Jardine Engineering Corporation, Limited

Contract No. DE/2007/07
Ultraviolet Disinfection Works for
Shatin Sewage Treatment Works and
Tai Po Sewage Treatment Works
- TPSTW, Stage V, Phase IIA (Disinfection)

Final Environmental Monitoring and Audit Review Report

(Version 3.0)

Certified By

(Environmental Team Leader)

REMARKS:

The information supplied and contained within this report is, to the best of our knowledge, correct at the time of printing.

CINOTECH accepts no responsibility for changes made to this report by third parties.

CINOTECH CONSULTANTS LTD
Room 1710, Technology Park,
18 On Lai Street,
Shatin, NT, Hong Kong
Tel: (852) 2151 2083 Fax: (852) 3107 1388
Email: info@cinotech.com.hk

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

EXECUTIVE SUMMARY

Introduction

1. This is the Final Environmental Monitoring and Audit Review Report prepared by Cinotech Consultants Limited for DSD Contract no. DE/2007/07 "Ultra-Violet Disinfection Works for Shatin Sewage Treatment Works and Tai Po Sewage Treatment Works". This report documents the findings of EM&A Works for Tai Po Sewage Treatment Works conducted between July 2008 and April 2010.

2. The Construction works for UV disinfection works of the Project were commenced on 18th July 2010. The construction works have been substantially completed in February 2010. The Construction Programme of the Project is shown in **Appendix A.** The weekly environmental site audit was ceased after the completion of civil works abd verification of outstanding items during site audit. The last site audit was conducted on 22nd April 2010. As there was no critical environmental deficiency observed, no monitoring exceedance, no complaint and prosecutions received. The completion of the EM&A programme was proposed by ET on 27th April 2010 (Ref.: MA8018/Corres/sl100427) and verified by IEC on 27th April 2010 (Ref.: 60045491/C/YKT100427/1).

3. The major site activities undertaken in the construction period included:

- Removal of disused sludge pipes;
- Preparation works of 1800 PCP;
- Pre-drilling works for UV Disinfection Channels / Shelter and Transformer House;
- Demolition of Sludge Stacking Building;
- Mini-piling works for Transformer House;
- Construction of C1, C2 & C3 Chamber, Mini Piles (Transformer House), Mini Piles (UV Structure), foundation, wall & roof of Transformer House, proposed DN2250 precast concrete pipe, superstructure for UV and Cable Duct & Drawpit;
- Install DN150 sludge D.I. pipe, gas pipe and make connection;
- Loading Test to Mini-Piles (Transformer House);
- Proof drilling (S.I. work) (Transformer House) (UV structure);
- Temporary flow diversion of existing DN1650 PCP;
- Breaking existing Chamber F1 & DN1650 PCP;
- Finishing work for Transformer House;
- Load test for mini-piles (UV structure);
- Bulk excavation for UV structure;
- Metal work (doors, windows, etc.) for Transformer House.
- Misc. reinstatement works;
- Water test to UV channel;
- Penatock installation and UV cabinet installation;
- Cable laying and termination and switchboard support installation;
- B.S. installation; and
- UV testing

Environmental Monitoring and Audit Works

4. Environmental monitoring and audit works for the Project were performed regularly as stipulated in the Final EM&A Manual and the results were checked and reviewed. The implementation of the environmental mitigation measures, Event Action Plans and environmental complaint handling procedures were also checked.

5. Summary of the events and action taken in the construction period is tabulated in **Table I**.

Table I Summary Table for Events Recorded in the Construction Period

Parameter	No. of Exceedance		No. of Events Due to this Project	Action Taken
	Action Level	Limit Level		
1-hr TSP	0	0	0	N/A
24-hr TSP	0	0	0	N/A
Noise	0	0	0	N/A
Landfill Gas	0	0	0	N/A

Construction Noise

6. All construction noise monitoring was conducted as scheduled in the construction period.

7. No Action Level (public complaint) / Limit Level exceedance was recorded in the construction period.

Air Quality

8. The air quality monitoring was conducted as scheduled in this reporting period. No Action/Limit Level exceedance was recorded in the construction period.

Landfill Gas

9. Landfill gas monitoring was performed by the Safety Officer of the Contractor in the construction period. All the measured results were complied with the Limit Levels.

Environmental Complaint and Prosecution

10. No environmental complaint, prosecution or notification of summons was received in this construction period.

Environmental Licensing and Permitting

11. Environmental related licenses/permits granted to the Project include the Environmental Permit (EP), Construction Noise Permit and discharge license for the Project.

1 INTRODUCTION

Background

1.1 Tai Po Sewage Treatment Works (TPSTW) is located within the Tai Po Industrial Estate. It currently comprises four Stages: I, II, IVA and IVB works. The TPSTW - Stage V aims to upgrade the existing STW to provide additional sewage treatment capacity from the present design flow of 88,000 m^3/day to 120,000 m^3/day to meet the demands of both the existing and future developments, and to meet the revised discharge license requirements.

1.2 The TPSTW Stage V, Phase I and Phase II are Designated Projects under the Environmental Impact Assessment Ordinance (Cap. 449) with the same EIAO Register No. AEIAR – 081/2004. A study of environmental impact assessment (EIA) was undertaken to evaluate various environmental impacts associated with the works within these two Designed Projects. An EIA Report as well as an Environmental Monitoring and Audit (EM&A) Manual were approved by the Environmental Protection Department (EPD) on 28 October 2004.

1.3 The Stage V works will be implemented in 2 phases. The design capacities of Phase 1 and Phase 2 works are 100,000 m^3/d and 120,000 m^3/d, respectively. An Environmental Permit (EP) No. EP-265/2007 was issued on 22 March 2007 for the TPSTW Stage V Phase II works to the Drainage Services Department (DSD) as the Permit Holder. Jardine Engineering Corporation Limited was awarded by DSD as the main contractor for the civil works Contract No. DE/2007/07 "Ultra-Violet Disinfection Works for Shatin Sewage Treatment Works and Tai Po Sewage Treatment Works" (hereinafter named "the Project"). A project site layout plan is provided in **Figure 1.1**. The construction activities of the Project commenced on 18 July 2008.

1.4 Cinotech Consultants Ltd. was commissioned by the Sub-Contractor as the Environmental Team (ET) to undertake the EM&A works for the Project. Dr. Priscilla CHOY of Cinotech Consultants Ltd. was appointed as the ET Leader as per the Condition 2.1 of the EP. AECOM Asia Co. Ltd. was employed by DSD to undertaken IEC services of the Project and Mr. YT Tang of AECOM Asia Co. Ltd. was appointed as the IEC under Condition 2.2 of the EP. This is the Final EM&A review report summarizing the EM&A works for the Project between July 2008 and April 2010.

Project Organizations

1.5 Different parties with different levels of involvement in the project organization include:

- Project Proponent / Engineer's Representative (ER) – Drainage Services Department
- Environmental Team (ET) – Cinotech Consultants Ltd.
- Independent Environmental Checker (IEC) – AECOM Asia Co. Ltd.
- Main Contractor – Jardine Engineering Corporation Limited
- Sub-Contractor – China Harbour Engineering Company Ltd.

1.6 The responsibilities of respective parties are detailed in Section 1.10 of the Final EM&A Manual of the Project. The key contacts of the Project are shown in **Table 1.1**.

Table 1.1 Key Project Contacts

Party	Role	Name	Position	Phone No.	Fax No.
DSD	Permit Holder	Mr. K.C. CHU	Project Engineer	2594 7310	2827 8532
		Mr. K. F. CHING	Engineer (E&M)	2594 7325	
		Mr. Derek CHUNG	Engineer (Civil)	2594 7456	2827 8700
Cinotech	Environmental Team	Dr. Priscilla CHOY	ET Leader	2151 2089	3107 1388
		Mr. TY Yeung	Project Coordinator and Audit Team Leader	2151 2099	
		Mr. Henry LEUNG	Monitoring Team Leader	2151 2087	
AECOM	Independent Environmental Checker	Mr. TANG Yu-tin	Independent Environmental Checker	3105 8537	2891 0305
		Ms. Joanne TSOI	Assistant to Independent Environmental Checker	3105 8506	
JEC	Main Contractor	Mr. Alex LAW	Site Agent	2807 4265	25107273
		Mr. Eric HO	Deputy Site Agent	2947 1125	
CHEC	Sub-Contractor	Mr. T.K. CHEUNG	Project Manager	2660 7112	2660 6191
		Mr. Jason Tse	Assistant Project Manager		

Construction Programme

1.7 The construction programme is presented in **Appendix A**. The site activities undertaken in the construction period were:

- Removal of disused sludge pipes;
- Preparation works of 1800 PCP;
- Pre-drilling works for UV Disinfection Channels / Shelter and Transformer House;
- Demolition of Sludge Stacking Building;
- Mini-piling works for Transformer House;
- Construction of C1, C2 & C3 Chamber, Mini Piles (Transformer House), Mini Piles (UV Structure), foundation, wall & roof of Transformer House, proposed DN2250 precast concrete pipe, superstructure for UV and Cable Duct & Drawpit;
- Install DN150 sludge D.I. pipe, gas pipe and make connection;
- Loading Test to Mini-Piles (Transformer House);
- Proof drilling (S.I. work) (Transformer House) (UV structure);
- Temporary flow diversion of existing DN1650 PCP;
- Breaking existing Chamber F1 & DN1650 PCP;
- Finishing work for Transformer House;
- Load test for mini-piles (UV structure);
- Bulk excavation for UV structure;
- Metal work (doors, windows, etc.) for Transformer House.
- Misc. reinstatement works;
- Water test to UV channel;
- Penatock installation and UV cabinet installation;
- Cable laying and termination and switchboard support installation;
- B.S. installation; and
- UV testing

Summary of EM&A Requirements

1.8 The EM&A programme requires construction phase air quality and noise monitoring as well as environmental site audits. The EM&A requirements are described in the following sections, including:

- All monitoring parameters;
- Action and Limit levels for all environmental parameters;
- Event / Action Plans;
- Environmental mitigation measures, as recommended in the project EIA study final report; and
- Environmental requirements in contract documents.

1.9 The advice on the implementation status of environmental protection and pollution control/mitigation measures is summarized in Section 4 of this report.

1.10 This report presents the monitoring results, observations, locations, equipment, period, methodology and QA/QC procedures of the required monitoring parameters, namely air quality and noise as well as audit works for the Project in the construction period.

2 ENVIRONMENTAL MONITORING AND AUDIT REQUIREMENTS

Monitoring Parameters and Monitoring Locations

2.1 The EM&A Manual designate locations for the ET to monitor environmental impacts in terms of noise and air quality due to the Project. The Project area and monitoring locations are depicted in **Figure 1.2**. **Appendix B** gives the details of monitoring requirements.

Calibration Details

2.2 Monitoring works/equipments were conducted/calibrated regularly in accordance with the EM&A Manual. Copies of calibration certificates are attached in the appendices of the Monthly Reports.

Monitoring Methodology and QA/QC Procedure

Air Quality

Instrumentation

2.3 High Volume Samplers (HVS) connected with appropriate sampling inlets were employed for air quality monitoring. Each sampler was composed of a motor, a filter holder, a flow controller and a sampling inlet and its performance specification complies with that required by USEPA Standard Title 40, Code of Federation Regulations Chapter 1 (Part 50).

HVS Installation

2.4 The following guidelines were adopted during the installation of HVS:

- Sufficient support was provided to secure the samplers against gusty wind.
- No two samplers were placed less than 2 meters apart.
- The distance between the sampler and an obstacle, such as buildings, was at least twice the height that the obstacle protrudes above the sampler.
- A minimum of 2 meters of separation from walls, parapets and penthouses was required for rooftop samples.
- A minimum of 2 meters separation from any supporting structure, measured horizontally was required.
- No furnaces or incineration flues were nearby.
- Airflow around the sampler was unrestricted.
- The samplers were more than 20 meters from the drip line.
- Any wire fence and gate, to protect the sampler, should not cause any obstruction during monitoring.

Filters Preparation

2.5 Fiberglass filters (G810) were used [Note: these filters have a collection efficiency of larger than 99% for particles of 0.3 mm diameter]. A HOKLAS accredited laboratory, Wellab Ltd., was responsible for the preparation of pre-weighed filter papers for Cinotech's monitoring team.

2.6 All filters, which were prepared by Wellab Ltd., were equilibrated in the conditioning environment for 24 hours before weighing. The conditioning environment temperature was around 25 °C and not variable by more than ±3 °C; the relative humidity (RH) was < 50% and not variable by more than ±5%. A convenient working RH was 40%.

2.7 Wellab Ltd. has a comprehensive quality assurance and quality control programmes.

Operating/Analytical Procedures

2.8 Operating/analytical procedures for the TSP monitoring were highlighted as follows:

- Prior to the commencement of the dust sampling, the flow rate of the HVS was properly set (between 1.1 and 1.4 m^3/min.) in accordance with the manufacturer's instruction to within the range recommended in USEPA Standard.
- The power supply was checked to ensure the sampler worked properly.
- On sampling, the sampler was operated for 5 minutes to establish thermal equilibrium before placing any filter media at the air quality monitoring station.
- The filter holding frame was then removed by loosening the four nuts and carefully a weighted and conditioned filter was centered with the stamped number upwards, on a supporting screen.
- The filter was aligned on the screen so that the gasket formed an airtight seal on the outer edges of the filter. Then the filter holding frame was tightened to the filter holder with swing bolts to avoid air leakage at the edges.
- The shelter lid was closed and secured with the aluminum strip.
- The timer was then programmed. Information was recorded on the record sheet, which included the starting time, the weather condition and the filter number (the initial weight of the filter paper can be found out by using the filter number).
- After sampling, the filter was removed and sent to the Wellab Ltd. for weighing. The elapsed time was also recorded.
- Before weighing, all filters were equilibrated in a conditioning environment for 24 hours. The conditioning environment should be between 25°C and 30°C and not vary by more than ±3°C; the relative humidity (RH) should be < 50% and not vary by more than ±5%. A convenient working RH is 40%. Weighing results were returned to Cinotech for further analysis of TSP concentrations collected by each filter.

Noise

Field Monitoring

2.9 The monitoring procedures are as follows:

- The microphone head of the sound level meter was positioned 1m exterior of the noise sensitive facade and lowered sufficiently so that the building's external wall acts as a reflecting surface.
- The battery condition was checked to ensure good functioning of the meter.

- Parameters such as frequency weighting, the time weighting and the measurement time were set as follows:

  - frequency weighting : A
  - time weighting : Fast
  - measurement time : 30 minutes

- Prior to and after noise measurement, the meter was calibrated using the calibrator for 94.0 dB at 1000 Hz. If the difference in the calibration level before and after measurement is more than 1.0 dB, the measurement was considered invalid and repeat of noise measurement was required after re-calibration or repair of the equipment.
- The wind speed at the monitoring station was checked with the portable wind meter. Noise monitoring was cancelled in the presence of fog, rain, and wind with a steady speed exceeding 5 m/s, or wind with gusts exceeding 10 m/s.
- Noise measurement was paused during periods of high intrusive noise if possible and observation was recorded when intrusive noise was not avoided.
- At the end of the monitoring period, the Leq, L10 and L90 were recorded. In addition, site conditions and noise sources were recorded on a standard record sheet.

Environmental Quality Performance Limits (Action and Limit Levels)

2.10 The environmental quality performance limits, i.e. Action and Limit Levels were derived from the baseline monitoring results. Should the measured environmental quality parameters exceed the Action/Limit Levels, the respective action plans would be implemented. The Action/Limit Levels for each environmental parameter are given in **Appendix C**.

Environmental Mitigation Measures

2.11 Relevant mitigation measures as recommended in the project EIA report have been stipulated in the EM&A Manual for the Contractor to implement. A summary of the updated Environmental Mitigation Implementation Schedule (EMIS) is given in **Appendix H**.

3 MONITORING RESULTS

Noise

3.1 All construction noise monitoring was conducted as scheduled in the construction period.

3.2 Graphical representations of the monitoring results are shown in **Appendix D**. No Action (public complaint) / Limit Level exceedance was recorded in the construction period.

Air Quality

3.3 All air quality monitoring was conducted as scheduled in this construction period.

3.4 Graphical presentations of 1-hr TSP and 24-hr TSP monitoring results are shown in **Appendices E and F** respectively. No Action/Limit Level exceedance was recorded in the construction period.

Landfill Gas

3.5 Landfill gas monitoring was performed by the Safety Officer of the Contractor in the construction period. All the measured results were complied with the Limit Levels.

3.6 Graphical presentations of landfill gas monitoring results are shown in **Appendix G.**

4 ENVIRONMENTAL AUDIT

Implementation Status of Environmental Mitigation Measures

4.1 The updated implementation status of environmental mitigation measures (EMIS) is given in **Appendix H**.

Site Audit Summary

4.2 In the construction period, total 94 environmental site inspections were conducted by ET and 22 environmental site inspections were conducted with IEC. During site inspections in the construction period, no non-conformance was identified.

Status of Environmental Licensing and Permitting

4.3 Environmental licenses and Permit including the Environmental Permit (EP), Construction Noise Permit (CNP) and Discharge licenses. The applications were under EPD's consideration.

Table 4.1 Summary Status of Environmental Licences and Permits

Permit / License No.	Valid Period		Details	Status
	From	To		
Environmental Permit (EP)				
EP-265/2007	22/3/2007	N/A	Expansion and upgrading of existing Tai Po Sewage Treatment Works from 100,000 m^3/day to 130,000 m^3/day: (a) additional secondary treatment process units(1 primary clarified; 3 bioreactors and 2 final clarifiers); (b) reconstruction of 4 existing final clarified; (c) provision of ultraviolet disinfection facilities; (d) additional sludge treatment facilities; and (e) ancillary works to existing treatment facilities.	Valid
Consruction Noise permit (CNP)				
GW-RN0336-08	8/10/2008	7/4/2009	Use of powered mechanical equipment for carrying out construction work at Dai Kwai Street, Tai Po Industrial Estate, Tai Po, N.T. during 0000 – 2400 hours on general holidays (including Sundays), 0000 – 0700 hours and 1900 – 2400 hours on any day not being a general holiday, besides, any of Group A powered mechanical equipment shall not operated between 2300 and 0700 hours on the next day.	Expired
GW-RN0095-09	9/4/2009	8/10/2009	Use of powered mechanical equipment for carrying out construction work at Dai Kwai Street, Tai Po Industrial Estate, Tai Po, N.T. during 0000 – 2400 hours on general holidays (including Sundays), 0000 – 0700 hours and 1900 – 2400 hours on any day not being a general holiday, besides, any of Group A powered mechanical equipment shall not operated between 2300 and 0700 hours on the next day.	Expired
GW-RN0346-09	7/12/2009	30/4/2010	Use of powered mechanical equipment for carrying out construction work at Dai Kwai Street, Tai Po Industrial Estate, Tai Po, N.T. during 0000 – 2400 hours on general holidays (including Sundays), 0000 – 0700 hours and 1900 – 2400 hours on any day not being a general holiday, besides, any of Group A powered mechanical equipment shall not operated between 2300 and 0700 hours on the next day.	Expired

Permit / License No.	Valid Period		Details	Status
	From	To		
Discharge Licence				
3762	31/12/2008	End of project	Discharge of industrial trade effluent: *Water Control Zone*: Tolo Harbour and Channel *Discharge Points*: Communal drain for the carriage of surface drainage water	Valid

Advice on Waste Management Status

4.4 The Construction and Demolition (C&D) materials generated in the reporting period were mainly inert C&D materials and C&D materials. Besides, no disposal of chemical waste was recorded in the construction period. The quantities of waste generated are summarized in **Appendix I**.

