1,2,3,7,8,9-HxCDF	n.d.	1.7	3.5	0.1	0
2,3,4,6,7,8-HxCDF	n.d.	1.7	3.5	0.1	0
1,2,3,4,6,7,8-HpCDF	n.d.	2.3	4.7	0.01	0
1,2,3,4,7,8,9-HpCDF	n.d.	2.3	4.7	0.01	0
OCDF	n.d.	2.5	5.0	0.001	0
I-TEQ from quantified 2,3,7,8-PCDD/Fs [pg 2,3,7,8-TCDD/l]-"Lowerbound"					**0**
I-TEQ from quantified 2,3,7,8-PCDDs [pg 2,3,7,8-TCDD/l]					0
I-TEQ from quantified 2,3,7,8-PCDFs [pg 2,3,7,8-TCDD/l]					0
I-TEQ from n.d. and non quantified 2,3,7,8-PCDD/Fs [pg 2,3,7,8-TCDD/l]					3.7
Maximum possible I-TEQ [pg 2,3,7,8-TCDD/l]-"Upperbound"					**3.7**

PCDDs	Content [pg/l]	**PCDFs**	Content [pg/l]
Tetra-CDDs	n.d.	Tetra-CDFs	n.d.
Penta-CDDs	n.d.	Penta-CDFs	n.d.
Hexa-CDDs	n.d.	Hexa-CDFs	n.d.
Hepta-CDDs	n.d.	Hepta-CDFs	n.d.
OCDD	n.d.	OCDF	n.d.
Total PCDDs	**n.d.**	**Total PCDFs**	**n.d.**

[1]I-TEF according to NATO.

The limits of quantification are defined as the double of the detection limits.

The limit of detection is defined as the amount of analyte producing a signal with S/N≥3.

The value of the detection limit is mentioned as the actual value at the acquisition date.

Measurement uncertainty is expressed as a double (k=2) relative standard deviation (RSD%), and corresponds to 95% interval of reliability.

Estimation of uncertainty of each 2,3,7,8-PCDD/F congener is 30% and total I-TEQ is 20%.

These values were ensured by analyses of certified reference material under conditions of internal reproducibility. Results marked "<" are situated in the interval of the limit of detection and the limit of quantification and are not quantified.

Results marked "n.d." are lower than the limit of detection.

"Lowerbound" and "Upperbound" are levels defined in Directive 2006/1883/EC a CEN/TS 1948-4:2007.

Annex No. 1 to test Report No. 18563/1/2008

Sample: P2 C

Measurement results:

Sample:	P2 C				
			Final extract [µl]:		40
Sample volume [ml]:	1055		Injection volume [µl]:		4
			Acquisition date [d.m.y h:m]:		11.9.08 1:10
2,3,7,8-PCDD/Fs	Content [pg/l]	Limit of Detection [pg/l]	Limit of Quantification [pg/l]	[1]I-TEFs	I-TEQ [pg/l]
2,3,7,8-TCDD	n.d.	1.3	2.6	1	0
1,2,3,7,8-PeCDD	n.d.	1.8	3.6	0.5	0
1,2,3,4,7,8-HxCDD	n.d.	1.8	3.7	0.1	0
1,2,3,6,7,8-HxCDD	n.d.	1.8	3.7	0.1	0
1,2,3,7,8,9-HxCDD	n.d.	1.8	3.7	0.1	0
1,2,3,4,6,7,8-HpCDD	n.d.	3.7	7.5	0.01	0
OCDD	n.d.	2.2	4.4	0.001	0
2,3,7,8-TCDF	n.d.	2.3	4.5	0.1	0
1,2,3,7,8-PeCDF	n.d.	0.66	1.3	0.05	0
2,3,4,7,8-PeCDF	n.d.	0.66	1.3	0.5	0
1,2,3,4,7,8-HxCDF	n.d.	1.7	3.3	0.1	0
1,2,3,6,7,8-HxCDF	n.d.	1.7	3.3	0.1	0
1,2,3,7,8,9-HxCDF	n.d.	1.7	3.3	0.1	0
2,3,4,6,7,8-HxCDF	n.d.	1.7	3.3	0.1	0
1,2,3,4,6,7,8-HpCDF	n.d.	2.3	4.5	0.01	0
1,2,3,4,7,8,9-HpCDF	n.d.	2.3	4.5	0.01	0
OCDF	n.d.	2.6	5.2	0.001	0
I-TEQ from quantified 2,3,7,8-PCDD/Fs [pg 2,3,7,8-TCDD/l]-"Lowerbound"					**0**
I-TEQ from quantified 2,3,7,8-PCDDs [pg 2,3,7,8-TCDD/l]					0
I-TEQ from quantified 2,3,7,8-PCDFs [pg 2,3,7,8-TCDD/l]					0
I-TEQ from n.d. and non quantified 2,3,7,8-PCDD/Fs [pg 2,3,7,8-TCDD/l]					4.1
Maximum possible I-TEQ [pg 2,3,7,8-TCDD/l]-"Upperbound"					**4.1**

PCDDs	Content [pg/l]	**PCDFs**	Content [pg/l]
Tetra-CDDs	n.d.	Tetra-CDFs	n.d.
Penta-CDDs	n.d.	Penta-CDFs	n.d.
Hexa-CDDs	n.d.	Hexa-CDFs	n.d.
Hepta-CDDs	n.d.	Hepta-CDFs	n.d.
OCDD	n.d.	OCDF	n.d.
Total PCDDs	**n.d.**	**Total PCDFs**	**n.d.**

[1]I-TEF according to NATO.

The limits of quantification are defined as the double of the detection limits.

The limit of detection is defined as the amount of analyte producing a signal with S/N≥3.

The value of the detection limit is mentioned as the actual value at the acquisition date.

Measurement uncertainty is expressed as a double (k=2) relative standard deviation (RSD%), and corresponds to 95% interval of reliability.

Estimation of uncertainty of each 2,3,7,8-PCDD/F congener is 30% and total I-TEQ is 20%.

These values were ensured by analyses of certified reference material under conditions of internal reproducibility. Results marked "<" are situated in the interval of the limit of detection and the limit of quantification and are not quantified.

Results marked "n.d." are lower than the limit of detection.

"Lowerbound" and "Upperbound" are levels defined in Directive 2006/1883/EC a CEN/TS 1948-4:2007.

Appendix G

G1 – Waste Disposal Delivery Scheulde to Landfill Site
G2 – Yearly Summary Waste Flow Table
G3 – Monthly Summary Waste Flow Table

Contract No. CV/2007/06
Kwai Chung Incineration Plant Demolition and Decontamination
Waste Disposal Delivery Schedule to Designated Landfill Site (Exclude the Period of Land Decontamination Works)

Type of Wastes	Estimated Quantity, m^3																					**Total, m^3**
	2007	2008												2009								
	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	
ACM										118	118	118	118				26					26	***524***
DCM																50	50	87	37	37	37	38	***336***
Non-inert C&D & general refuse	100	100	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	***1,200***
Total	**100**	**100**	**50**	**50**	**50**	**50**	**50**	**50**	**50**	**168**	**168**	**168**	**168**	**50**	**50**	**100**	**126**	**137**	**87**	**87**	**87**	**114**	**2,060**

Note: ACM wastes will be disposed of from Sep 08 to Sep 09 and DCM wastes will be disposed of from Mar 09 to Sep 09 as programmed.

Contract No. CV/2007/06
Kwai Chung Incineration Plant Demolition and Decontamination Works

Yearly Summary Waste Flow Table

Year	Estimated Annual Quantities of Inert C&D Materials (in '000m^3)										Estimated Annual Quantities of C&D Wastes									
	Total Quantity Generated		Broken Concrete (see Note 4)		Reused in the Contract		Reused in other Projects		Disposed as Public Fill		Metals		Paper/ cardboard packaging		Plastics (see Note 3)		Chemical Waste (incld. ACM, DCM, spent oil) (see Note 5)		Others, e.g. general refuse	
	(a)		(b)		(c)		(d)		(a-b-c-d)		(in '000 kg)		(in '000kg)		(in '000kg)		(in '000m^3)		(in '000m^3)	
	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.
2007	0.00	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	0.10	0.05
2008	0.27	1.71	-	0.00	-	0.00	-	0.00	-	0.0405	0	187.43	1.20	0.023	1.20	0.005	0.472	182.25	0.70	0.26
2009	9.13		-		-		-		9.40		1,920		0.90		0.90		0.388		0.45	
Grand Total	9.40	1.71	0.00	0.00	0.00	0.00	0.00	0.00	9.40	0.04	1,920	187.43	2.10	0.02	2.10	0.01	0.860	182.25	1.25	0.32

Notes: (1) The performance targets are given in Sub-clause 2(5)(c) of this Appendix to the PS.

(2) The waste flow table shall also include C&D materials that are specified in the Contract to be imported for use at the Site.

(3) Plastics refer to plastic bottles/containers, plastic sheets/foam from packaging material

(4) Broken concrete for recycling into aggregates

(5) ACM wastes will be disposed of from Sep 08 to Sep 09 and DCM wastes will be disposed of from Jan 09 to Sep 09 as programmed.

Contract No. CV/2007/06
Kwai Chung Incineration Plant Demolition and Decontamination Works

Monthly Summary Waste Flow Table for 2007

Month	Actual Quantities of Inert C&D Materials Generated Monthly										Actual Quantities of C&D Wastes Generated Monthly									
	Total Quantity Generated		Broken Concrete (see Note 4)		Reused in the Contract		Reused in other Projects		Disposed as Public Fill		Metals		Paper/ cardboard packaging		Plastics (see Note 3)		Chemical Waste (incld. ACM, DCM, spent oil, cont. soil)		Others, e.g. general refuse	
	(in '000m^3)		(in '000m^3)		(in '000m^3)		(in '000m^3)		(in '000m^3)		(in '000 kg)		(in '000kg)		(in '000kg)		(in '000kg)		(in '000m^3)	
	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.
Jan																				
Feb																				
Mar																				
Apr																				
May																				
June																				
Sub-total																				
July																				
Aug																				
Sept																				
Oct																				
Nov																				
Dec	0.00	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	0.10	0.0540
Total	0.00	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	0.10	0.0540

Notes: (1) The performance targets are given in Sub-clause 2(5)(c) of this Appendix to the PS.

(2) The waste flow table shall also include C&D materials that are specified in the Contract to be imported for use at the Site.

(3) Plastics refer to plastic bottles/containers, plastic sheets/foam from packaging material

(4) Broken concrete for recycling into aggregates

Contract No. CV/2007/06
Kwai Chung Incineration Plant Demolition and Decontamination Works

Monthly Summary Waste Flow Table for 2008

Month	Actual Quantities of Inert C&D Materials Generated Monthly										Actual Quantities of C&D Wastes Generated Monthly									
	Total Quantity Generated		Broken Concrete (see Note 4)		Reused in the Contract		Reused in other Projects		Disposed as Public Fill (e.g. site clearance)		Metals		Paper/ cardboard packaging		Plastics (see Note 3)		Chemical Waste (incld. ACM, DCM, spent oil, cont. soil) (see Note 5)		Others, e.g. general refuse, site clearance	
	(in '000m^3)		(in '000m^3)		(in '000m^3)		(in '000m^3)		(in '000m^3)		(in '000 kg)		(in '000kg)		(in '000kg)		(in '000m^3)		(in '000m^3)	
	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.
Jan	0.00	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	0.10	0.10	0.10	0.10	-	0.00	0.10	0.0585
Feb	0.00	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	0.10	0.10	0.10	0.10	-	0.00	0.10	0.0630
Mar	0.00	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	0.10	0.10	0.10	0.10	-	0.00	0.05	0.0180
Apr	0.00	0.0225	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	0.10	0.10	0.10	0.10	-	0.00	0.05	0.0045
May	0.00	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	3.20	0.10	0.10	0.10	0.10	-	0.00	0.05	0.0000
June	0.00	0.00	-	0.00	-	0.00	-	0.00	-	0.0225	-	8.10	0.10	0.10	0.10	0.10	-	0.00	0.05	0.0135
Sub-total	0.00	0.0225	-	0.00	-	0.00	-	0.00	0.00	0.0225	0.00	11.30	0.60	0.60	0.60	0.60	0.00	0.00	0.40	0.1575
July	0.00	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	0.10	0.10	0.10	0.10	-	0.00	0.05	0.0090
Aug	0.135	0.018	-	0.00	-	0.00	-	0.00	-	0.018	-	0.00	0.10	0.00	0.10	0.00	-	0.00	0.05	0.0090
Sept	0.135	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	9.00	0.10	0.018	0.10	0.005	0.1180	0.0657	0.05	0.0180
Oct	0.00	0.3950	-	0.00	-	0.00	-	0.00	-	0.00	-	16.12	0.10	0.00	0.10	0.00	0.1180	0.0850	0.05	0.0180
Nov	0.00	0.1280	-	0.00	-	0.00	-	0.00	-	0.00	-	16.90	0.10	0.005	0.10	0.00	0.1180	0.0354	0.05	0.0315
Dec	0.00	1.0760	-	0.00	-	0.00	-	0.00	-	0.00	-	133.64	0.10	0.00	0.10	0.00	0.1180	0.1425	0.05	0.0180
Total	0.27	1.6395	-		-		-		0.00	0.0405	0.00	186.96	1.20	0.72	1.20	0.71	0.4720	0.3286	0.70	0.2610

Notes: (1) The performance targets are given in Sub-clause 2(5)(c) of this Appendix to the PS.