5 NON-COMPLIANCE (EXCEEDANCES) OF THE ENVIRONMENTAL QUALITY PERFORMANCE LIMITS (ACTION AND LIMIT LEVELS)

Summary of Exceedances

5.1 Environmental monitoring works were performed in the construction period and all monitoring results were checked and reviewed. A summary of exceedance is attached in **Appendix J**.

5.2 No Action Level (public complaint) / Limit Level exceedance was recorded for construction noise monitoring in the construction period.

5.3 No Action/Limit Level exceedance was recorded for both 1-hour TSP and 24-hour TSP of air quality monitoring in the construction period.

5.4 All the measured results of landfill gas monitoring were complied with the Limit Levels.

Review of the Reasons for and the Implications of Non-compliance

5.5 There was no non-compliance from the site audits in this reporting period. The observations and recommendations made in each individual site audit session were attached in the Monthly Reports.

6 ENVIRONMENTAL COMPLAINTS

6.1 No environmental complaint was received in the construction period. The Complaint Log is attached in **Appendix K**.

7 COMMENTS, CONCLUSIONS AND RECOMMENDATIONS

Comments on Overall EM&A Programme

7.1 The EM&A works were conducted in accordance with the Manual. The EM&A programme included air quality monitoring, construction noise monitoring and site audits.

7.2 The EM&A methodology was effective in monitoring the environmental impacts of the Project. The data collected were useful in determining whether the Project has caused unacceptable impacts on the sensitive receivers. During the construction phase the impact data indicated where exceedances occurred and helped determine whether the exceedances were due to the works. Analysis of all EM&A data collected throughout the construction periods demonstrated the environmental acceptability of the Project.

7.3 The weekly site inspections were effective to ensure the implementation and efficiency of the mitigation measures. In addition, the recommendations made by the auditors of the ET could continuously improve the house keeping of the Contractor and maintain good site cleaning and tidiness. As a result, environmental nuisance to the public could be reduced to a minimal.

7.4 The EM&A programme was found to be effective in monitoring impacts arising from the Project. No adverse impacts on sensitive receivers were brought and no non-compliance was recorded by the Project. In conclusion, the Project was environmentally acceptable in terms of air quality and noise levels.

7.5 With the success of the overall EM&A programme, the deterioration of the Project could be cost-effectively identified and necessary prompt effective mitigation measures were implemented to avoid any unacceptable the impacts. In consequence, no additional mitigation measure was taken due to no complaint was reported by the Project.

7.6 Therefore, the overall performance of the environmental management system in this Project was sound and effective.

Comparison between EM&A data and EIA findings

Air Quality

7.7 According to the EIA report, dust levels at all ASRs would comply with the dust criteria with the implementation of mitigation measures stipulated in the Air Pollution Control (Construction Dust) Regulation.

7.8 Under this Regulation, no Action Level and Limit Level exceedances for 1-hr TSP and 24-hr TSP were recorded during the project period. The mitigation measures were effective to control the dust level, and the Project is in line with the requirement of EIA report.

Noise

7.9 According to the EIA report, construction noise levels at all NSRs would comply with the criteria set out in the Noise Control Ordinance (NCO) and Technical Memorandum on Environmental Impact Assessment Ordinance (EIAO-TM).

7.10 Under the NCO and EIAO-TM, no Action Level and Limit Level exceedances for Noise were recorded during the project period. The mitigation measures were effective to control the construction noise level, and the Project is in line with the requirement of EIA report.

Landfill Gas Hazard

7.11 According to the EIA report, landfill gas monitoring would comply with the criteria set out in the Technical Memorandum on Environmental Impact Assessment Ordinance (EIAO-TM).

7.12 Under the EIAO-TM, no Limit Level exceedances for landfill gas were recorded during the project period. The mitigation measures were effective to control the landfill gas level, and the Project is in line with the requirement of EIA report.

Recommendations and Conclusions

7.13 Impact air quality and noise were conducted at the designated monitoring stations in accordance with the Manual.

Air Quality

7.14 No Action Level and Limit Level exceedances for 1-hr and 24-hr TSP were recorded during the project period.

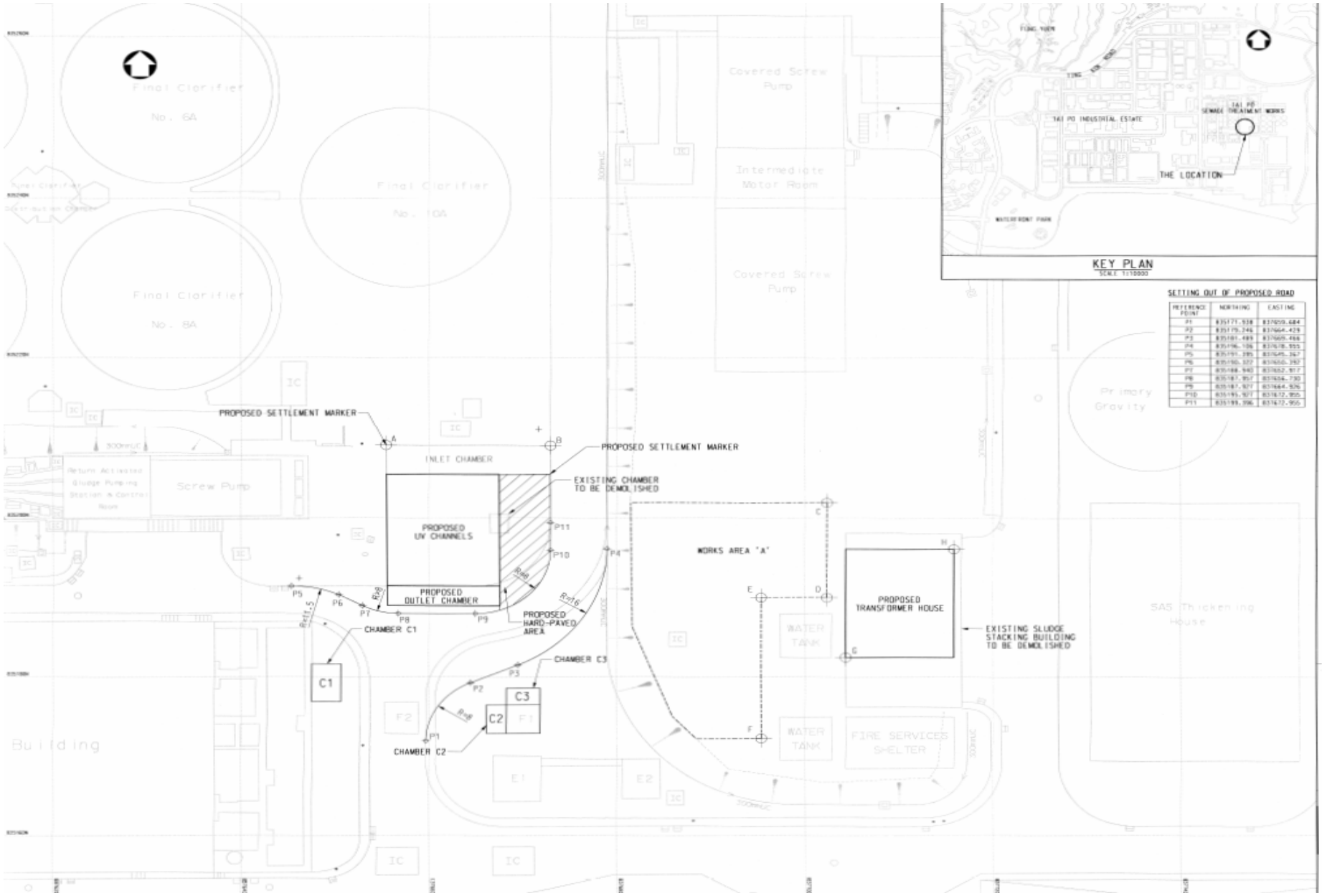
Construction Noise

7.15 No Action Level and Limit Level exceedances for noise level were recorded during the project period.

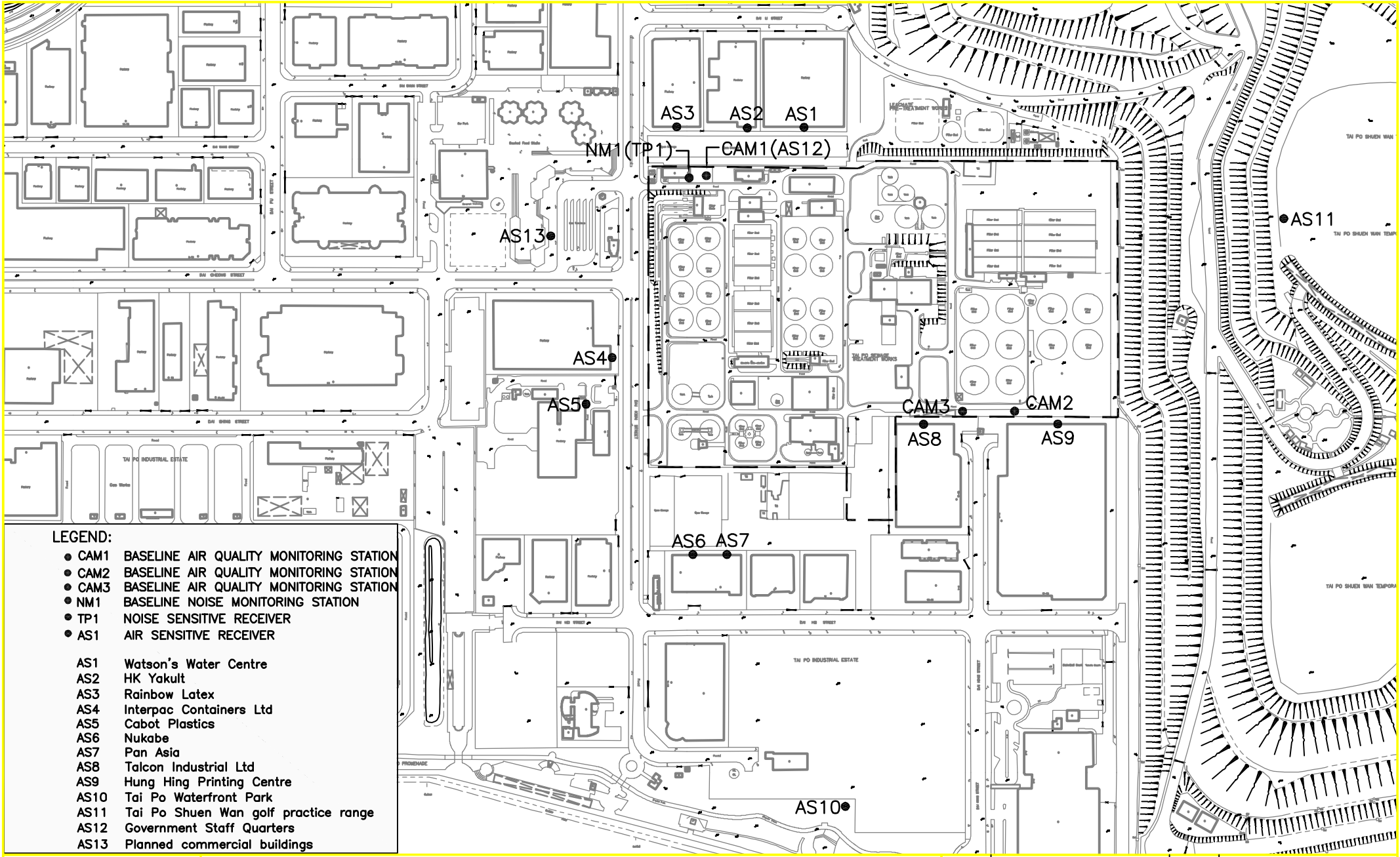
7.16 The EM&A programme were found to be effective in monitoring impacts arising from the Project. The findings of the environmental monitoring program suggest that no adverse impacts on sensitive receivers were brought about by the Project. In year 2008 to 2010, there was no non-compliances recorded. In conclusion the Project was environmentally acceptable in terms of air quality and noise levels. The Project is in line with the requirement of EIA Report and baseline monitoring report.

7.17 With the success of the overall EM&A programme, the deterioration of the Project could be cost-effectively identified and necessary prompt effective mitigation measures were implemented to avoid the impacts.

FIGURES



CINOTECH Cinotech Consultants Limited	Contract No. DE/2007/07 UV Disinfection Works for Sha Tin Sewage Treatment Works and Tai Po Sewage Treatment Works - TPSTW, Stage V, Phase IIA (Disinfection) Site Layout Plan	SCALE: N.T.S. / DATE: Jul-08 CHECK: PC / DRAWN: CM JOB NO.: MA8018 / DRAWING No.: Fig1.1 / Rev: -	



LEGEND:

CAM1	BASELINE AIR QUALITY MONITORING STATION
CAM2	BASELINE AIR QUALITY MONITORING STATION
CAM3	BASELINE AIR QUALITY MONITORING STATION
NM1	BASELINE NOISE MONITORING STATION
TP1	NOISE SENSITIVE RECEIVER
AS1	AIR SENSITIVE RECEIVER

AS1	Watson's Water Centre
AS2	HK Yakult
AS3	Rainbow Latex
AS4	Interpac Containers Ltd
AS5	Cabot Plastics
AS6	Nukabe
AS7	Pan Asia
AS8	Talcon Industrial Ltd
AS9	Hung Hing Printing Centre
AS10	Tai Po Waterfront Park
AS11	Tai Po Shuen Wan golf practice range
AS12	Government Staff Quarters
AS13	Planned commercial buildings

CINOTECH
Cinotech Consultants Limited

TAI PO SEWAGE TREATMENT WORKS – STAGE V PHASE I

LOCATIONS OF AIR QUALITY AND NOISE MONITORING STATIONS AND AIR AND NOISE SENSITIVE RECEIVERS

SCALE	A4 1:5000	DATE	2010
CHECK	GL	DRAWN	SL
JOB No.	MA8018	DRAWING No.	1.2
		REV	—

F:\MA5023\DRAWING\FIGURE\BASELINE\FIGURE 1.2.DWG

APPENDIX A
CONSTRUCTION PROGRAMME

Activity ID	Activity Name	Original Duration	Start	Finish
UV Disinfection System for Sewage Treatment Works				
Contract Commencement / Completion - STSTW				
Completion of Section Ia, IIIa, IVa & Va for STSTW				
00100	Contract Commencement Date	0d	30/05/08 A	
00200	Time for Completion of the Works of Section Ia	180d	30/05/08 A	25/11/08 A
00300	Time for Completion of the Works of Section IIIa	550d	29/06/08 A	07/04/10*
00400	Time for Completion of the Works of Section IVa	730d	08/04/10*	05/04/12
00500	Time for Completion of the Works of Section Va	1000d	05/04/09 A	05/04/12
Shatin Sewage Treatment Works				
Preliminaries				
Site Facilities Set up				
GN00100a	Site Accommodation / Temp. Facilities Set up	34d	02/06/08 A	05/07/08 A
GN00200	Application Works Permit to Works Areas	8d	30/05/08 A	05/06/08 A
GN00300	Approval of Works Permits	16d	06/06/08 A	19/06/08 A
GN00302	DSD confirmed the Project Sign Board would not be required	0d		31/12/09 A
GN00400a	Erection of Temp. Fencing & Project Sign Board	41d	20/06/08 A	31/12/09 A
GN00500a	Completion of Site Facilities Set up	0d		01/02/10
GN00800	Project Running - Section IIIa	550d	29/06/08 A	07/04/10
GN01100	Project Running - Section IVa & Va	700d	08/04/10	01/03/12
GN01500	Site Accommodation / Temp. Facilities Clear Up	30d	02/03/12	31/03/12
GN01650	Instrument Installation	5d	20/06/08 A	23/06/08 A
GN01700	Settlement Monitoring	480d	24/06/08 A	13/02/10
GN01800a	Pilot Test - Shatin	46d	12/08/08 A	29/10/08 A
GN01900a	Completion of Pilot Test - Shatin	0d		29/10/08 A
Section Ia - Technical Submission / Approval				
UV System - Design Submission				
1aa0010a	Time for Technical Submission	180d	30/05/08 A	25/11/08 A
1aa0100a	UV System / Equipment	150d	01/06/08 A	25/11/08 A
1aa0200	Transformers	45d	01/06/08 A	04/08/08 A
1aa0300	Penstocks	21d	16/07/08 A	05/08/08 A
1aa0350a	Stoplog and Lifting Appliance	28d	16/07/08 A	03/10/08 A
1aa0400	B.S. & L.V. Switchboard	35d	06/08/08 A	19/11/08 A
1aa0500a	Civil Works Requirement Drawing Submission	150d	01/06/08 A	25/11/08 A
1aa0600a	General Arrangement Drawing Submission	150d	01/06/08 A	25/11/08 A
1aa0700a	Design Approval	150d	29/06/08 A	25/11/08 A
1aa0800	Prepare Pilot Test c/w Submission	60d	01/06/08 A	24/10/08 A
1aa0900	Approval of Pilot Test Procedure	44d	01/07/08 A	28/10/08 A
1aa1100a	Completion of Works of Section Ia	0d		25/11/08 A
Section IIIa - Construction of UV System				
Construction of UV Chambers / Shelters				
3aa0010a	Time for Completion of Civil Works	365d	29/06/08 A	07/04/10
3aa0020a	Design / Method Statement Submission / Approval	20d	29/06/08 A	17/10/08 A
3aa0100	Removal & Diversion of Existing Utilities	20d	29/06/08 A	15/04/09 A
3aa0150	Temp. Flow Diversion of Extg. DN2100/2500 Pipes	90d	24/10/08 A	09/02/09 A
3aa0200	Pre-drilling Works	15d	01/08/08 A	03/09/08 A
3aa0250	Construct Trial Pile	10d	22/12/08 A	31/12/08 A
3aa0300	Load Test to Trial Pile	10d	01/01/09 A	10/01/09 A
3aa0350	Construct Mini Piles (46 nos.)	70d	11/01/09 A	14/02/09 A
3aa0400	Pile Test (Load Test & Proof-drilling)	20d	15/02/09 A	12/03/09 A
3aa0450	ELS / Excavation Works	45d	13/03/09 A	18/05/09 A
3aa0500	Pile Head Construction	20d	27/04/09 A	26/05/09 A
3aa0550	Base Slab Construction	15d	27/05/09 A	17/06/09 A
3aa0600	Walls / Intermediate Top Slab Construction	15d	18/06/09 A	31/08/09 A
3aa0650	Partition / External Walls Construction	10d	01/08/09 A	11/09/09 A
Civil Works				
3aa1350	Concreting of Canopy	0d		10/10/09 A
3aa1450	Removal of Formwork	5d	11/10/09 A	15/10/09 A
3aa1550	Removal of Falsework & Scaffolding	5d	25/10/09 A	29/10/09 A
3aa1650	Remedial Works of UV Channels for UV Bank Installation	10d	30/10/09 A	30/11/09 A
3aa1750	Water Test of UV Chamber	14d	19/11/09 A	20/12/09 A
3aa1850	Installation of Guide Channels for Partitioning System	10d	03/12/09 A	30/12/09 A
3aa1950	Internal Finishing Work for UV Chamber	5d	03/12/09 A	30/12/09 A
3aa2050	Internal Finishing Work for UV Local Control Kiosk	5d	02/11/09 A	15/11/09 A
3aa2150	Doors, Louvre, External Finishing Work for UV Local Control Kiosk	10d	31/01/10*	15/03/10

JEC

Project Start:30/05/08
Pproject Finish:11/05/12
Job Ref:J53G219504

Project ID_UV-30
Baseline_UV_04_Master_UV_05
?Primavera Systems, Inc.