(2) The waste flow table shall also include C&D materials that are specified in the Contract to be imported for use at the Site.

(3) Plastics refer to plastic bottles/containers, plastic sheets/foam from packaging material

(4) Broken concrete for recycling into aggregates

(5) ACM wastes will be disposed of from Sep 08 to Sep 09 and DCM wastes will be disposed of from Mar 09 to Sep 09 as programmed.

Contract No. CV/2007/06
Kwai Chung Incineration Plant Demolition and Decontamination Works

Monthly Summary Waste Flow Table for 2009

Month	Actual Quantities of Inert C&D Materials Generated Monthly										Actual Quantities of C&D Wastes Generated Monthly									
	Total Quantity Generated		Broken Concrete (see Note 4)		Reused in the Contract		Reused in other Projects		Disposed as Public Fill (e.g. site clearance)		Metals		Paper/ cardboard packaging		Plastics (see Note 3)		Chemical Waste (incld. ACM, DCM, spent oil, cont. soil) (see Note 5)		Others, e.g. general refuse	
	(in '000m^3)		(in '000m^3)		(in '000m^3)		(in '000m^3)		(in '000m^3)		(in '000 kg)		(in '000kg)		(in '000kg)		(in '000m^3)		(in '000m^3)	
	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.
Jan	0.95		-		-		-		1.22		213		0.10		0.10		0.0000		0.05	
Feb	1.03		-		-		-		1.03		213		0.10		0.10		0.0000		0.05	
Mar	1.03		-		-		-		1.03		213		0.10		0.10		0.0500		0.05	
Apr	1.03		-		-		-		1.03		213		0.10		0.10		0.0760		0.05	
May	1.03		-		-		-		1.03		213		0.10		0.10		0.0870		0.05	
June	1.03		-		-		-		1.03		213		0.10		0.10		0.0370		0.05	
Sub-total	6.10		-		-		-		6.37		1,278		0.60		0.60		0.250		0.30	
July	1.03		-		-		-		1.03		213		0.10		0.10		0.0370		0.05	
Aug	1.00		-		-		-		1.00		213		0.10		0.10		0.0370		0.05	
Sept	1.00		-		-		-		1.00		216		0.10		0.10		0.0640		0.05	
Oct	0.00		-		-		-		-		-		-		-		-		-	
Nov	0.00		-		-		-		-		-		-		-		-		-	
Dec	0.00		-		-		-		-		-		-		-		-		-	
Total	9.13		-		-		-		9.40		1,920		0.90		0.90		0.3880		0.45	

Notes:
(1) The performance targets are given in Sub-clause 2(5)(c) of this Appendix to the PS.
(2) The waste flow table shall also include C&D materials that are specified in the Contract to be imported for use at the Site.
(3) Plastics refer to plastic bottles/containers, plastic sheets/foam from packaging material
(4) Broken concrete for recycling into aggregates
(5) Spent oil generation is estimated from Jan 09 to Sep 09 during the demolition works. Land decontamination work is scheduled from Oct 09. Actual volume of contaminated soil to be disposed of is subjected to percentage of cement mixture and will present in separated WMP.

Appendix H

Site Management Plan for Trip-ticket System

List of Appendices of Appendix H

Appendix 1 Management Structure for TTS
Appendix 2 Yearly Summary Waste Flow Table
Appendix 3 Monthly Summary Waste Flow Table
Appendix 4 Site procedure s to ensure each truckload of C&D material leaving the Site will bear a duly completed DDF
Appendix 5 Proposed Mechanism to ensure timely retrieval of DDF
Appendix 6 Register of the DDF issued
Appendix 7 Control Measures to track internal movement of materials
Appendix 8 Sample Format of the Construction and Demolition Material Disposal Delivery Form
Appendix 9 Works Execution Plan by Chun Ming Machinery Engineering Ltd. for Chun Ming Vessel No. 23, 33, 68, 78
Appendix 10 Written Instruction to Barge Operator & Truck Drivers
Appendix 11 Site Layout Plan Showing Outlets

Contract No. CV / 2007 / 06
Kwai Chung Incineration Plant
Demolition and Decontamination Works

Site Management Plan for TRIP TICKET SYSTEM

(Version 1.3)

CONTENT

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1. Introduction

The Site Management Plan for Implementation of trip-ticket system (TTS) has been developed for implementation of measures, procedures and initiatives to control and manage the removal of construction and demolition (C&D) materials arising from the construction work of CEDD Contract CV/2007/06 (the Contract) compliance with the CEDD& Environmental Protection Departments requirements and to C&D materials from this contract site to the designated disposal ground. The inert portion of C&D materials which is comprising soil, broken rock and concrete shall be disposed of at specified public fill reception facilities (PFPF) at Fill bank of Tuen Mun Area 38 or other designated area as directed by the Engineer as mentioned in PS Clause 25.25A of the Contract. The non-inert portion of the C&D materials that are not recyclable shall be disposed of at SENT landfill as listed in PS Clause 25.25A of the Contract. In accordance with Construction Waste Disposal Charging Scheme came into operation on 1 December 2005, the Main Contractor has opened a billing account **CHIT A/C – 7006285 as per** EPD/EID's letter ref.: WFG06164 dated 16 November 2007 for the Contract. This TTS concentrated on the continued monitoring the disposal of C&D and solid wastes to public filling facilities and landfills under a three ways approach:

- Sets out TTS in most efficient way
- Implemented under the supervision
- Regularly reviewing the situation and ensure TTS dovetail with current or works programme

This TTS will be achieved by:

1. Sets out the system to ensure all C&D waste material being disposed to designated disposal ground;

2. Identify other construction projects where such C& D waste materials can be reused;

3. Sets out the system with a view to enhance knowledge on solid waste control and to increase awareness and to ensure no illegal dumping of C&D waste materials;

4. Establish a site management plan and ensure implementation under

the supervision of the Contractor Environmental Team;

5. Establish and follow closely the general procedures of record keeping.

6. Monitor TTS performance by including review of site management plan and implementation of TTS and review of NC incidents and follow up actions in agenda of the site safety and environmental committee meeting and site safety and environmental management committee meeting.

7. Sets out the system to ensure no improper disposal and major improper disposal.

8. Sets out a recording system to ensure timely retrieval of the DDF and receipt from the disposal grounds, and makes it available for inspection by the Engineer's Representative or his staffs upon request or where irregularities are observed.