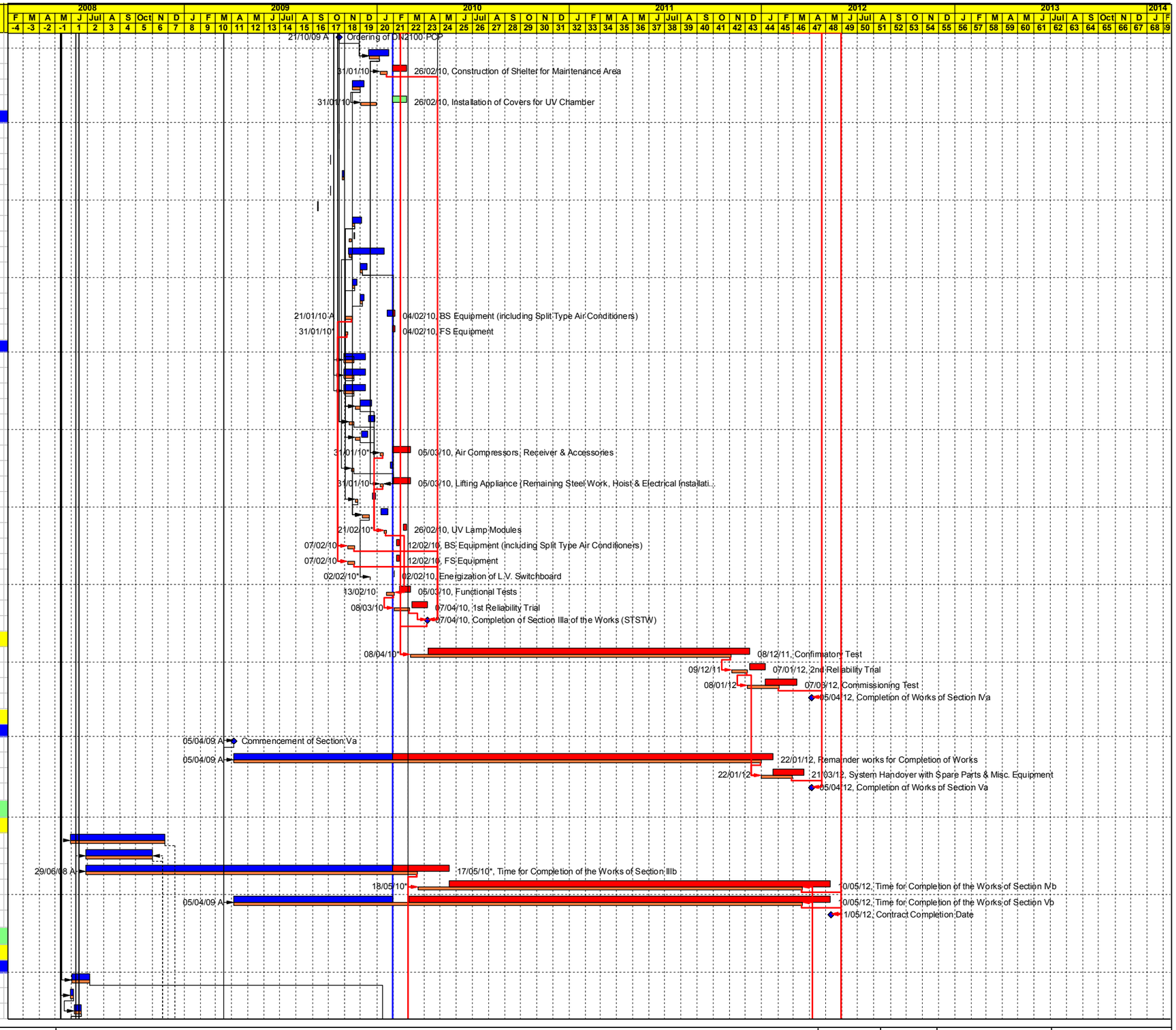
- Time for Completion
- Progress of Time for Completion
- Primary Baseline
- Actual Progress
- Activity
- Critical Activity
- Milestone

Master Program for the Installation of UV Disinfection System for Shatin and Tai Po Sewage Treatment Works Contract No. DE/2007/07

(Progress up to 31-Jan-2010)

Date	Revision	Checked	Approved
22/Aug/08	a		
27/Nov/08	b		
09/11/09	c		

Activity ID	Activity Name	Original Duration	Start	Finish
3aa2250	Ordering of DN2100 PCP	0d	21/10/09 A	
3aa2350	Reinstatement of Temporary Flow Diversion Works	21d	17/12/09 A	23/01/10 A
3aa2450	Construction of Shelter for Maintenance Area	14d	31/01/10	26/02/10
3aa2550	Construction of Cable Drawpits and Cable Ducts	14d	16/11/09 A	08/12/09 A
3aa2650	Installation of Covers for UV Chamber	30d	31/01/10	26/02/10
Delivery of E&M Equipment on Site				
3aa35001	Cast Iron Penstock (4 nos.)	1d	21/10/09 A	21/10/09 A
3aa35003	Inlet Slide Gates (5 nos.)	1d	21/10/09 A	21/10/09 A
3aa35005	Outlet Weirs (5 nos.)	1d	05/10/09 A	05/10/09 A
3aa35007	UV Lamp Modules	4d	27/10/09 A	30/10/09 A
3aa35009	UV Junction Boxes	1d	05/10/09 A	05/10/09 A
3aa35011	UV Module Frames, Baffles, Sensors & Accessories	1d	11/09/09 A	12/09/09 A
3aa35013	UV Electrical & Control Cabinets	5d	16/11/09 A	03/12/09 A
3aa35015	Air Compressors, Receiver & Accessories	5d	19/11/09 A	20/11/09 A
3aa35017	Lifting Appliance (Steel Work)	5d	09/11/09 A	15/01/10 A
3aa35019	Lifting Appliance (Hoist)	5d	30/11/09 A	14/12/09 A
3aa35021	L.V. Switchboard	5d	16/11/09 A	25/11/09 A
3aa35023	Cables & Accessories	5d	30/11/09 A	07/12/09 A
3aa35025	BS Equipment (including Split Type Air Conditioners)	14d	21/01/10 A	04/02/10
3aa35027	FS Equipment	5d	31/01/10*	04/02/10
E&M Installation				
3aa4952	Cast Iron Penstock (4 nos.)	20d	30/10/09 A	10/12/09 A
3aa4954	Inlet Slide Gates (5 nos.)	20d	30/10/09 A	10/12/09 A
3aa4956	Outlet Weirs (5 nos.)	20d	30/10/09 A	10/12/09 A
3aa4958	UV Junction Boxes	10d	01/12/09 A	23/12/09 A
3aa4960	UV Module Frames, Baffles, Sensors & Accessories	10d	17/12/09 A	28/12/09 A
3aa4962	UV Electrical & Control Cabinets	10d	03/12/09 A	15/12/09 A
3aa4964	Air Compressors, Receiver & Accessories	7d	31/01/10*	05/03/10
3aa4966	Lifting Appliance (Steel Work)	5d	27/01/10 A	31/01/10 A
3aa4968	Lifting Appliance (Remaining Steel Work, Hoist & Electrical Installation)	7d	31/01/10	05/03/10
3aa4970	L.V. Switchboard	5d	24/12/09 A	30/12/09 A
3aa4972	Cables & Accessories	14d	09/01/10 A	22/01/10 A
3aa4974	UV Lamp Modules	5d	21/02/10*	26/02/10
3aa4976	BS Equipment (including Split Type Air Conditioners)	14d	07/02/10	12/02/10
3aa4978	FS Equipment	14d	07/02/10	12/02/10
3aa4980	Energization of L.V. Switchboard	1d	02/02/10*	02/02/10
3aa4982	Functional Tests	15d	13/02/10	05/03/10
3aa4984	1st Reliability Trial	30d	08/03/10	07/04/10
3aa4986	Completion of Section IIIa of the Works (STSTW)	0d		07/04/10
Section IVa - Reliability Trials, Confirmatory and Commissioning Tests				
3aa5050	Confirmatory Test	610d	08/04/10*	08/12/11
3aa5150a	2nd Reliability Trial	30d	09/12/11	07/01/12
3aa5250	Commissioning Test	60d	08/01/12	07/03/12
3aa5350	Completion of Works of Section IVa	0d		05/04/12
Section Va - Remainder Works for the Completion of the Works				
Remainder Works				
3aa5550	Commencement of Section Va	0d	05/04/09 A	
3aa5650	Remainder works for Completion of Works	940d	05/04/09 A	22/01/12
3aa5750	System Handover with Spare Parts & Misc. Equipment	60d	22/01/12	21/03/12
3aa5850	Completion of Works of Section Va	0d		05/04/12
Contract Commencement / Completion - TPSTW				
Completion of Ib, IIb, IIIb, IVb & Vb for TPSTW				
00600	Time for Completion of the Works of Section Ib	180d	30/05/08 A	25/11/08 A
00700	Time for Completion of the Works of Section IIb	70d	29/06/08 A	01/11/08 A
00800	Time for Completion of the Works of Section IIIb	550d	29/06/08 A	17/05/10*
00900	Time for Completion of the Works of Section IVb	730d	18/05/10*	10/05/12
01000	Time for Completion of the Works of Section Vb	1000d	05/04/09 A	10/05/12
01100	Contract Completion Date	0d		11/05/12
Tai Po Sewage Treatment Works				
Preliminaries				
Site Facilities Set up				
GN02100a	Site Accommodation / Temp. Facilities Set up	34d	02/06/08 A	05/07/08 A
GN02500	Application Works Permit to Works Areas	7d	30/05/08 A	05/06/08 A
GN02600	Approval of Works Permits	14d	06/06/08 A	19/06/08 A



Project Start:30/05/08
Pproject Finish:11/05/12
Job Ref:J53G219504

Project ID_UV-30
Baseline_UV_04_Master_UV_05
?Primavera Systems, Inc.

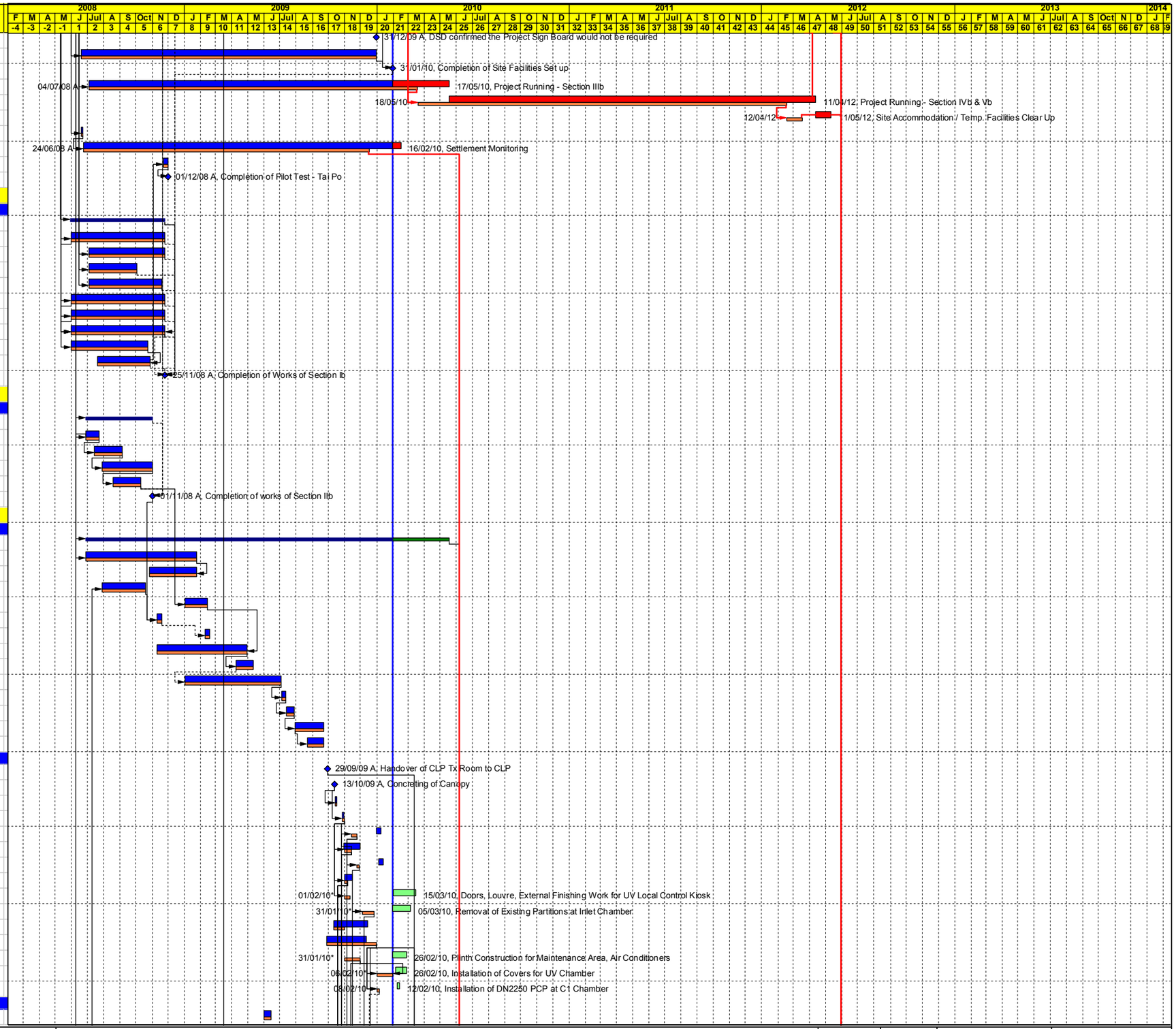
- Time for Completion
- Progress of Time for Completion
- Primary Baseline
- Actual Progress
- Activity
- Critical Activity
- Milestone

Master Program for the Installation of UV Disinfection System for Shatin and Tai Po Sewage Treatment Works Contract No. DE/2007/07

(Progress up to 31-Jan-2010)

Date	Revision	Checked	Approved
22/Aug/08	a		
27/Nov/08	b		
09/11/09	c		

Activity ID	Activity Name	Original Duration	Start	Finish
GN02650	DSD confirmed the Project Sign Board would not be required	0d		31/12/09 A
GN02700a	Erection of Temp. Fencing & Project Sign Board	35d	20/06/08 A	31/12/09 A
GN02800a	Completion of Site Facilities Set up	0d		31/01/10
GN02900	Project Running - Section IIIb	545d	04/07/08 A	17/05/10
GN03000	Project Running - Section IVb & Vb	700d	18/05/10	11/04/12
GN03500	Site Accommodation / Temp. Facilities Clear Up	30d	12/04/12	11/05/12
GN05200	Instrument Installation	4d	20/06/08 A	23/06/08 A
GN05300	Settlement Monitoring	450d	24/06/08 A	16/02/10
GN05400a	Pilot Test - Tai Po	28d	22/11/08 A	01/12/08 A
GN05500a	Completion of Pilot Test - Tai Po	0d		01/12/08 A
Section Ib - Technical Submission / Approval				
UV System				
1bb0110a	Time for Technical Submission	180d	30/05/08 A	25/11/08 A
1bb1100a	UV System / Equipment	90d	01/06/08 A	25/11/08 A
1bb1200a	SCADA System	45d	04/07/08 A	25/11/08 A
1bb1300a	Penstocks and Lifting Appliance	35d	04/07/08 A	03/10/08 A
1bb1400a	B.S. & L.V. Switchboard	45d	04/07/08 A	19/11/08 A
1bb1500a	Civil Works Requirement Drawing Submission	90d	01/06/08 A	25/11/08 A
1bb1600a	General Arrangement Drawing Submission	90d	01/06/08 A	25/11/08 A
1bb1700a	Design Approval	90d	01/06/08 A	25/11/08 A
1bb1800a	Prepare Pilot Test c/w Submission	60d	01/06/08 A	24/10/08 A
1bb1900a	Approval of Pilot Test Procedure	40d	21/07/08 A	28/10/08 A
1bb2100a	Completion of Works of Section Ib	0d		25/11/08 A
Section IIb - Sewer between Inlet Chamber & Chamber F1 & Associated Chambers				
Section IIb of the Works at TPSTW				
2bb0010	Time for Completion of Section IIb	70d	29/06/08 A	01/11/08 A
2bb0100	Design / Method Statement Submission / Approval	15d	29/06/08 A	24/07/08 A
2bb0150	ELS / Excavation Works	15d	14/07/08 A	05/09/08 A
2bb0200a	Modify Ex. Chamber F1 & Construct Chamber C3	20d	29/07/08 A	01/11/08 A
2bb0250	Laying of DN1800 PCP / Backfilling	20d	18/08/08 A	11/10/08 A
2bb0300	Completion of works of Section IIb	0d		01/11/08 A
Section IIIb - Construction of UV System				
Construction of UV Chambers / Shelters				
3bb0010	Time for Completion of Civil Works - Section IIIb	328d	28/06/08 A	17/05/10
3bb0200a	Diversion of Extg. Sludge Pipes / Utilities & Asso. Chambers	120d	29/06/08 A	24/01/09 A
3bb0400	Removal of Disused Sludge Pipes	90d	27/10/08 A	24/01/09 A
3bb0450	Pre-drilling Works	30d	29/07/08 A	20/10/08 A
3bb0480a	Removal of Ex. DN1650 PCP	28d	03/01/09 A	14/02/09 A
3bb0500	Construct Trial Pile	10d	10/11/08 A	20/11/08 A
3bb0550	Load Test to Trial Pile	10d	09/02/09 A	18/02/09 A
3bb0600	Construct Mini Piles (41 nos.)	60d	10/11/08 A	30/04/09 A
3bb0650	Pile Test (Load Test & Proof-drilling)	20d	10/04/09 A	11/05/09 A
3bb0700	ELS and Excavation Works	30d	03/01/09 A	04/07/09 A
3bb0750	Pile Head Construction	15d	05/07/09 A	13/07/09 A
3bb0800	Base Slab Construction	15d	14/07/09 A	29/07/09 A
3bb0850	Walls / Intermediate Top Slab Construction	15d	30/07/09 A	22/09/09 A
3bb0900	Partition / External Walls Construction	10d	23/08/09 A	22/09/09 A
Civil Works - IIIB				
3bb1151	Handover of CLP Tx Room to CLP	0d		29/09/09 A
3bb1152	Concreting of Canopy	0d		13/10/09 A
3bb1154	Removal of Formwork	5d	14/10/09 A	18/10/09 A
3bb1156	Removal of Falsework & Scaffolding	4d	28/10/09 A	31/10/09 A
3bb1158	Remedial Works of UV Channels for UV Bank Installation	10d	31/12/09 A	09/01/10 A
3bb1160	Water Test of UV Chamber & C1 Chamber	14d	31/10/09 A	30/11/09 A
3bb1162	Internal Finishing Work for UV Chamber	5d	04/01/10 A	13/01/10 A
3bb1164	Internal Finishing Work for UV Local Control Kiosk	5d	01/11/09 A	15/11/09 A
3bb1166	Doors, Louvre, External Finishing Work for UV Local Control Kiosk	10d	01/02/10*	15/03/10
3bb1168	Removal of Existing Partitions at Inlet Chamber	21d	31/01/10*	05/03/10
3bb1170	Construction of Cable Drawpits & Ducts from Tx House to UV Cham...	20d	12/10/09 A	15/12/09 A
3bb1172	Construction of CLP Cable Drawpits & Ducts	64d	28/09/09 A	12/12/09 A
3bb1174	Plinth Construction for Maintenance Area, Air Conditioners	30d	31/01/10*	26/02/10
3bb1176	Installation of Covers for UV Chamber	30d	06/02/10*	26/02/10
3bb1178	Installation of DN2250 PCP at C1 Chamber	5d	08/02/10	12/02/10
Construction of DN2250 Pipeline				
3bb1200	ELS / Excavation Works	15d	01/06/09 A	15/06/09 A



Project Start:30/05/08
Pproject Finish:11/05/12
Job Ref:J53G219504

Project ID_UV-30
Baseline_UV_04_Master_UV_05
?Primavera Systems, Inc.