2. Disposal of C&D Materials to Designated Disposal Ground

2.1 The C&D materials includes the inert portion and the non-inert portion.

2.2 The inert portion comprising the followings:

a. Soil
b. Broken rock
c. Broken concrete etc.

2.3 The non-inert portion comprising

a. Steel
b. Timber etc.
c. Plastic.

2.4 The inert portion of C&D materials shall be disposed of at Public Fill of Tuen Mun Area 38 or other designated area as directed by the Engineer.

2.5 The non-inert portion of C&D materials such as steel waste shall be reused or recycled by steel waste collector collected on site.

2.6 The non-inert portion of C&D materials that are not recycled or reused shall be disposed of at a landfill (or landfills) to be designated by the Waste Disposal Authority (WDA).

2.7 The waste load shall be delivered by truck with power-operated covered as stated in Appendix 32 to PS.

2.8 Disposal of all C& D materials/waste shall through marine transport by means of barge.

3. Site Management Plan for Trip Ticket Implementation

3.1 Site Organization and Staff Duties

3.1.1 Site Organization Chart –

Please refer to attached management structure in Appendix No. 1.

3.1.2 Duties of Staff –

a. **Site Agent** is resident on site and is the point of contact for day-to-day waste management issues. He has responsibility for coordinating all waste management matters with the Engineer Representative, EO, Waste Manager and environmental team;

b. **Environmental Officer**

- Monitoring the performance of the Waste Manager in overseeing the implementation of TTS;
- Identifies/Recommend of remedial actions and ensure implementation of solution to any problems arising.

c. **Waste Manager**

- The senior staff member (with more than two years experience in site management) fully implementing and overseeing the operation of TTS and ensure that no NC is observed during the operation;
- Prepares of C&D waste disposal records and keep adequate and proper records for inspection by the Engineer Representative; and
- Investigates potential re-use and recycle opportunities of waste generated.

d**. General Foreman –**

- Supervises the exit from the Site for the purpose of checking every truck carrying C&D materials leaving the Site; and
- Supervises and ensure all truck drivers bear a duly completed, signed and stamped Disposal Delivery Form (DDF) and CHIT.

e. **Foreman**

- Supervises and monitor the material loading process;
- Supervises and ensure quality, no overloading and proper cover as stated in Appendix 32 to PS. of the Contract; and
- Pass the duly completed, signed and stamped Disposal Delivery Form (DDF) and CHIT to truck drivers.

3.2 Disposal Programme

3.2.1 The Company does not identify other construction projects where C&D materials generated by the site can be used for the time being. Once the Company identifies other construction project where C&D materials generated can be used, the Company shall review and update the disposal programme.

3.2.2 The Company shall prepare a monthly programme for disposal of C&D materials off the Site. (Record forms refer to Appendices No. 2 & 3)

3.2.3 The monthly programme should indicate estimated quantity, types of the C&D materials and corresponding disposal grounds.

3.2.4 The Company shall update the programme on a monthly basis.

3.2.5 The Company shall submit the updated programme to the Engineer for information by a 1st day of each month, or other specified date as agreed by the Engineer.

3.3 Waste Reduction (Recycling Materials) Management

Waste reduction is best achieved by segregation of temporary store of C&D waste materials disposal and recyclable materials such as metal, paper, plastics etc., which have been sorted on the Site to enhance reuse or recycling of materials and their proper disposal. The estimate quantities of metal, paper/cardboard packaging & plastics as per the appendix. For such sorted recyclable materials, the Contractor shall devise appropriate control measures such as different types of recycling materials should be segregated and stored in different containers or designed area. An on-site temporary storage area should be provided. This will be achieved by:

3.3.1 Integrating TTS and demolition works programme planning can reduce the generation of significant amounts of waste, which in turn alleviates the demands put on to public filling facilities and landfills and lessens the impact on the environment;

3.3.2 Avoid over ordering of materials;

3.3.3 Avoid cross contamination of C&D waste materials, either for use in works site or for reuse or recycling;

3.3.4 Minimize the use of timber in temporary works;

3.3.5 Office paper consumption at site office shall be minimized by copying on both sides of paper and reused paper that is printed

on one side;

3.3.6 Packaging Materials and Pallets

For materials delivered to site, reusable and recyclable packaging materials pallets shall be reused, recycled or returned to the supplier.

3.4 General Refuse & Non-Inert C&D Material

3.4.1 General refuse generated on-site shall be stored in enclosed bins or and enclosed area. A reputable waste collector shall be employed by the Contractor to remove general refuse from the site daily or every second days basis to minimize odour, pest and other nuisance. General refuse and non-inert C&D material will be disposed by a reputable waste collector to landfill site.

3.5 Chemical Waste (ACM / DCM / Spent Oil / Lubricant)

3.5.1 ACM / DCM waste will be stored in container separately to avoid cross-contamination with other material. Marine transportation will use to deliver ACM / DCM waste to the landfill site or other designated by EPD by the licensed waste collector.

3.5.2 Preventive measures will be implemented for leakage and spillage of fuel and lubricating oil to avoid contamination of the construction site. Spent oil / lubricant will be collected by licensed waste collector.

3.6 Site Procedures

3.6.1 The Company shall establish site procedures to ensure that each load of C&D materials leaving the Site will bear a duly competed DDF and CHIT. Details of the site procedures please refer to Appendix No. 4.

3.6.2 The Company shall establish the mechanism to ensure timely retrieval of the DDF and/or receipt from the disposal grounds where irregularities are observed. Details of the mechanism please refer to Appendix No. 5.

3.7 Recording System

Waste Manager / General Foremen shall be responsible to supervise the implementation of all the procedures. Daily site inspection shall be carried out by Foreman, to avoid any non-compliance to this Site Management Plan for trip ticket implementation (TTS). No unauthorized disposal of C&D materials without the stamped DDF & CHIT tickets will be permitted to exit and re-enter the Project site for delivery of any C&D material generated under any conditions.

3.7.1 The Company shall maintain a comprehensive register filing system of the DDF & CHIT tickets issued and keep by waste manager. The summary record will be submitted to Engineer's Representative in monthly basis. The part 1 of daily record summary of C&D material disposal will be submitted to Engineer's Representative by 1:00pm of following working day and part 2 will be submitted within 3 working days of the disposal trip. The monthly disposal summary and daily disposal record were given in Appendix 6.

3.7.2 The Company shall make the DDF register available for inspection by Engineer's Representative upon request.

3.7.3 The Company shall establish the record system for the recyclable materials, such as time record and delivery note number.

3.7.4 The Company shall establish the trip-ticket system for the chemical waste such as ACM / DCM, spent oil, etc.

3.8 Control Measure to Track Internal Movement of Materials

3.8.1 The Company shall devise control measures to ensure that the C&D materials generated by the Site are not disposed of outside the Site in breach of the Contract. Details of the control measure please refer to Appendix No. 7.

3.9 Surveillance

3.9.1 The Company established a surveillance system within the Site to check that the disposal activities comply with the requirements as set out in PS25.25A of C&D materials leaving the Site will bear a duly competed DDF & CHIT. This will be achieved by:

- ✧ For each vehicular trip, a receipt from the operator of the public filling facility or the landfill shall be obtained. The original receipt shall be submitted to the ER's representative within 14 working days of the vehicular trip, and we can fax/by hand to ER's representative within 2 working days. Late return without any acceptable reason may be regarded as non-compliance by the CEDD/MCL. Follow-up action shall be taken to trace back the receipt by interview the truck driver/ responsible site personnel.
- ✧ Site inspections will be checked by the foreman/Waste Manager randomly so as to provide a direct means to trigger and enforce the specified are properly implemented.
- ✧ The Contractor shall counter check from CEDD website http://www.cedd.gov.hk/eng/services/tripticket/index.html to verify the printout of corresponding public filling facility or the landfill and the accuracy of the information on that DDF receipt.
- ✧ The disposal of C&D and solid waste activities will be stepped up to higher peak during September 2008 to October 2009, making it vitally important to try every affords to closely monitoring the DDF returning system, in a timely manner. Under normal condition, late return or non return DDF is not allowed. This preventive measures will achieved by:

  a) Appoint one site personnel to assist waste manager to keep in/out DDF records during the peak period;

  b) Record the contact phone number for each dump truck driver in the back of duplicated DDF for reference/traceability;

  c) `A dump truck without a Dumping License will be rejected, and all the dump truck shall be registered and record by the Waste Manager and keep in the contractor site office for inspection by the Engineer Representative upon request; and

  d) Disposal of all C& D materials/waste shall through marine transport.

A sample of the Delivery Disposal Form (DDF) is attached in Appendix 8 and Work Execution Plan by Chun Ming Machinery Engineering Ltd. for Chun Ming Vessel No. 23, 33, 68, 78 is attached in Appendix 9.

4. Informing the Barge /Vessel Operator

4.1 The Company shall write to all barge /vessel operator whom be engaged for removal of C&D materials from the Site and draw their attention to the following ground:

a. Each barge/vessel carrying C&D materials leaving the Site for a disposal ground must bear a duly completed and stamped DDF, irrespective of the location and nature of the disposal ground.

b. The C&D materials must be disposed of at the disposal ground as stipulated in the DDF.

c. What constitutes an improper disposal and that the Public Fill Committee will consider revoking the Dumping Licence from the holder of the offending vessel/barge.

Both English and Chinese versions of the written instruction are enclosed in Appendix No. 10.

5. General Procedures of the TTS and Record Keeping

Inert C&D Material

5.1 Inform Engineer's Representative or his site staff the date of disposal of C&D and solid waste activities in a reasonable time, then the stamped DDF with the Contract bar code will prepare and hand to the waste manager/general foreman. Then the Contractor will hand the DDF with CHIT tickets to dump truck driver/vessel/barge operator after checking which complied with conditions as stated in Appendix 32 to PS. The barging point location is shown in Appendix No. 11.

5.2 The dump truck will unload the C&D waste materials to barge by means of crane grab at barging point at Portion B. For each barge/vessel of C&D materials leaving the Site, the Contractor's vessel/barge operator should bear a duly completed, signed and stamped DDF with the Contract bar code & vessel CHIT tickets.

5.3 The vessel/barge operator shall proceed to the disposal ground as stipulated in the DDF. Where the disposal ground is a government disposal facility, the Contractor's vessel/barge operator shall present the DDF to the facility operator. If the C&D materials accords with the acceptance criteria, the facility operator will give the Contractor's vessel/barge operator a transaction receipt and stamp the DDF.

General Refuse & Non-Inert C&D Material

5.4 General refuse and non-inert C&D material will be loaded on the dump truck. The truck driver collected DDF and CHIT form from RSS and Foreman. The truck driver should bear a duly completed, signed and stamped DDF with the Contract bar code & CHIT tickets.

5.5 The truck driver shall proceed to the disposal ground as stipulated in the DDF. Where the disposal ground is a government disposal facility, the truck driver shall present the DDF to the facility operator. The facility operator will give the truck driver a transaction receipt and stamp the DDF if the material accepted.

Chemical Waste

5.6 Spent oil will be collected by the licensed waste collector on site on required basis. The Trip-ticket will be given from the licensed waste collector to Contractor. The Contractor will keep record and report to ER by monthly basis.

5.7 Containers of ACM / DCM will be delivered by marine transportation from the site barging point to landfill area or other designed by EPD. The Contractor shall apply the direction of disposal. Disposal forms / trip-tickets will be obtained and then contact with disposal site manager before 4 working days for disposal arrangement. When the barge proceeds to the disposal ground, the containers will load on the trucks. Trip-tickets will be passed to the truck drivers and enter the disposal facility area. The truck driver shall present the trip-ticket to the facility operator. The facility operator will give the truck driver a transaction receipt and stamp the trip-ticket. The barging point location is shown in Appendix No. 11.

Record Keeping

5.4 The Contractor shall maintain a daily record of disposal of C&D materials from the site including details/types of the C&D materials, the vessel/barge number and name, departure time etc, using the Daily Record Summary (DRS).

5.5 The Contractor shall submit the duly completed Part 1 of the DRS form promptly to the Engineer's Representative by 1:00 pm of the working day following the date of disposal.

5.6 For disposal at government disposal facilities, the Contractor shall check the information recorded in the DRS against available information including his own records and data from CEDD website http://www.cedd.gov.hk/eng/services/tripticket/index.html and then complete Part 2 of the DRS form for submission to the Engineer's Representative within 3 working days after the date.

5.7 Where an irregularity is observed or where requested by the Engineer's Representative under special circumstances the Contractor shall submit to the Engineer's Representative within 5 working days after the recorded date of disposal the supporting evidence to confirm proper completion of the delivery trios in question, within 2 working days after the Engineer's Representative has requested for such evidence, whichever is later. A fax copy of the DDF and transaction receipt is acceptable, unless otherwise directed by the Engineer.

6. Performance Monitoring

The following items should be included in the agenda for discussion at every Site Safety and Environmental Management Committee Meeting and Site Safety and Environmental Committee Meeting for performance monitoring. This will focus on:

a. Regularly reviewing the site management plan and implementation of the TTS, and identify areas of improvement, in a timely manner.

b. Regularly reviewing incidents of non-compliance and discuss the necessary follow-up actions.

c. Monitor the follow-up action on defects and deficiencies identified.