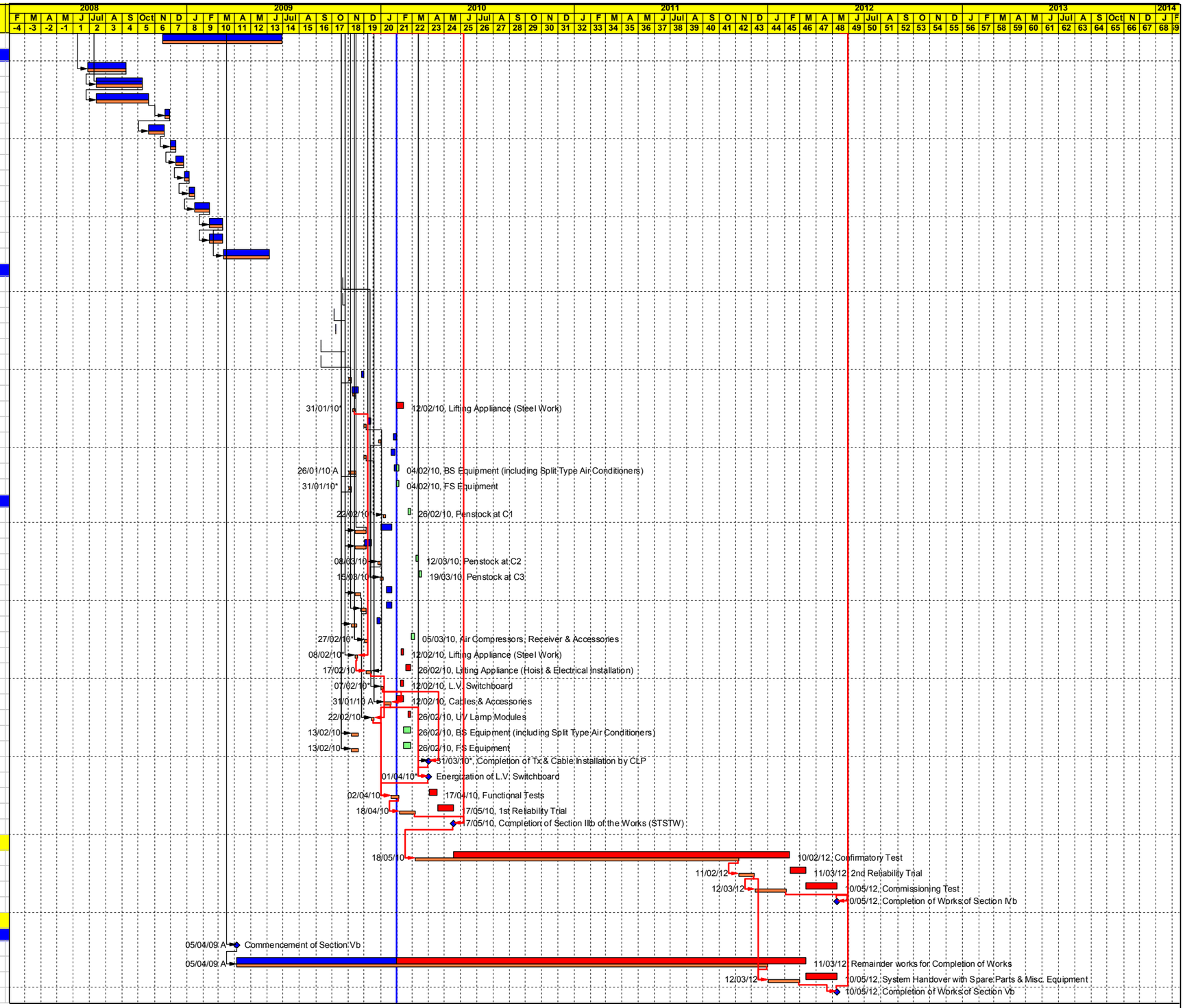
Time for Completion
Progress of Time for Completion
Primary Baseline
Actual Progress
Activity
Critical Activity
Milestone

Master Program for the Installation of UV Disinfection System for Shatin and Tai Po Sewage Treatment Works Contract No. DE/2007/07

(Progress up to 31-Jan-2010)

Date	Revision	Checked	Approved
22/Aug/08	a		
27/Nov/08	b		
09/11/09	c		

Activity ID	Activity Name	Original Duration	Start	Finish
3bb1250	Construct Chamber C1 and C2	20d	16/11/08 A	29/06/09 A
Construction of Transformer House				
3bb1350	Demolish Extg. Sludge Stacking House	15d	29/06/08 A	09/09/08 A
3bb1400	Pre-drilling Works	15d	14/07/08 A	09/10/08 A
3bb1450	Construct Trial Pile	10d	15/07/08 A	21/10/08 A
3bb1500	Load Test to Trial Pile	10d	21/11/08 A	30/11/08 A
3bb1550	Construct Mini Piles (16nos.)	30d	21/10/08 A	19/11/08 A
3bb1600	Pile Test (Load Test & Proof-drilling)	20d	01/12/08 A	11/12/08 A
3bb1650	ELS / Excavation Wroks	15d	12/12/08 A	26/12/08 A
3bb1700	Pile Head Construction	10d	27/12/08 A	05/01/09 A
3bb1750	Pile Caps & Grd. Beams Construction	10d	06/01/09 A	15/01/09 A
3bb1800	Grd. Slab Construction / Backfilling	15d	16/01/09 A	12/02/09 A
3bb1850	G/F to R/F Construction	15d	13/02/09 A	10/03/09 A
3bb1900	External Stair Construction	15d	13/02/09 A	10/03/09 A
3bb1950	ABWF Works	30d	11/03/09 A	06/06/09 A
E&M Equipment Delivery on Site IIIb				
3bb3722	Cast Iron Penstock (3 nos.)	1d	21/10/09 A	21/10/09 A
3bb3724	Inlet Slide Gates (5 nos.)	1d	21/10/09 A	21/10/09 A
3bb3726	Outlet Weirs (5 nos.)	1d	05/10/09 A	05/10/09 A
3bb3728	UV Lamp Modules	1d	09/10/09 A	09/10/09 A
3bb3730	UV Junction Boxes	1d	11/09/09 A	11/09/09 A
3bb3732	UV Module Frames, Baffles, Sensors & Accessories	1d	11/09/09 A	11/09/09 A
3bb3734	UV Electrical & Control Cabinets	5d	26/11/09 A	01/12/09 A
3bb3736	Air Compressors, Receiver & Accessories	5d	09/11/09 A	20/11/09 A
3bb3738	Lifting Appliance (Steel Work)	5d	31/01/10*	12/02/10
3bb3740	Lifting Appliance (Hoist)	5d	08/12/09 A	14/12/09 A
3bb3742	L.V. Switchboard	5d	25/01/10 A	31/01/10 A
3bb3744	Cables & Accessories	5d	21/01/10 A	28/01/10 A
3bb3746	BS Equipment (including Split Type Air Conditioners)	14d	26/01/10 A	04/02/10
3bb3748	FS Equipment	5d	31/01/10*	04/02/10
E&M Installation - IIIb				
3bb5502	Penstock at C1	5d	22/02/10*	26/02/10
3bb5504	Inlet Slide Gates (5 nos.)	21d	02/01/10 A	22/01/10 A
3bb5508	Outlet Weirs (5 nos.)	21d	01/12/09 A	15/12/09 A
3bb5510	Penstock at C2	5d	08/03/10	12/03/10
3bb5512	Penstock at C3	5d	15/03/10	19/03/10
3bb5514	UV Junction Boxes	10d	12/01/10 A	22/01/10 A
3bb5516	UV Module Frames, Baffles, Sensors & Accessories	10d	12/01/10 A	22/01/10 A
3bb5518	UV Electrical & Control Cabinets	10d	25/12/09 A	31/12/09 A
3bb5520	Air Compressors, Receiver & Accessories	7d	27/02/10*	05/03/10
3bb5522	Lifting Appliance (Steel Work)	5d	08/02/10*	12/02/10
3bb5524	Lifting Appliance (Hoist & Electrical Installation)	10d	17/02/10	26/02/10
3bb5526	L.V. Switchboard	5d	07/02/10*	12/02/10
3bb5528	Cables & Accessories	14d	31/01/10 A	12/02/10
3bb5530	UV Lamp Modules	5d	22/02/10	26/02/10
3bb5532	BS Equipment (including Split Type Air Conditioners)	14d	13/02/10	26/02/10
3bb5534	FS Equipment	14d	13/02/10	26/02/10
3bb5536	Completion of Tx & Cable Installation by CLP	0d		31/03/10*
3bb5538	Energization of L.V. Switchboard	0d	01/04/10*	
3bb5540	Functional Tests	15d	02/04/10	17/04/10
3bb5542	1st Reliability Trial	30d	18/04/10	17/05/10
3bb5544	Completion of Section IIIb of the Works (STSTW)	0d		17/05/10
Section IVb - Reliability Trials, Confirmatory and Commissioning Tests				
4bb6200	Confirmatory Test	610d	18/05/10	10/02/12
4bb6300a	2nd Reliability Trial	30d	11/02/12	11/03/12
4bb6400	Commissioning Test	60d	12/03/12	10/05/12
4bb6500	Completion of Works of Section IVb	0d		10/05/12
Section Vb - Remainder Works for the Completion of the Works				
Remainder Works				
5bb0100	Commencement of Section Vb	0d	05/04/09 A	
5bb0200	Remainder works for Completion of Works	900d	05/04/09 A	11/03/12
5bb0300	System Handover with Spare Parts & Misc. Equipment	60d	12/03/12	10/05/12
5bb0400	Completion of Works of Section Vb	0d		10/05/12



JEC

Project Start:30/05/08
Pproject Finish:11/05/12
Job Ref:J53G219504

Project ID_UV-30
Baseline_UV_04_Master_UV_05
?Primavera Systems, Inc.

- Time for Completion
- Progress of Time for Completion
- Primary Baseline
- Actual Progress
- Activity
- Critical Activity
- Milestone

Master Program for the Installation of UV Disinfection System for Shatin and Tai Po Sewage Treatment Works Contract No. DE/2007/07

(Progress up to 31-Jan-2010)

Date	Revision	Checked	Approved
22/Aug/08	a		
27/Nov/08	b		
09/11/09	c		

APPENDIX B
MONITORING REQUIREMENTS

APPENDIX B – Monitoring Requirements

Type of Monitoring	Parameter	Frequency	Duration	Location of Measurement
Noise	L_{eq}(30 min.) (0700-1900 hrs. on normal weekdays)	Once per week	30 mins	• NM1 (Outside the corridor of 1/F of Government Staff Quarter)
Air	1-hour TSP	3 times / 6-day	1 hour	• CAM1 (on flat roof of Government Staff Quarters) • CAM2 (on ground within TPSTW and just next to the Printing Centre of Hung Hing Printing Centre) • CAM3 (on ground within TPSTW and just next to Talcon Industrial Ltd.)
	24-hour TSP	Once / 6-day	24 hour	

APPENDIX C
ACTION AND LIMIT LEVELS

APPENDIX C – Action and Limit Levels

1-Hour TSP

Location	Action Level, µg/m^3	Limit Level, µg/m^3
CAM1	309	500
CAM2	303	
CAM3	311	

24-Hour TSP

Location	Action Level, µg/m^3	Limit Level, µg/m^3
CAM1	167	260
CAM2	161	
CAM3	170	

Construction Noise

Time Period	Action Level	Limit Level
0700-1900 hrs on normal weekdays	When one documented complaint is received	75 dB(A)
0700-2300 hrs on holidays; and 1900-2300 hrs on all other days		70* dB(A)
2300-0700 hrs of next day		55* dB(A)

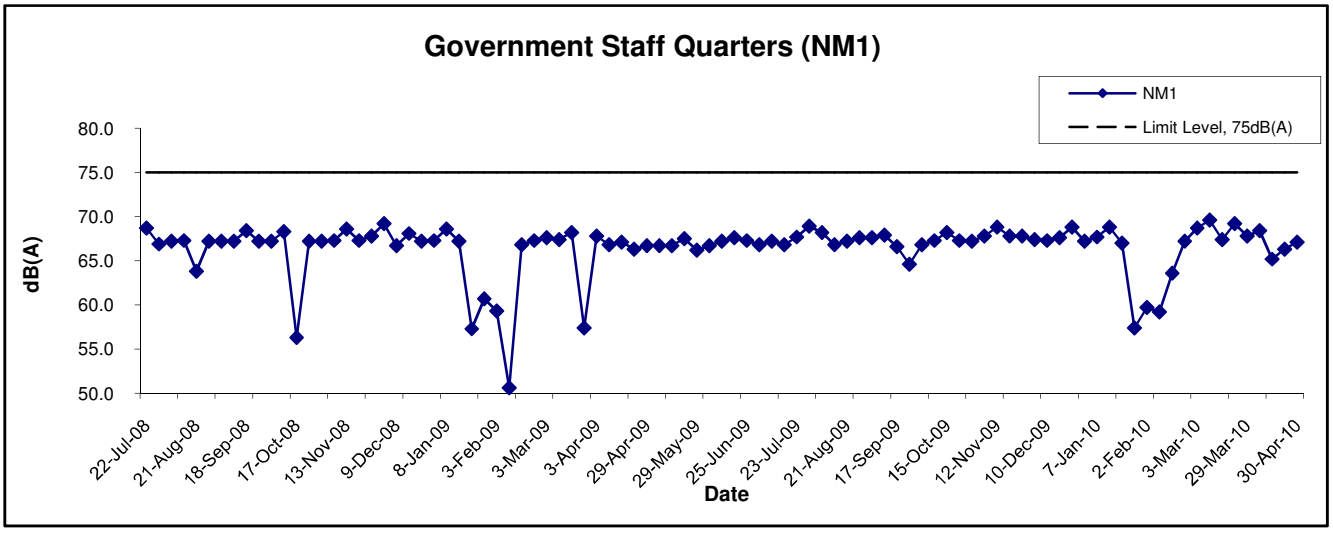
Notes:
* The Area Sensitivity Rating for Station NM1 is taken as C, due to the nearby industrial area, according to Table 1 of EPD's Technical Memorandum on Noise from Construction Work other than Percussive Piling.

Landfill Gas

Parameter	Limit Level	Action
Oxygen	<19%	Ventilate to restore oxygen to >19%
	<18%	Stop works Evacuate personnel / prohibit entry Increase ventilation to restore oxygen to >19%
Methane	>10% LEL (i.e. >0.5% by volume)	Post "No Smoking" signs Prohibit hot works Ventilate to restore methane to <10% LEL
	>20% LEL (i.e. >1% by volume)	Stop works Evacuate personnel / prohibit entry Increase ventilation to restore methane to <10%
Carbon Dioxide	>0.5%	Ventilate to restore carbon dioxide to <0.5%
	>1.5%	Stop works Evacuate personnel / prohibit entry Increase ventilation to restore carbon dioxide to <0.5%

APPENDIX D
GRAPHICAL PRESENTATION OF NOISE MONITORING RESULTS

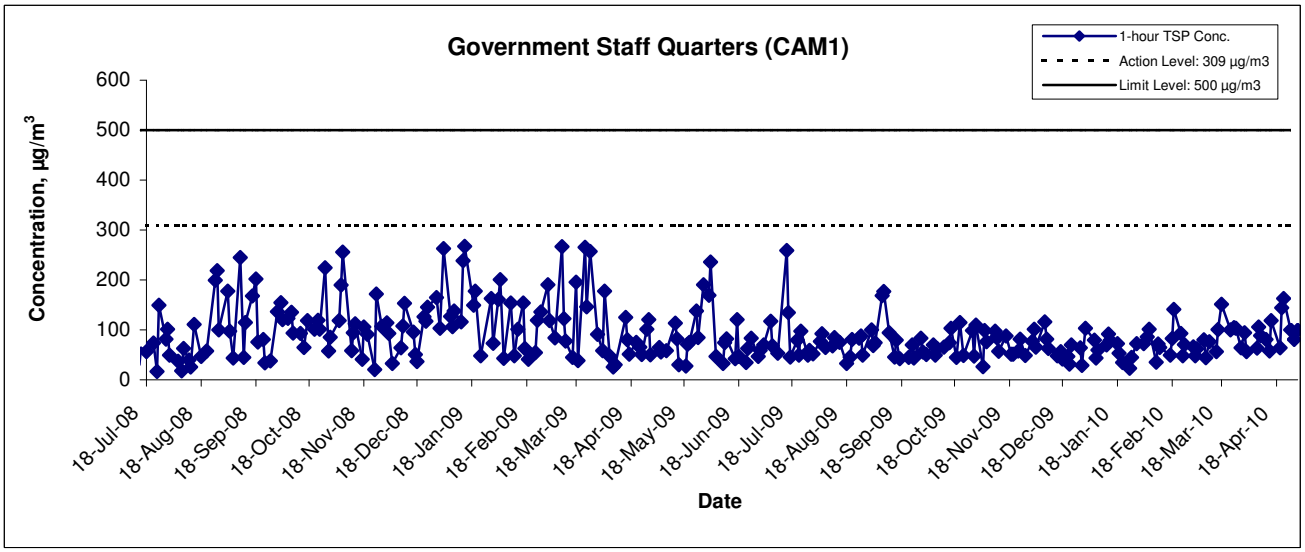
Noise Levels

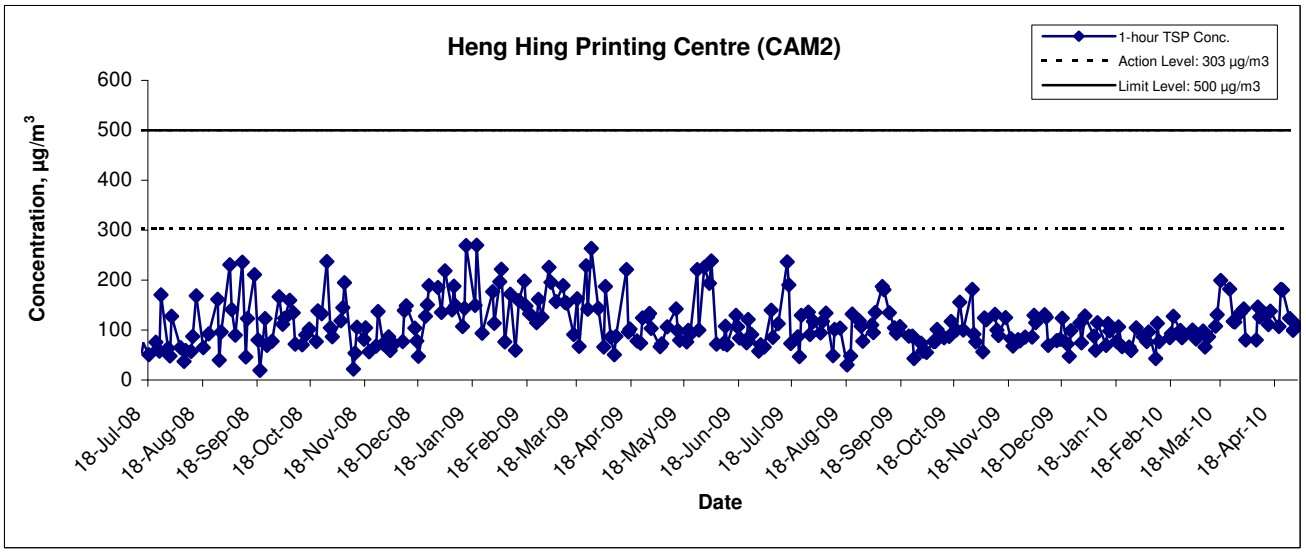


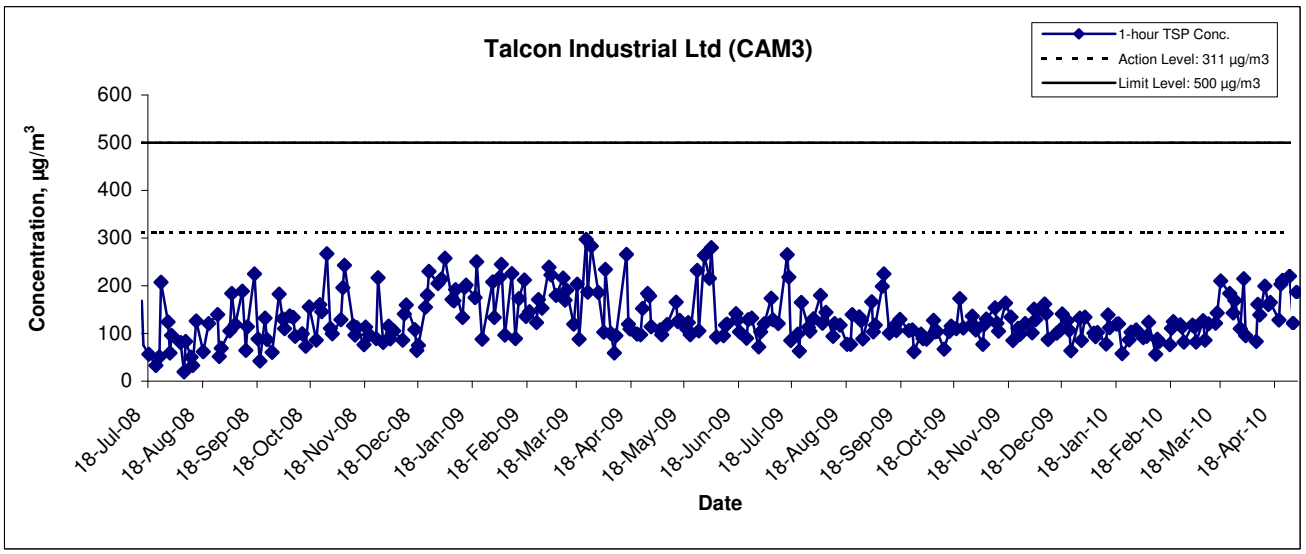
Title: Tai Po Sewage Treatment Work, Stage V, Phase IIA Graphical Presentation of Construction Noise Monitoring Results	Scale: N.T.S Date: Apr 10	Project No.: MA8018 Appendix: D	CINOTECH