7. Removal of C&D Materials from Unauthorized Disposal Ground

7.1 Where C&D materials from the Site have been dumped at a place other than that designated under the Contract or approved by the Engineer, the Company shall at his own cost undertake the following remedial action:

a. Remove the dumped C&D materials form unauthorized disposal ground.
b. Reinstate the unauthorized disposal ground to the condition before dumping of the C&D materials.
c. Remove the C&D materials to the disposal ground as designated under the Contract or approved by the Engineer to this satisfaction.

7.2 Where the unauthorized disposal ground is private property, the Contractor shall be responsible for obtaining the landowner's consent before removal of the dumped C&D materials.

7.3 Should the Contractor fail to remove the C&D materials from the unauthorized disposal ground or fail to reinstate the unauthorized disposal ground the employer may instruct another contractor to perform the work and the Employer shall be entitled to recover such costs form the Contractor.

8. Improper Disposal of C&D Material

Improper disposals are

a. Loaded vessel/barge having left site without DDF completed.
b. Disposal at ground not designated.
c. Fail to produce the stamped DDF or the transaction receipts.

Major improper disposals are:

a. Disposal at ground not designed and such ground is private agricultural land.
b. Illegal dumping of C&D materials.

8.1 The Company notes that the Employer takes a very serious view of any non-compliance with the TTS requirement.

8.2 The Company also notes that the performance in implementing the TTS will be fully reflected in the Report on the Contractor's Performance and subject to relevant regulating actions.

8.3 The Company further notes that the Public Fill Committee will consider revoking the Dumping Licence from the holder of the offending vessel/barge

9. Arrangement for Collection of Recyclable Materials by Recycling Contractors

9.1 Introduction

a. The contractor shall make arrangements with potential recycling contractors to facilitate that recyclable materials sorted from the site are collected with reasonable care.

b. The contractor shall record the quantities of all the recyclable materials (steel,) before removal off site by the recycling contractors and include the details in the Waste Flow Table for submission to the Engineer.

9.2 The Arrangement

a. The company has made arrangement with potential recycling contractors for removal of recyclable materials (waste collectors).

b. The company has appointed General Foreman / Foreman to record the quantities off all the recyclable materials before removal off sites by the recycling contractors.

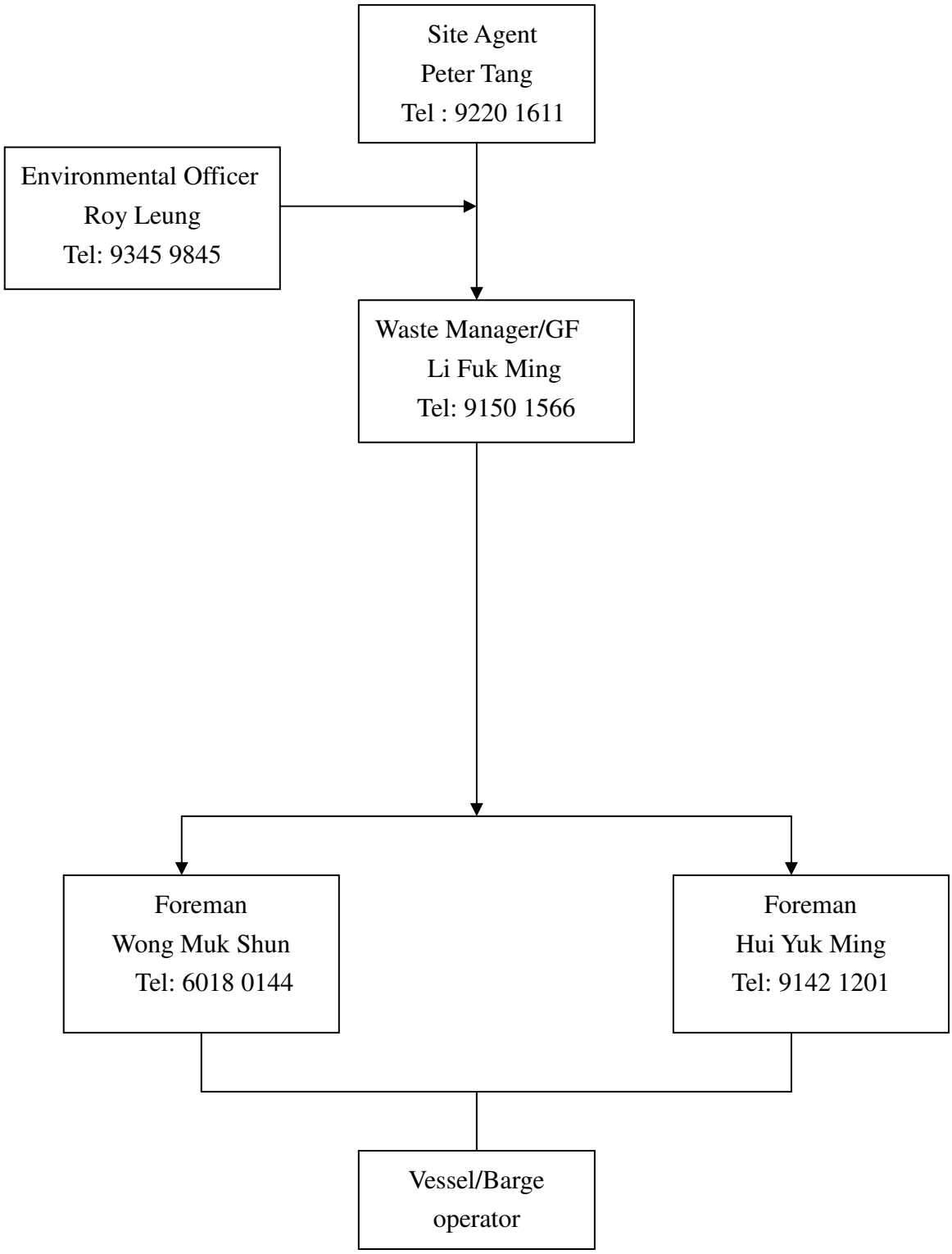
c. The Waste Flow Table as per Appendices 2 & 3 submitted to the Engineer shall include the quantities of all the recyclable materials before removal off sites by the recycling contractors.

10. APPENDICES

Appendix No.	Content
1.	Management Structure for TTS
2	Yearly Summary Waste Flow Table
3.	Monthly Summary Waste Flow Table
4..	Site procedure s to ensure each truckload of C&D material leaving the Site will bear a duly completed DDF
5.	Proposed Mechanism to ensure timely retrieval of DDF
6.	Summary of the DDF issued and Sample of Daily Disposal Form
7.	Control Measures to track internal movement of materials
8.	Sample Format of the Construction and Demolition Material Disposal Delivery Form
9.	Works Execution Plan by Chun Ming Machinery Engineering Ltd. for Chun Ming Vessel No. 23, 33, 68, 78
10.	Written Instruction to Barge Operator & Truck Drivers
11.	Site Layout Plan Showing Outlets

Appendix No.1

Management Structure



Appendix No.2 & 3

Refer to Waste Flow Tables at Appendix G of WMP

Contract No. CV / 2007 / 06 Appendix 4

SITE PROCEDURES TO ENSURE EACH TRUCKLOAD OF C&D MATERIAL LEAVING THE SITE WILL BEAR A DULY COMPLETED DDF

No.	Procedure	Action by	Monitored by	Checked by
1.	Registration of vessel/barge at check point by form in Appendix No. 6	Foreman	General Foreman	Waste Managert
2.	Loading of C& D materials onto vessel/barge (ensure quality, no overloading and ensure proper cover)	Disposal Worker	Foreman	General Foreman
3.	The vessel/barge operator should then obtain a completed DDF from the experienced person before being allowed to leave the outlet check point	Foreman	General Foreman	Waste Manager
4.	No vessel/barge without registration at entering the outlet check spot shall be allowed to load any C&D materials	Foreman	General Foreman	Waste Manager
5.	No vessel/barge with or without loading of C&D materials shall be allowed to leave the site without checking at the check points	Foreman	General Foreman	Waste Manager

Remark: This procedure shall be reviewed every three months by the Waste Manager and checked by the Site Agent

Contract No. CV / 2007 / 06 Appendix 5

PROPOSED MECHANISM TO ENSURE TIMELY RETRIEVAL OF DDF

No.	Procedure	Action by	Monitor by
1.	Prepare registration of all approved vessel/barge operator including names, contact telephone no. and address	Waste Manager	Site Agent
2.	The vessel/barge operator shall be instructed both verbally and in writing the procedure of reporting promptly the result of dumping, whether successful or not, to the General Foreman responsible for the C&D material disposal	General Foreman	Waste Manager
3.	The vessel/barge operator shall return the DDF within two working days	Vessel/Barge Operator	General Foreman
4.	Should the vessel/barge operator fail to return the DDF within two days, the General Foreman shall remind him to do so promptly or demand him to return the DDF through speed mail.	General Foreman	Waste Manager
5.	The General Foreman should ensure completing the register of vessel/barge by form in Appendix No. 6 before leaving the site ,and for further action to speed up the return of DDF	General Foreman	Waste Manager
6.	For any suspected irregularities the Waste Manager should contact the disposal ground immediately to know the truth and report to the Waste Manager for further action	Waste Manager	Site Agent
7.	Check on CEDD web site daily whether any N/C or not	Waste Manager	Site Agent

Remark: this mechanism shall be reviewed every three months by the Site Agent and further checked by the Project Director

Appendix 6

Contract No. CV / 2007 / 06

REGISTER OF THE DDF ISSUED

Date	DDF No.	Vehicle Registration No.	Departure Time from Site	Approx. Vol.	Type of Waste	Actual Disposal Ground	Arrival Time at Disposal Ground	Remarks

Contract No.: CV/2007/06
Kwai Chung Incineration Plant Demolition and Decontamination Works
Monthly Record Summary to Record Daily Disposal of C&D Materials from the Site

Designated Disposal Ground(s): (a) SENT Landfill
(b) TM38 Fill Bank

Part 1						Part 2		
Date	DDF no.	Vehicle Registration no.	Departure Time from Site	Approx Vol. (Full / 3/4 / Half / 1/4)	Type of Wastes	Actual Disposal Ground	Arrival Time at Disposal Ground	Remarks

Part 1:

Submitted by: ____________________
Signature: ____________________
Date: ____________________
Received by: ____________________
Post: ____________________
Date & Time: ____________________

Part 2:

Submitted by: ____________________
Signature: ____________________
Date: ____________________
Received by: ____________________
Post: ____________________
Date & Time: ____________________

Note:
Part 1 - The Contractor shall complete Part 1 and submit it to the Engineer's Reprsentative by 1:00pm of the following working day of the disposal trip.
Part 2 - The Contractor shall complete Part 2 and submit it to the Engineer's Reprsentative within 3 working days of the disposal trip.

Appendix 7

Contract No. CV/2007/06

CONTROL MEASURES TO TRACK INTERNAL MOVEMENT OF MATERIALS

1. The Company shall set up guiding path at outlet Point from Portion A to Portion B, and ensure absolutely no trucks entering and leaving the outlet are not going to the temporary barging point. From outlet point of Portion A to unloading area of Portion B, Foreman shall station at loading area inside Portion A to oversee the entire process without causing inconvenience to others and pass an internal trip-ticket to truck driver. The barge operator responsible to collect the internal trip-ticket when C&D material is unloaded at Portion B.

2. The Foreman shall check for any illegal disposal of C&D materials within or adjacent to the site area.

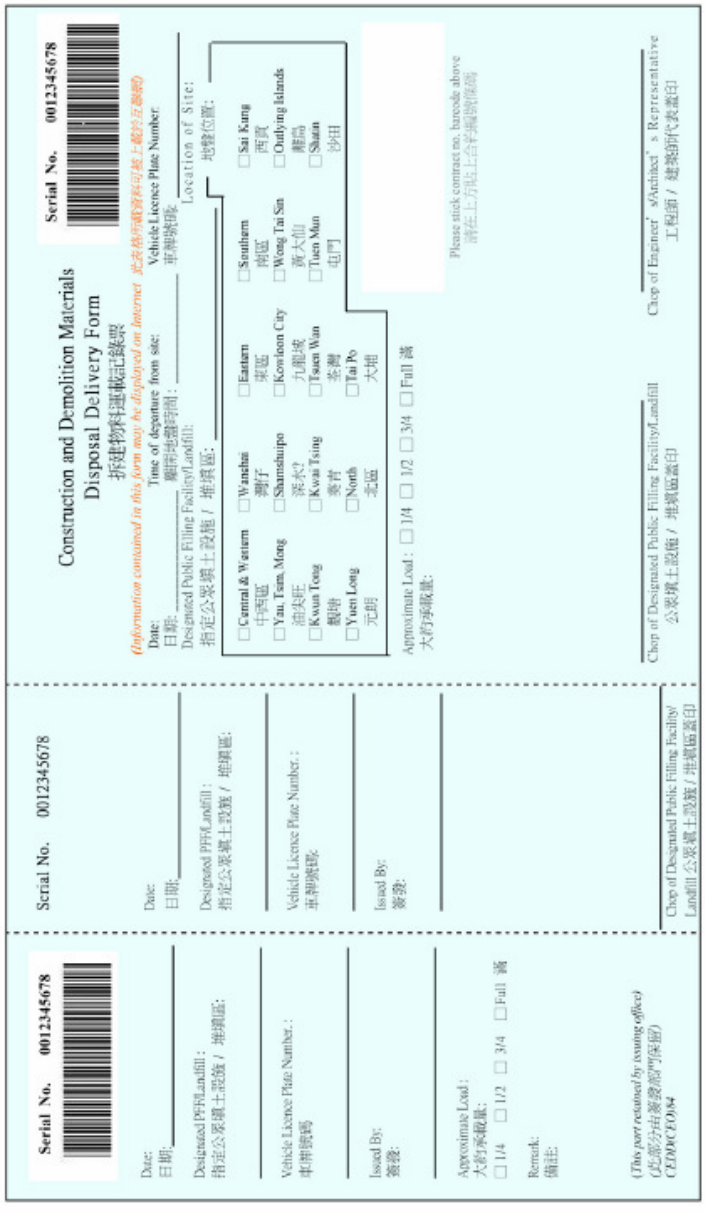
3. Disobedient vessel/barge operator and truck drivers would be dismissed immediately at discovery of their poor conduct.