APPENDIX E
GRAPHICAL PRESENTATION OF 1-HOUR TSP MONITORING RESULTS

1-hr TSP Concentration Levels





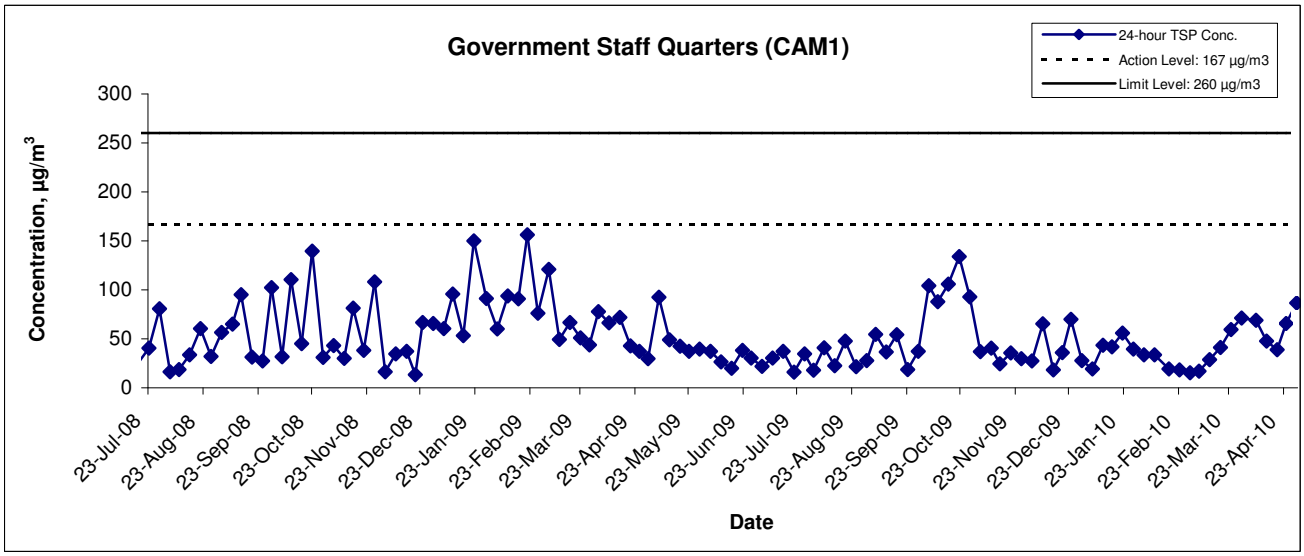


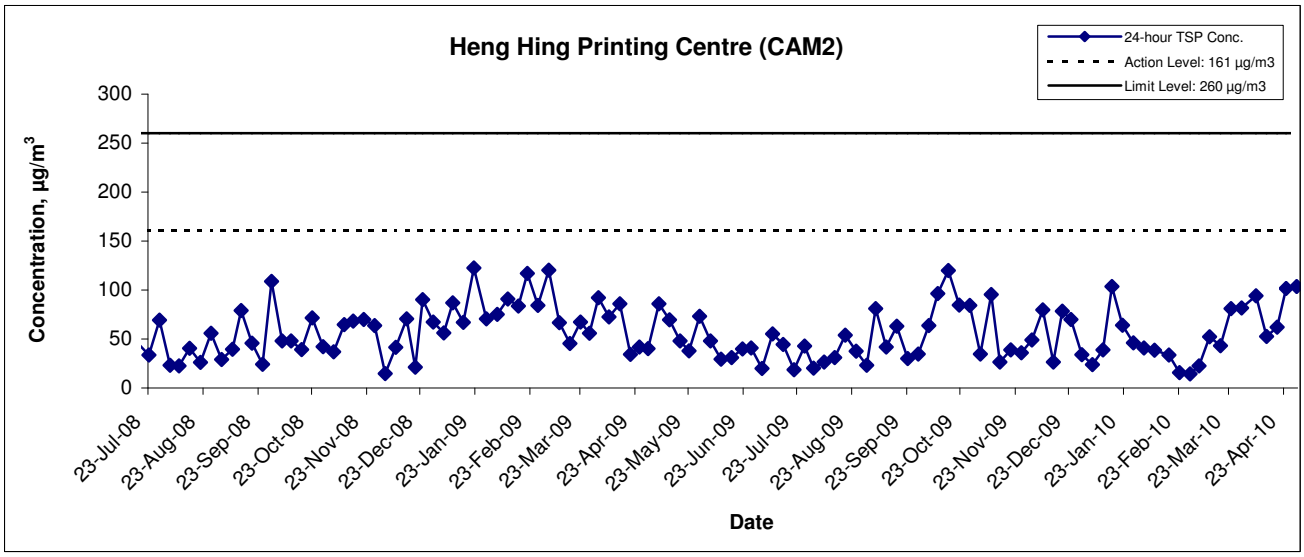
Title	Scale	Project No.
Tai Po Sewage Treatment Work, Stage V, Phase IIA Graphical Presentation of 1-hour TSP Impact Monitoring Results	N.T.S	MA8018
	Date: Apr 10	Appendix: E

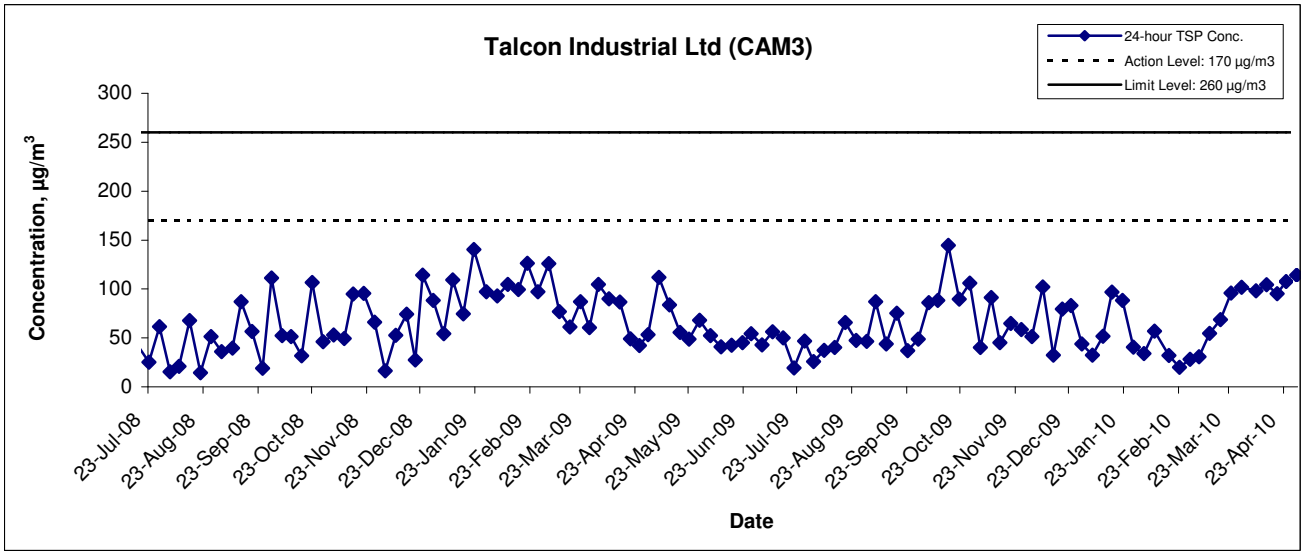
CINOTECH

APPENDIX F
GRAPHICAL PRESENTATION OF 24-HOUR TSP MONITORING RESULTS

24-hr TSP Concentration Levels



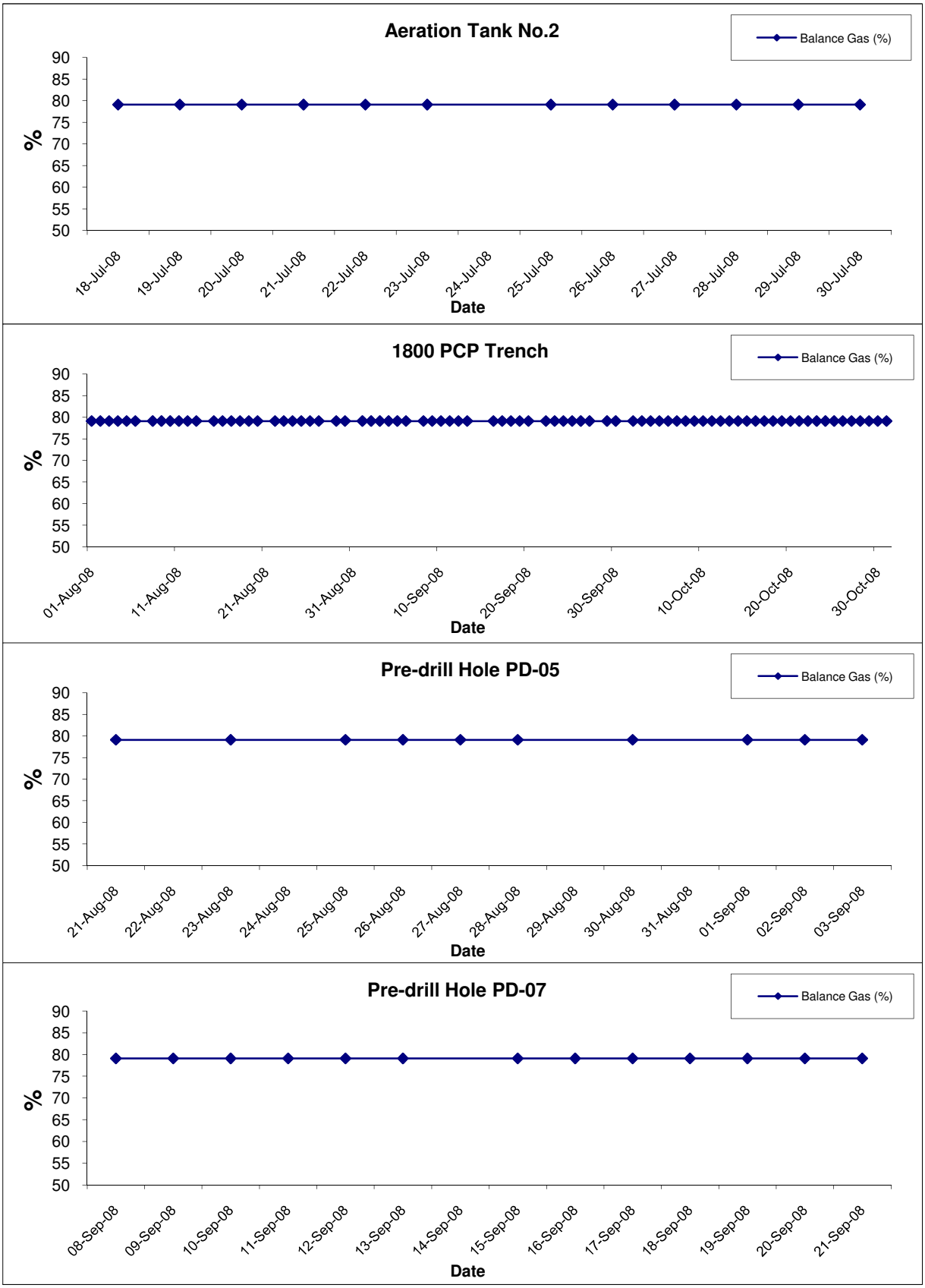




Title: Tai Po Sewage Treatment Work, Stage V, Phase IIA Graphical Presentation of 24-hour TSP Impact Monitoring Results	Scale: N.T.S Date: Apr 10	Project No.: MA8018 Appendix: F	CINOTECH

APPENDIX G
GRAPHICAL PRESENTATION OF LANDFILL GAS MONITORING RESULTS

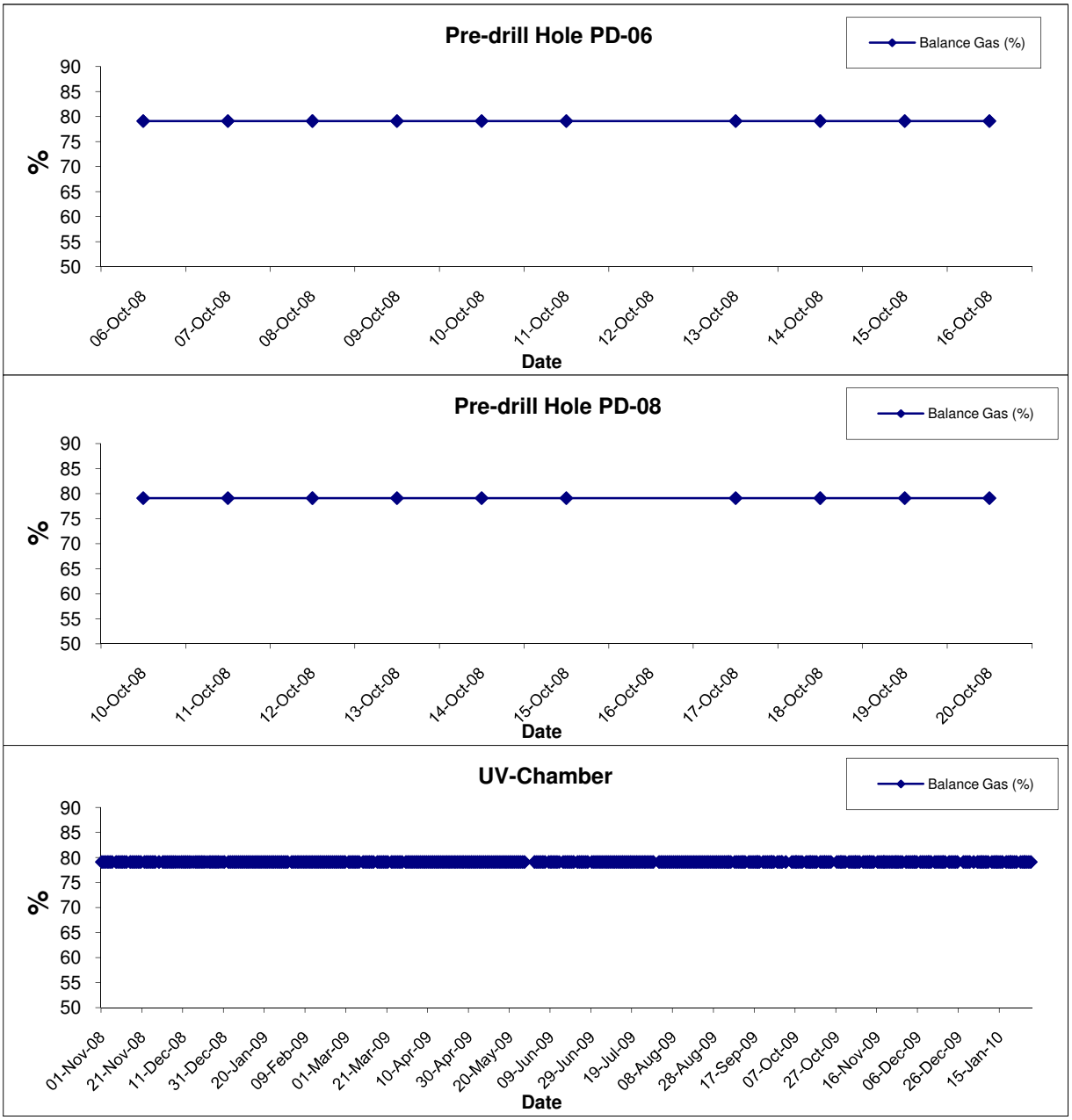
Balance Gas



Title	Scale	Project No.
Tai Po Sewage Treatment Work, Stage V, Phase IIA	N.T.S	MA8018
Graphical Presentation of Landfill Gas Measurement	Date: Jul 10	Appendix: G

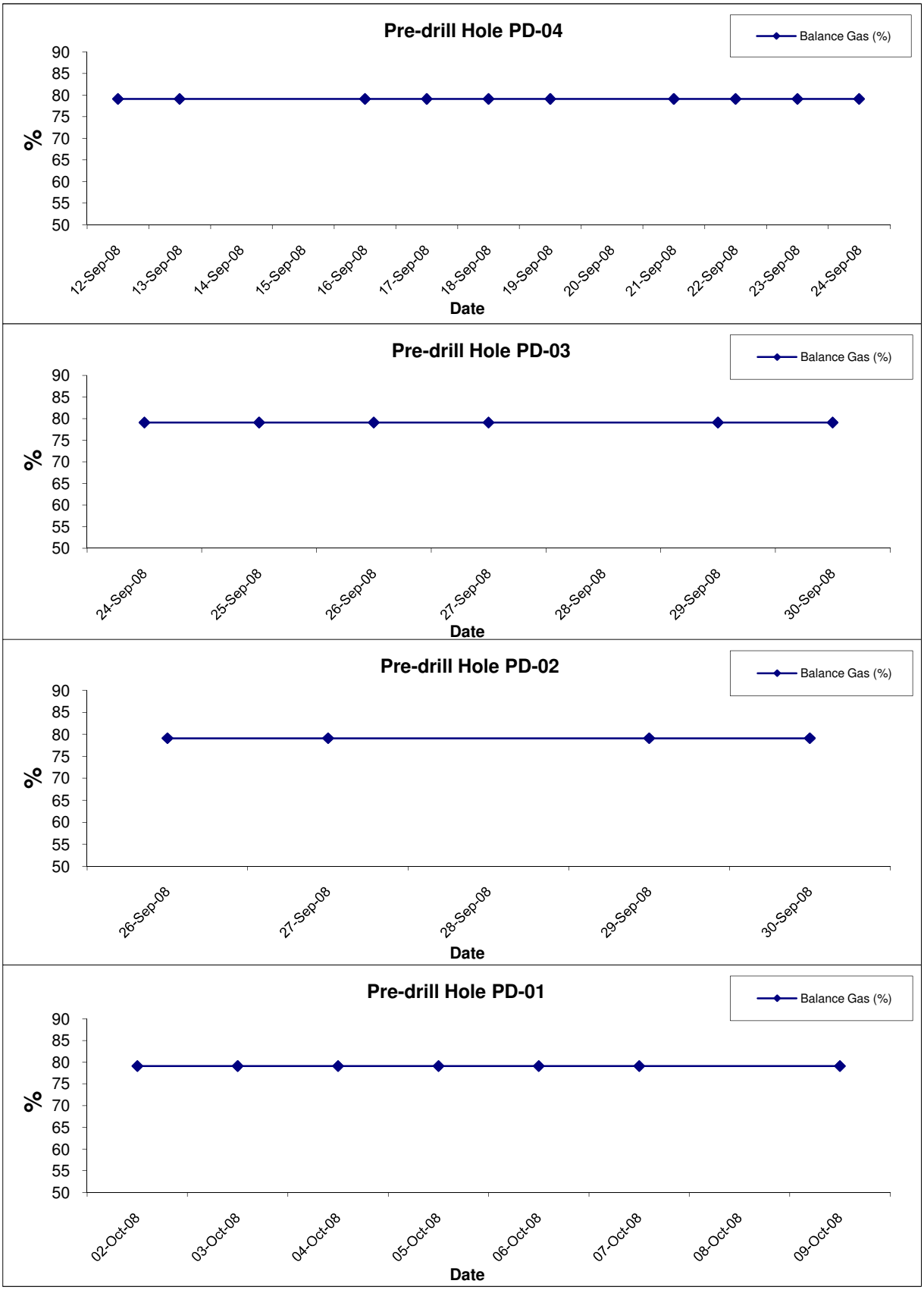
CINOTECH

Balance Gas



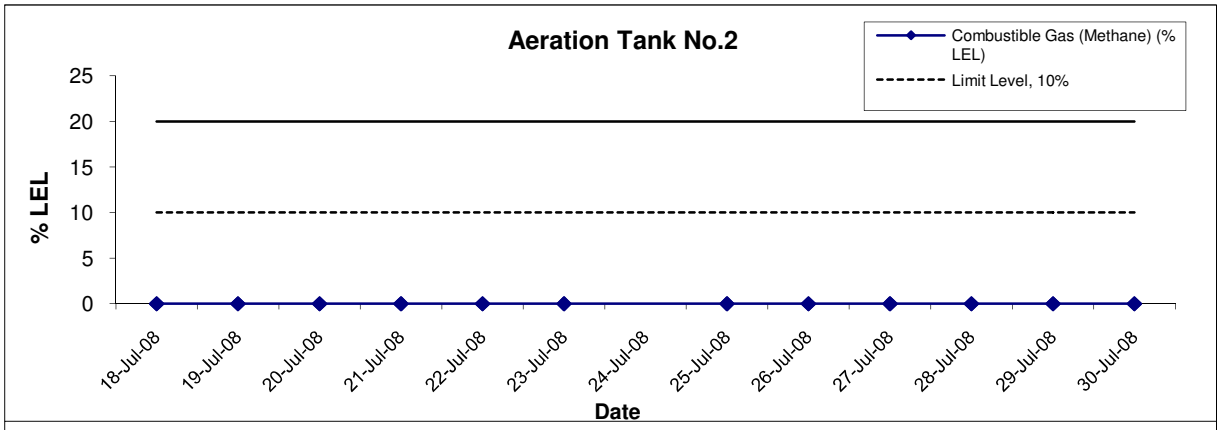
Title: Tai Po Sewage Treatment Work, Stage V, Phase IIA Graphical Presentation of Landfill Gas Measurement	Scale: N.T.S Date: Jul 10	Project No.: MA8018 Appendix: G	CINOTECH

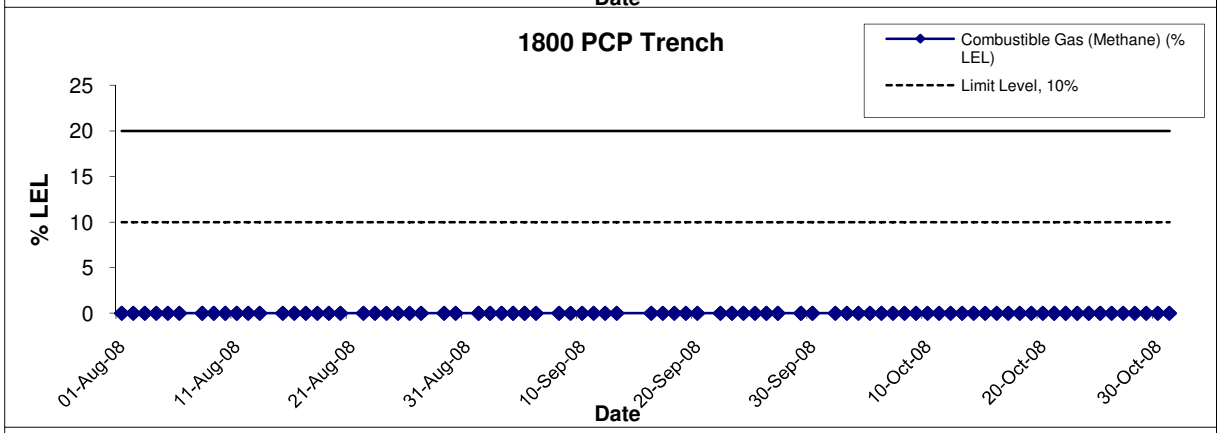
Balance Gas

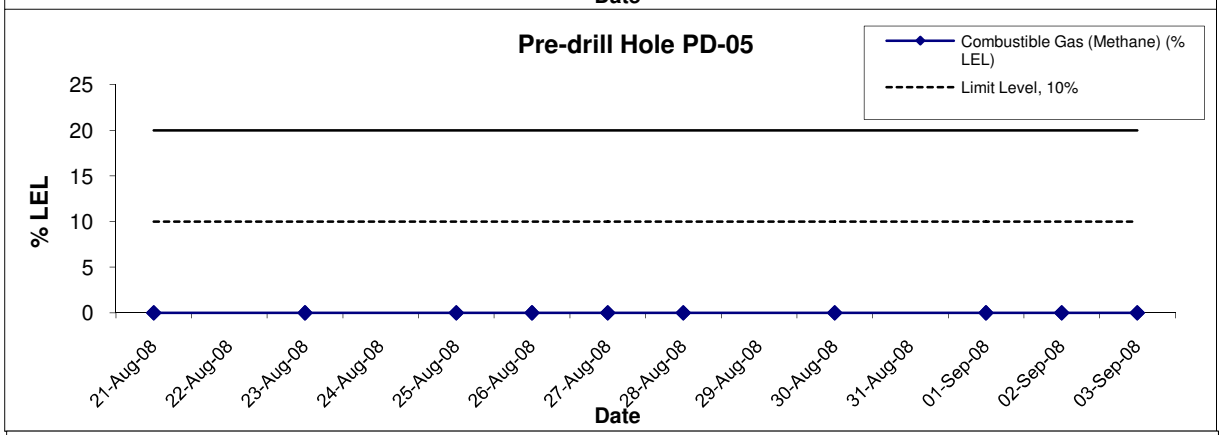


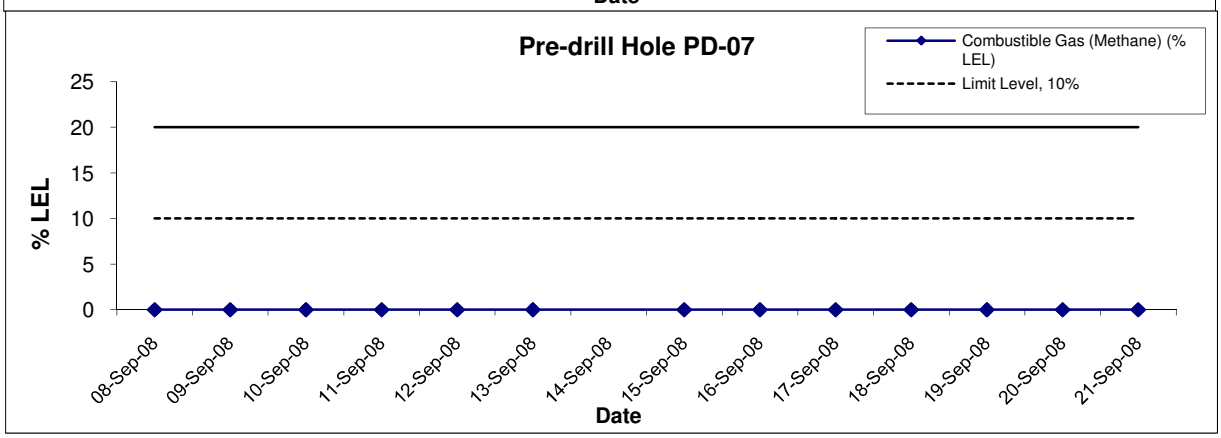
Title: Tai Po Sewage Treatment Work, Stage V, Phase IIA Graphical Presentation of Landfill Gas Measurement	Scale: N.T.S Date: Jul 10	Project No.: MA8018 Appendix: G	CINOTECH

Combustible Gas (Methane)



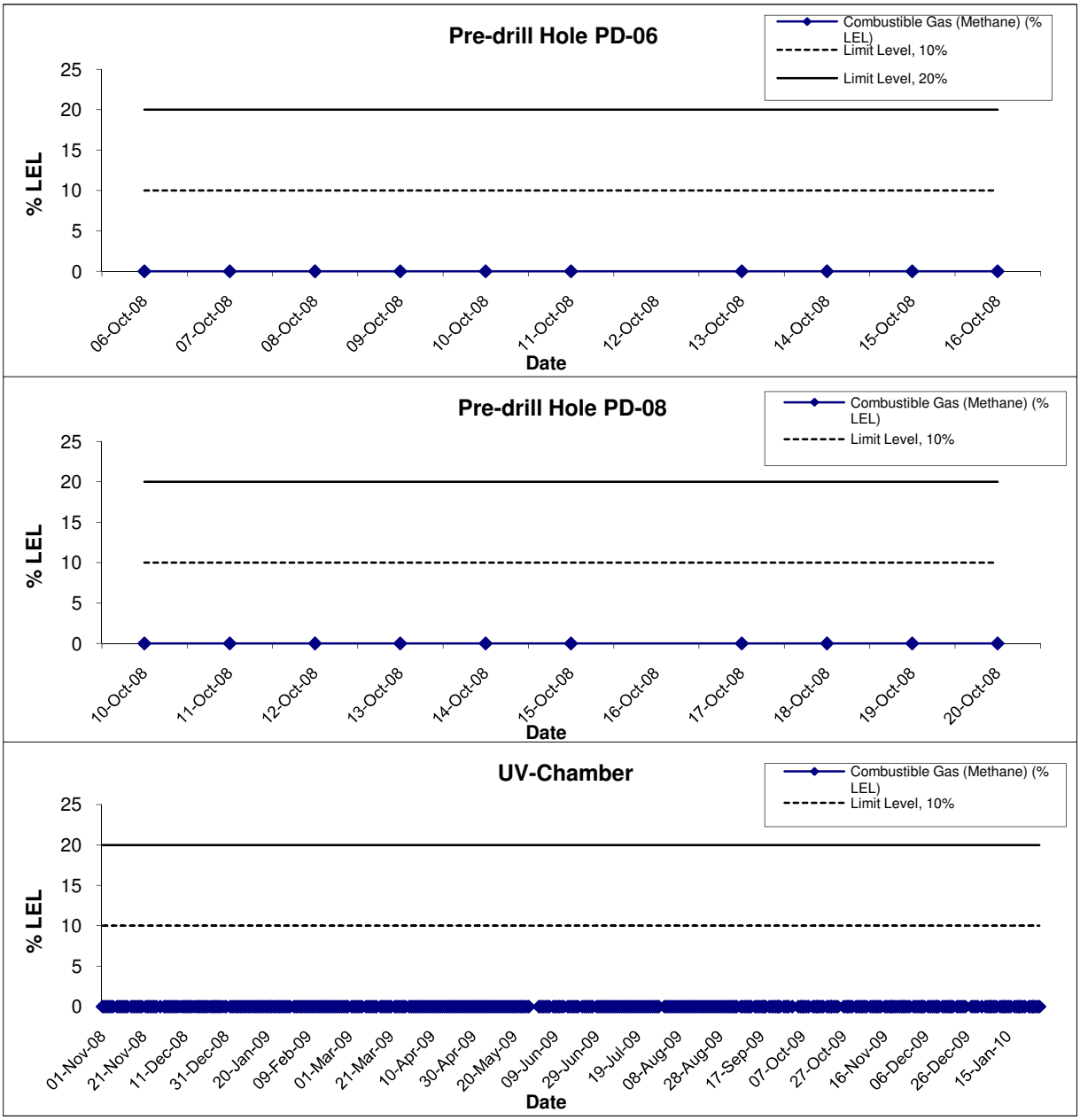






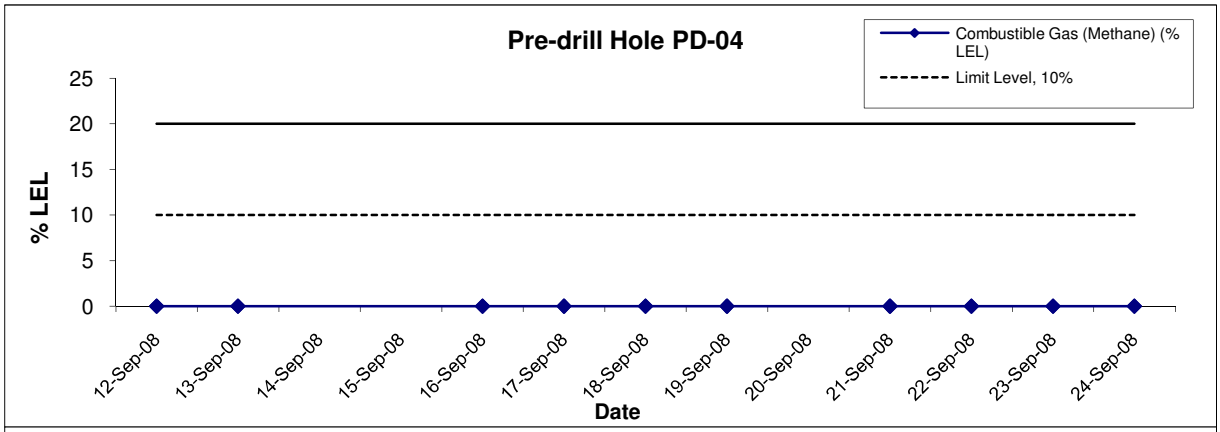
Title: Tai Po Sewage Treatment Work, Stage V, Phase IIA Graphical Presentation of Landfill Gas Measurement	Scale: N.T.S Date: Jul 10	Project No.: MA8018 Appendix: G	CINOTECH

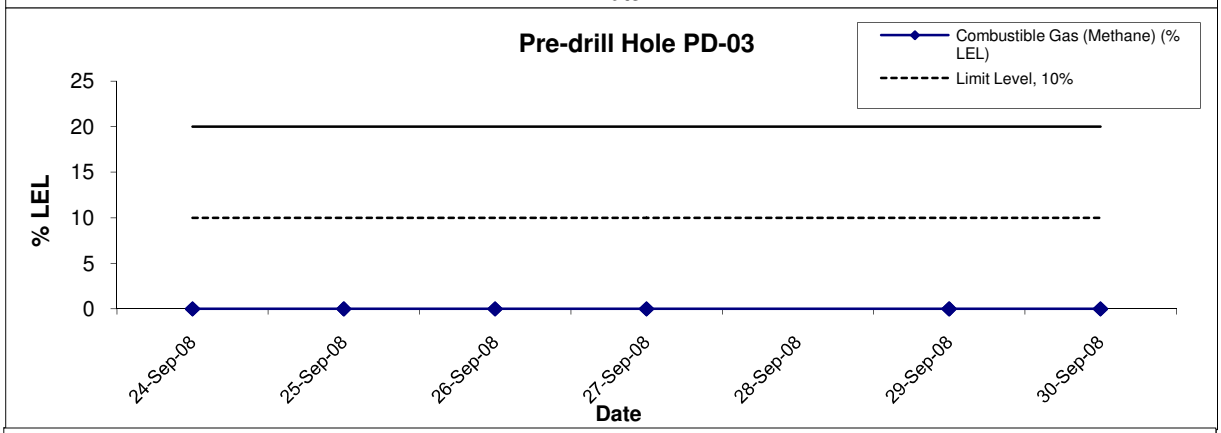
Combustible Gas (Methane)

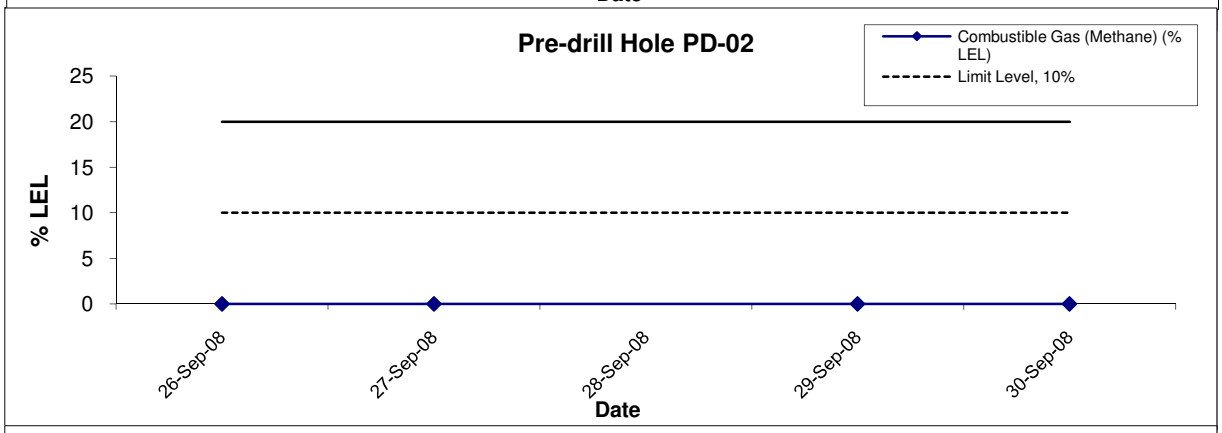


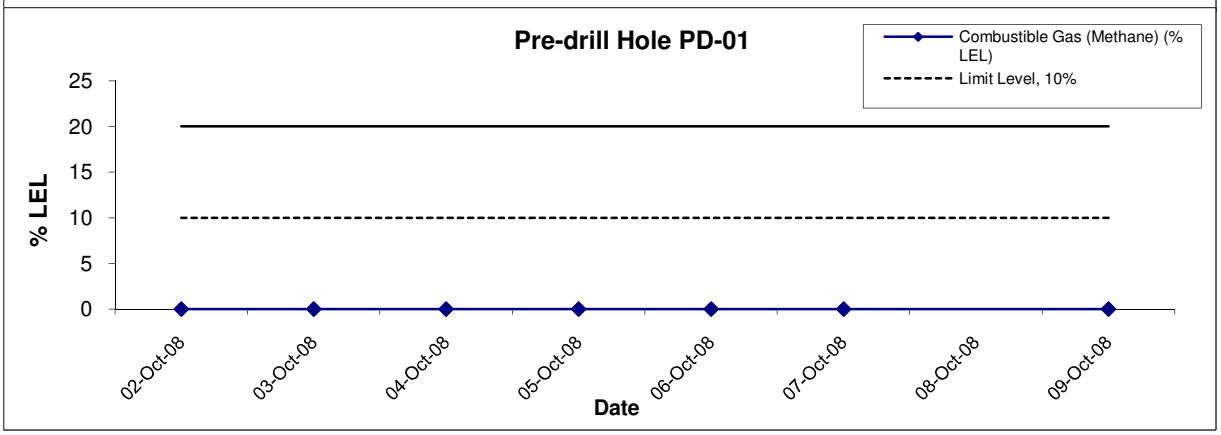
Title: Tai Po Sewage Treatment Work, Stage V, Phase IIA Graphical Presentation of Landfill Gas Measurement	Scale: N.T.S Date: Jul 10	Project No.: MA8018 Appendix: G	CINOTECH