4. Before commencement of the disposal of C&D material, all approved vessel/barge operator and truck drivers should attend a disposal briefing training lesson organized by the training section of the company which includes Site Agent, Waste Manager, General Foreman, Foreman and Safety Officer of the site. All attendants shall be briefed on the TTS procedure of works and related site and safety matters. During the lesson, all involved operators and drivers are required to sign and receive a copy of Instruction to Work, regarding disposal of C&D materials created by activities of the Site.

Appendix 8

Contract No. CV/2007/06

SAMPLE FORMAT OF THE CONSTRUCTION AND DEMOLITION MATERIAL DISPOSAL DELIVERY FORM



Remark: Original form with a light red and inclined watermark "DDF".

Appendix 9

Contract No. CV/2007/06

WORKS EXECUTION PLAN BY CHUN MING MACHINERY ENGINEERING LTD. FOR CHUN MING VESSEL NO. 23, 33, 68, 78

CHUN MING MACHINERY ENGINEERING LTD.

Works Execution Plan

Chung Ming Vessel No. 23, 33, 68, 78

CHUN MING MACHINERY ENGINEERING LTD.
No. 19 Tam Kung Temple Road, Shau Kei Wan, Hong Kong.

1. Overview

This work Execution Plan (WEP) has been developed specifically to support the barge general operations that will take place in loading and dumping jetty. The purpose of this plan is to provide a set of procedures that will be used by the barge attendants. The concerns addressed by this plan are personal safety and vessel safety.

2. This Work Execution Plan is composed of the following elements.

- Distribution of WEP
- Training and Implementation
- Project Location
- Offshore Safe Working Conditions
- Rigging and Lifting Operations
- Anchoring and Berthing Operations
- Crewboat

3. Distribution of WEP

This WEP will be distributed to all barge attendants, the main contractor's project related staff and dumpling truck driver.

4. Training and Implementation

Chun Ming Machinery Engineering Ltd.'s CMMEL project manager, field supervisors will review the contents of this WEP at a pre-dispositioning kick-off meeting that will take place before any marine field work. Comments and suggestions made during this meeting may be inserted into revised versions.

5. Project Location

The dumping jetty will take place in working site of Contract CV/2007/06. The jetting is well away from ship traffic areas and water visibility is generally in excess of 100 m.

6. Offshore Safe Working Conditions

In the event of unsafe sea states or weather conditions, CMMEL's project manager will not permit any operation that effected by these conditions. In addition CMMEL will take care of the weather forecast to daily weather and sea state predictions. These forecasts will have a 5 day look-forward report as well.

7. Rigging and Lifting Operations

All critical rigging and lifting of heavy objects will be pre-determined and pre-planned, and all these lifting chain, rope, gear and appliances shall be tested and examined by registered professional engineer in accordance with the requirement of Form 6 and 7 of Labour Department.

8. Anchoring and Berthing Operations

Anchoring operations will take place as specified in place via each anchor's crown line. No anchors will be allowed to drag on the seafloor. All anchor handling crews will be trained and experienced in operating the anchor winches, flying anchors to location, releasing anchors and recovering anchors. The berthing operations will be towed and tended by a tugboat. The Barge shall be tightly moored along the berthing edge, so as to avoid clearance generating that may cause spoil / debris / wastes accidentally falling in the sea. All C & D and Chemical Wastes which loaded onto the barge, shall be covered with tarpaulin sheet and tied up to anchor bollard throughout the entire trip.

9. Crewboat

A crewboat will be employed by CMMEL to haul attendants and related personnel to and from the local shore base on a daily basis. The crewboat will travel the most direct route between the work site and local shore base.

Appendix 10

Contract No. CV/2007/06
WRITTEN INSTRUCTION TO
BARGE OPERATOR & TRUCK DRIVERS

To: All Approved Operators and Drivers for Disposal of C&D Waste of this Contract

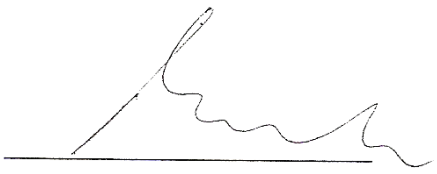
All vessel / barge operator, and truck drivers selected to work for this site should obey the following working rules:

1. **Each Vessel / Barge or dump truck carrying C&D materials leaving the Site for a disposal ground must bear a duly completed and stamped DDF, irrespective of the location and nature of the disposal ground.**

2. **The C&D materials must be disposed of at the disposal ground as stipulated in the DDF.**

3. **What constitutes an improper disposal and that the Public Fill Committee will consider revoking the Dumping Licence from the holder of the offending vessel/barge or dump truck.**

For and On Behalf of
China International Water &
Electric Corporation



Peter Tang
Site Agent

Appendix 10

合約編號：CV/2007/06

躉船船長及泥頭車司機指引

至：本工程批准之運載拆建物料躉船船長及泥頭車司機

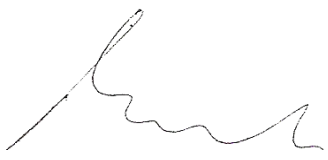
所有於本地盤工作之躉船船長及泥頭車司機請遵守以下規則：

一、 每首運載拆建物料的躉船或車輛必須持有一張已填寫及經工程顧問公司蓋章之拆建物料運載記錄票，方可離開本地盤作物料處置。

二、 所有拆建物料必須傾倒於列印在拆建物料運載記錄票上之指定傾瀉點。

三、 任何對拆建物料作出違規處置的船長或泥頭車司機，其傾瀉牌照將會被公眾填土區之委員撤銷。

中國水利電力對外公司



鄧彼德

地盤主管

Appendix 11

Contract No. CV / 2007 / 06

SITE LAYOUT PLAN SHOWING OUTLETS