Combustible Gas (Methane)



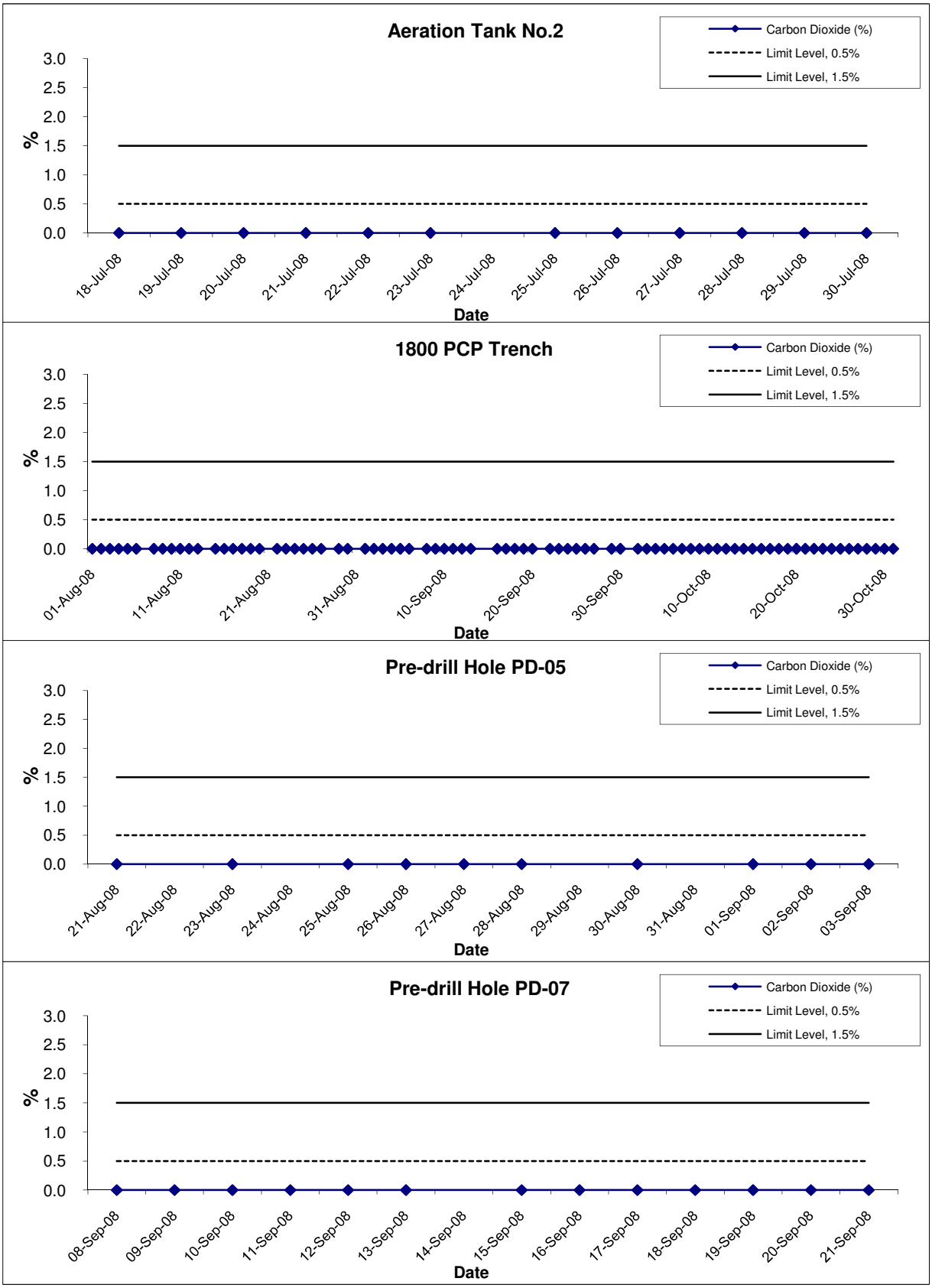






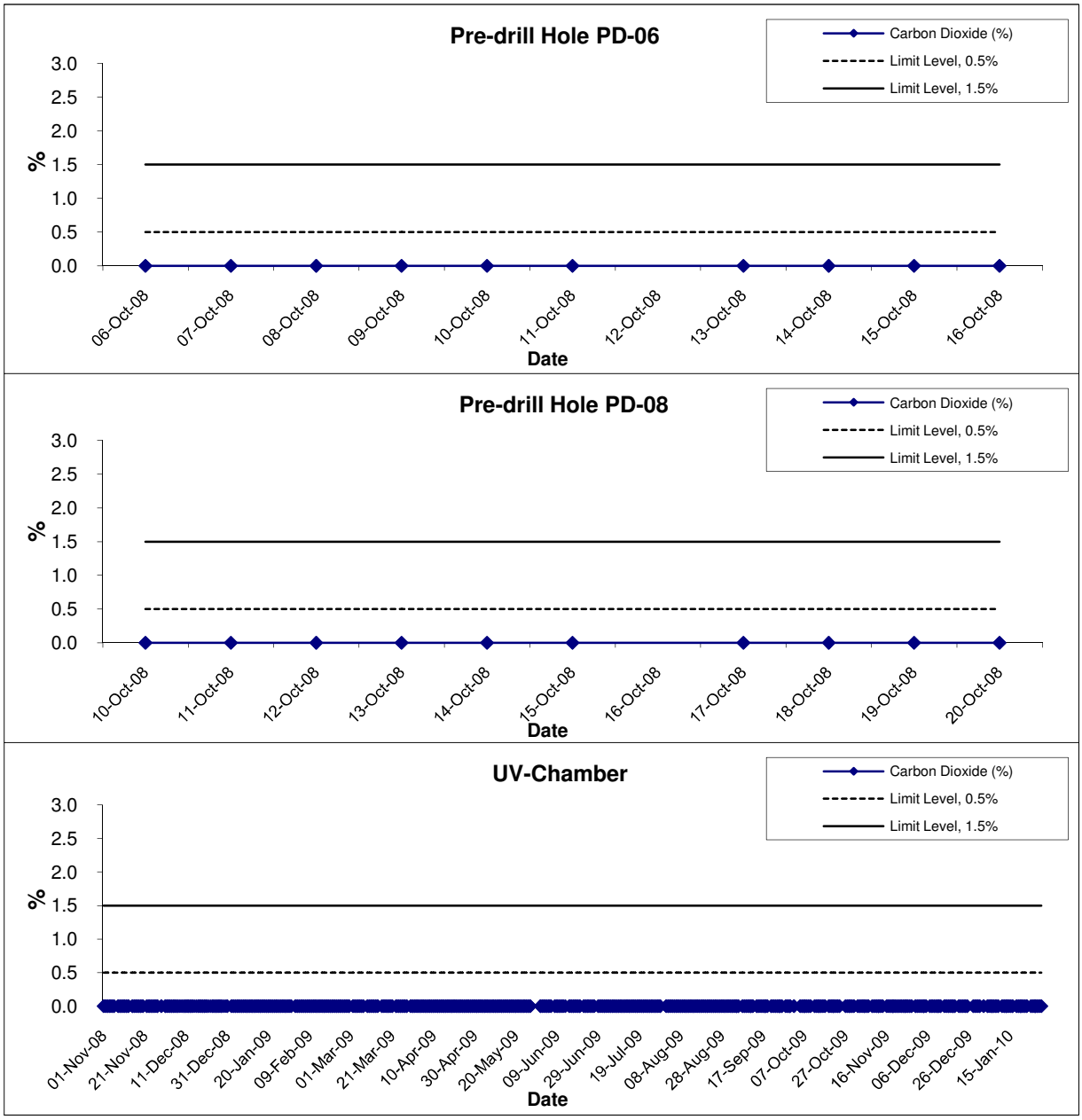
Title: Tai Po Sewage Treatment Work, Stage V, Phase IIA Graphical Presentation of Landfill Gas Measurement	Scale: N.T.S Date: Jul 10	Project No.: MA8018 Appendix: G	CINOTECH

Carbon Dioxide



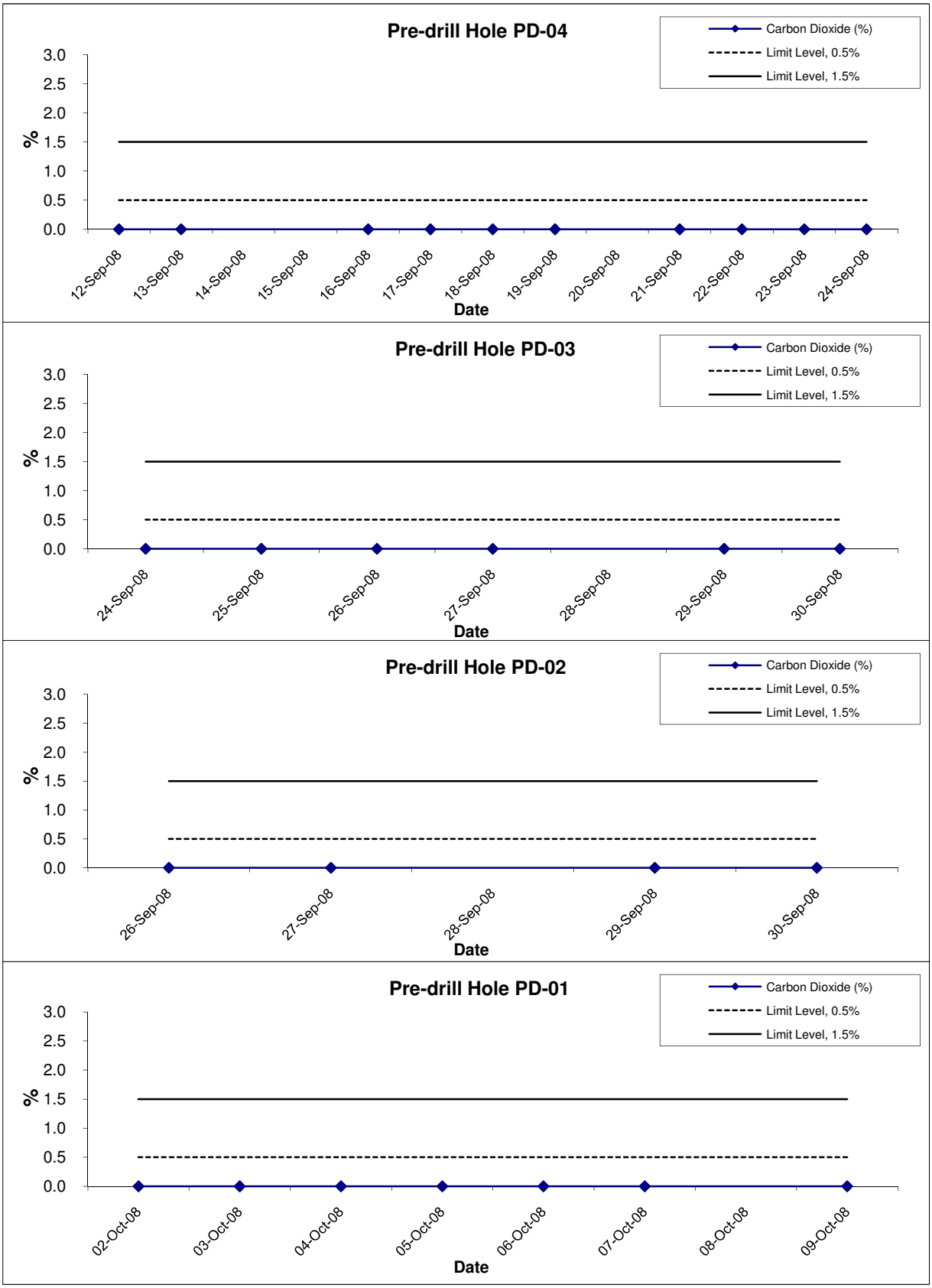
Title	Scale	Project No.	
Tai Po Sewage Treatment Work, Stage V, Phase IIA	N.T.S	MA8018	CINOTECH
Graphical Presentation of Landfill Gas Measurement	Date: Jul 10	Appendix: G	

Carbon Dioxide



Title: Tai Po Sewage Treatment Work, Stage V, Phase IIA Graphical Presentation of Landfill Gas Measurement	Scale: N.T.S Date: Jul 10	Project No.: MA8018 Appendix: G	CINOTECH

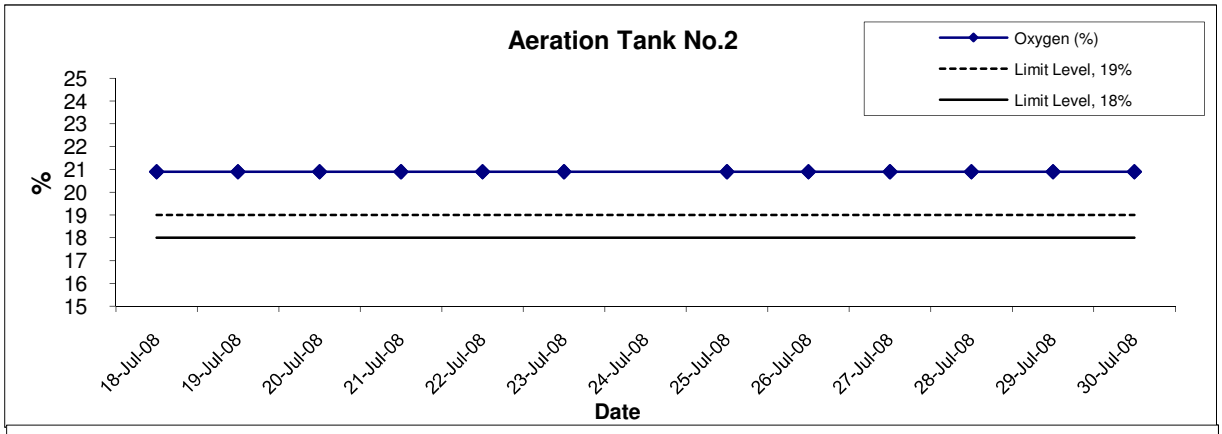
Carbon Dioxide

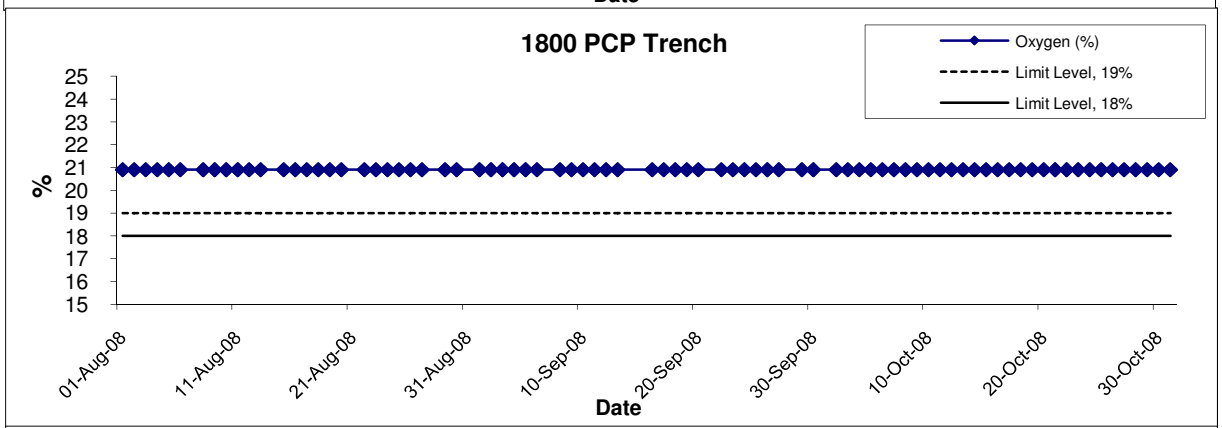


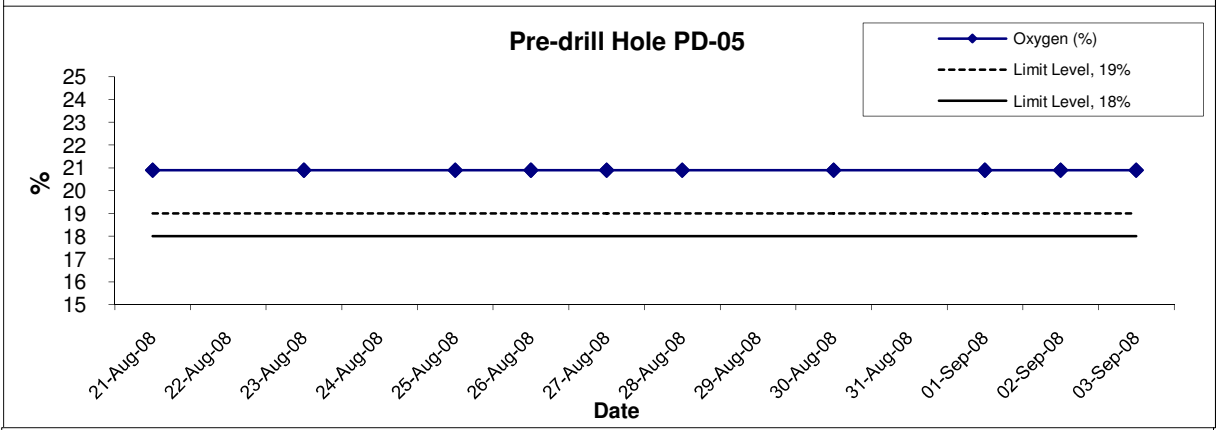
Title	Scale	Project No.
Tai Po Sewage Treatment Work, Stage V, Phase IIA	N.T.S	MA8018
Graphical Presentation of Landfill Gas Measurement	Date: Jul 10	Appendix: G

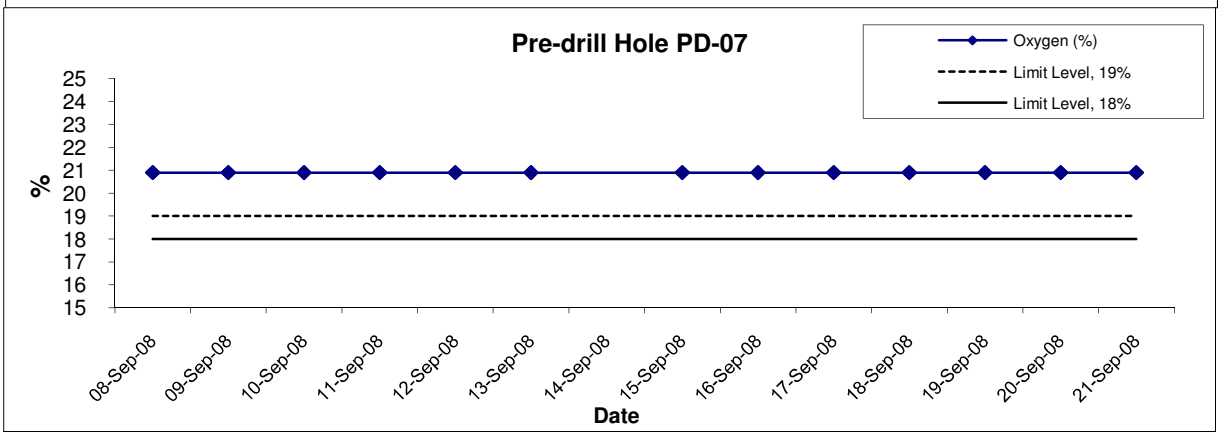
CINOTECH

Oxygen



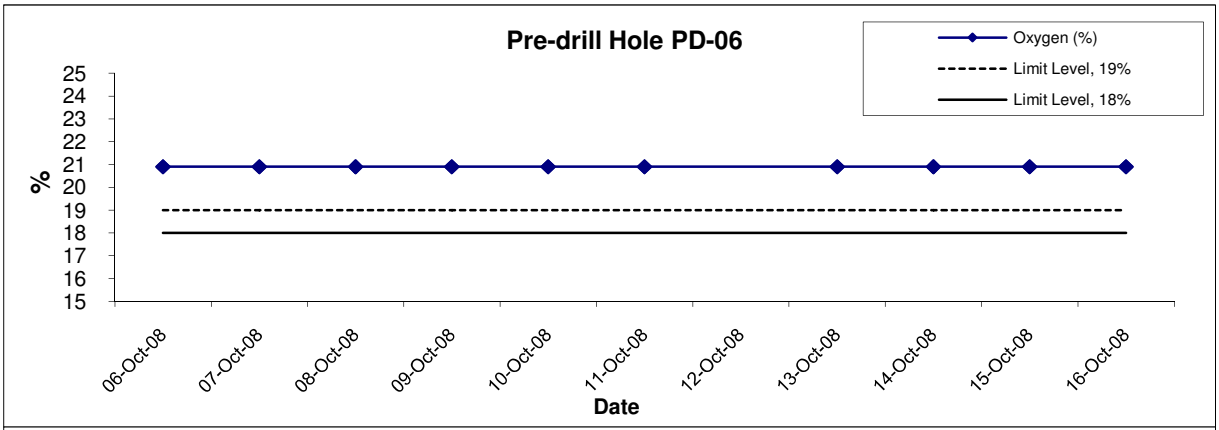


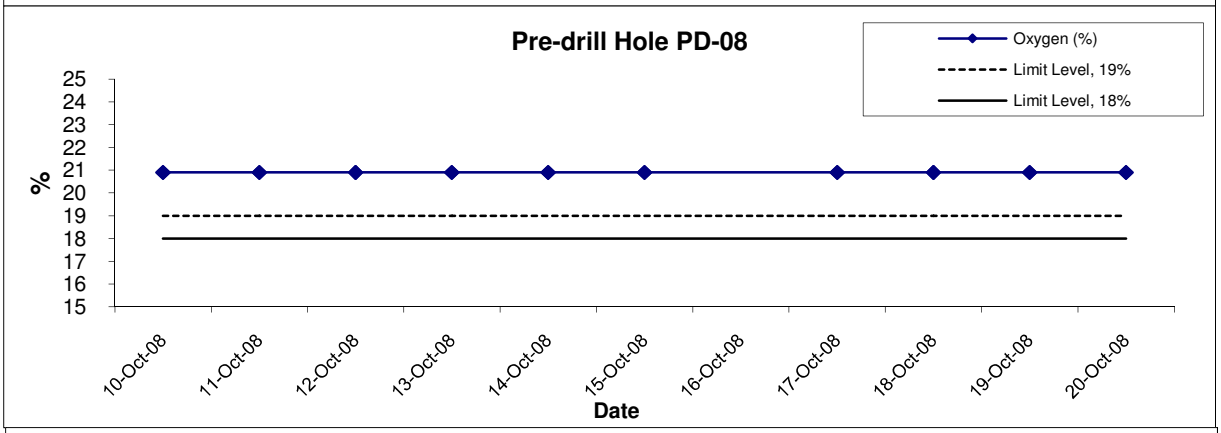


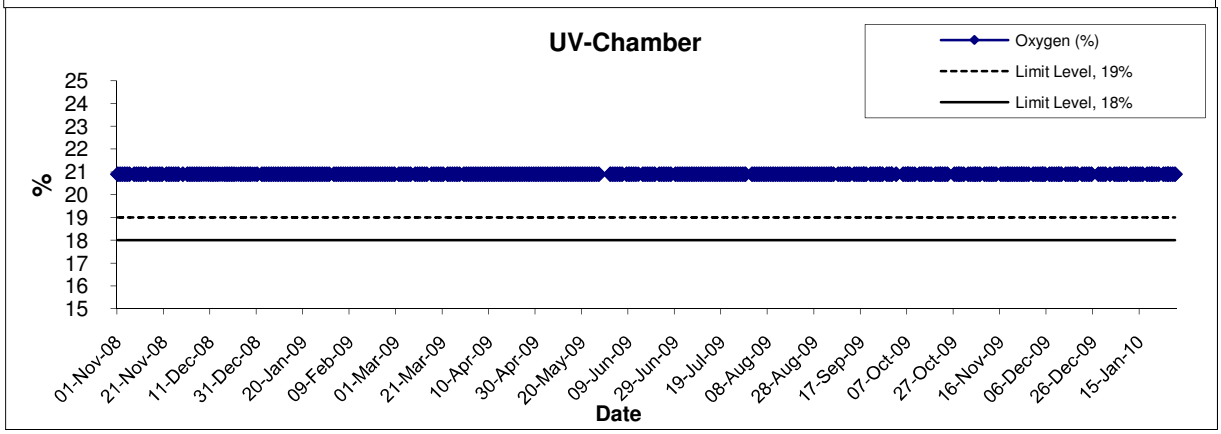


Title: Tai Po Sewage Treatment Work, Stage V, Phase IIA Graphical Presentation of Landfill Gas Measurement	Scale: N.T.S Date: Jul 10	Project No.: MA8018 Appendix: G	CINOTECH

Oxygen

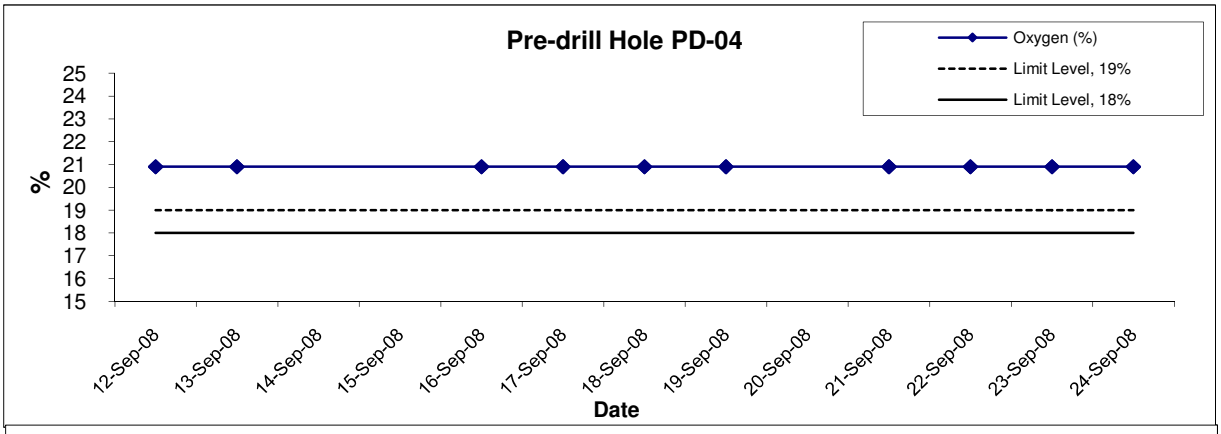


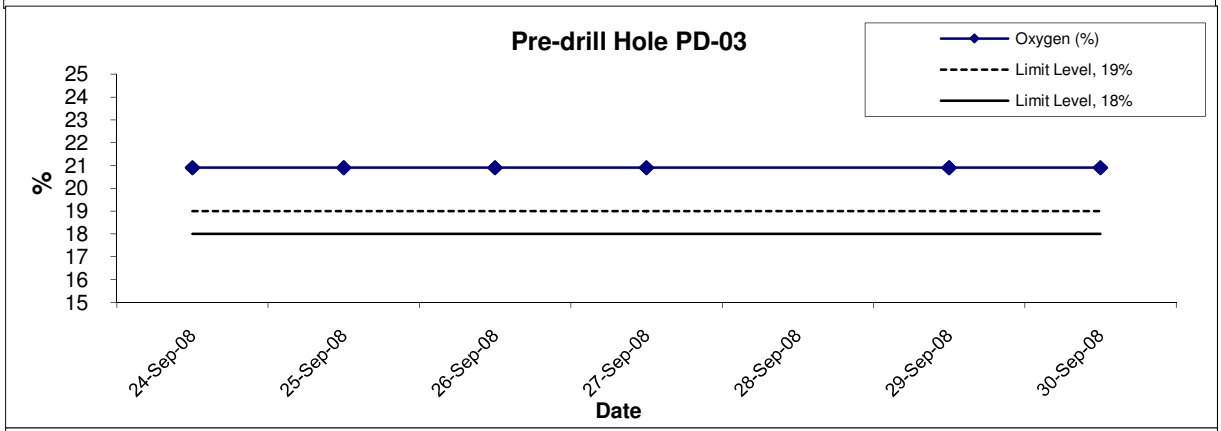


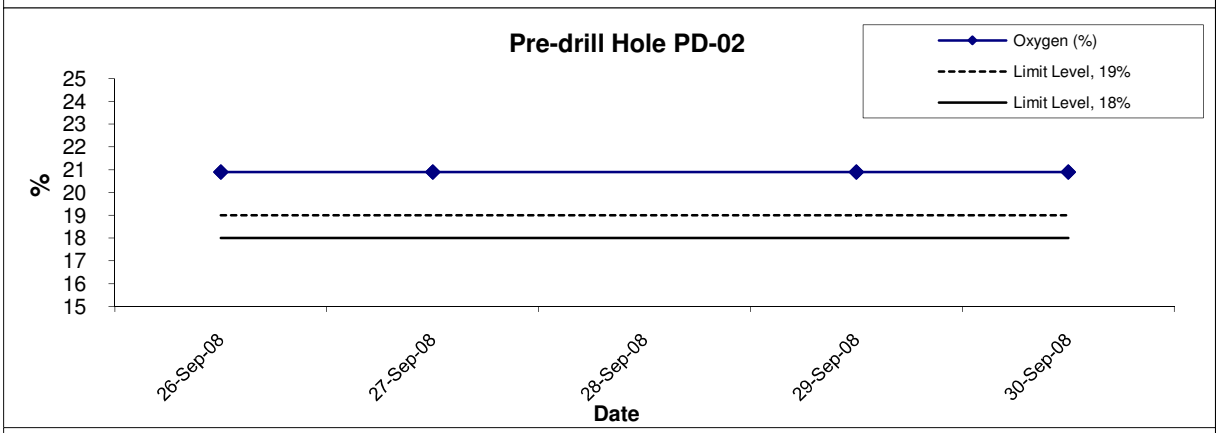


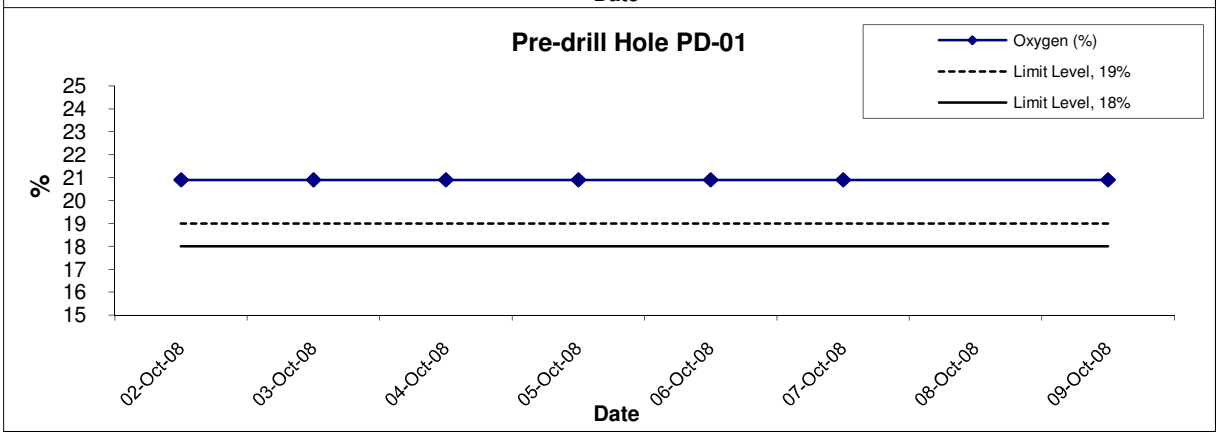
Title: Tai Po Sewage Treatment Work, Stage V, Phase IIA Graphical Presentation of Landfill Gas Measurement	Scale: N.T.S Date: Jul 10	Project No.: MA8018 Appendix: G	CINOTECH

Oxygen









Title: Tai Po Sewage Treatment Work, Stage V, Phase IIA Graphical Presentation of Landfill Gas Measurement	Scale: N.T.S Date: Jul 10	Project No.: MA8018 Appendix: G	CINOTECH

APPENDIX H
UPDATED ENVIRONMENTAL MITIGATION IMPLEMENTATION SCHEDULE (EMIS)

APPENDIX H – Updated Environmental Mitigation Implementation Schedule (EMIS)

During Construction Phase:

Type of Impact	Recommended Mitigation Measures	Status
Air Quality	**Dust control measures:** • Water shall be sprayed to minimise dust generation; • Any debris from the demolition or construction of the Project shall be covered entirely by impervious sheeting or stored in a debris collection area sheltered on the top and at three sides; • Any dusty material remaining after a stockpile of cement or other materials is removed shall be wetted and cleared from the surface of roads; • Any skip hoist for material transport shall be totally enclosed by impervious sheeting; • Vehicle washing facilities, including a high pressure water jet, shall be provided. Every vehicle shall be washed to remove any dusty materials from its body and wheels; • Selective area shall be paved with concrete, bituminous materials, hardcore or metal plates and kept clear of dusty materials; • Water shall be sprayed to keep the entire road surface wet and to minimize dust generation; • Every stock of more than 20 bags of cement shall be covered entirely by impervious sheeting or placed in an area sheltered on the top and at 3 sides; • Cement bags or any other dusty materials collected during the work shall be disposed of in totally enclosed containers; • Every belt conveyor used for the transfer of point between any two belt conveyors shall be totally enclosed.	√
Water Quality	**Mitigation Measures to minimise and control of water quality impact:** • Surface run-off shall be directed into storm drains via adequately designed sand silt removal facilities such as sand traps, silt traps and sediment basins; • Silt removal facilities, channels and manholes shall be maintained and the deposited silt and grit shall be regularly to ensure the effectiveness of the system; • Temporarily exposed soil surfaces shall be covered e.g., by tarpaulin, and temporary access roads shall be protected by crushed stone or gravel, as excavation proceeds; • Rainwater pumped out from trenches, such as those excavated for pipelaying, shall be discharged into storm drains via silt removal facilities; • Open stockpile of construction materials (e.g. aggregates and sand) on site shall be covered with tarpaulin or similar fabric during rainstorms; • Groundwater pumped out wells, etc. for the lowering of ground water level in foundation construction of the Stage III facilities shall be discharged into storm drains after the removal of silt in slit removal facilities; • Wastewater generated from concreting, plastering, internal decoration, cleaning work and other similar activities, shall undergo large object removal by installing bar traps at the drain inlets. • Sewage from toilets, kitchens and similar facilities for the construction workers shall be discharged into a foul sewer or chemical toilets; • All fuel tanks and chemical storage areas should be provided with locks and be sited on seals areas; • The storage areas should be surrounded by bunds with a capacity of the largest tank to prevent spilled oil, fuel and chemicals from reaching the receiving waters. • Guidelines and procedures for immediate clean-up actions following any spillages of oil, fuel or chemicals should be provided.	√
Noise	Construction activities shall be limited to the daytime hours (0700 to 1900) on Monday to Saturday The following mitigation measures shall be followed: • The contractor shall comply with and observe the *Noise Control ordinance* and its subsidiary regulations in force in Hong Kong; • Before the commencement of any work, the Engineer may require the methods of working equipment and sound-reducing measures intended to used on the Site to be made available for inspection and approval to ensure that they are suitable for the Project; • The Contractor shall be ensure that all plant and equipment to be used on the site are properly maintained in a good operating condition; • Only well-maintained plant shall be operated on-site and plant shall be serviced regularly; • Machines and plant (such as trucks) that may be in intermittent use shall be shut down between work periods or shall be throttled down to a minimum; • Plant known to emit noise strongly in one direction, shall, where possible, be orientated so that	√

Type of Impact	Recommended Mitigation Measures	Status
	the noise is directed away from noise sensitive receivers (NSRs); • Silencers or mufflers on construction equipment shall be utilized, if found necessary to further reduce noise, and shall be properly maintained during the construction phase; • Mobile plant shall be sited as far away from NSRs as possible;	
Waste Management	• Construction waste shall be handled and stored in a manner to ensure that they are held securely without loss to leakage; • Licensed waste hauliers for chemical wastes and for dumping at public filling area shall be used and they shall only collect wastes prescribed by their permits; • Construction wastes shall be removed in a timely manner; • Waste storage areas shall be maintained and cleaned regularly; • Windblown litter and dust during transportation shall be minmised by either covering trucks or transporting wastes in enclosed containers; • Wastes shall be disposed of at licensed waste disposal facilities; • Careful design, planning and good site management shall be adopted to minimise over-ordering and generation of waste materials such as concrete, mortars and cement grouts; • The handling and disposal of bentonite slurries shall be undertaken in accordance with *Practice Note for Professional Persons – Construction Site Drainage* (ProPECC PN 1/94) on construction site drainage; • Chemical waste that is produced, during construction shall be handled in accordance with the *Code of Practice on the Packaging, Handling and Storage of Chemical Wastes*; • Containers used for the Storage of Chemical wastes shall be suitable for the substance they are holding, resistant to corrosion, display a label in English and Chinese in accordance with instructions prescribed in *Schedule 2 of the Chemical Waste Regulations*; • The chemical waste storage area shall be also have adequate ventilation; be covered to prevent rainfall entering; and be arranged so that incompatible materials are adequately separated ; • Disposal of chemical waste shall be via a licensed waste collector; and to a facility licensed to receiver chemical waste; • General refuse shall be stored in enclosed bins; • Construction/ demolition waste should be separated from chemical waste; • Burning of refuse on construction sites is strictly prohibited,	√
Contaminated Land	Approximately 1,400m^3 of contaminated soil shall be disposal of at the SENT landfill. Potential exposure to the contaminated materials by the construction workers shall be avoided by implementing following measures. • Bulk earth moving equipment shall be used to minimise potential contact with site construction workers; • Exposure to any contaminated materials present shall be minimized by wearing appropriate clothing and personal protective gear when interacting directly with contaminated material, providing adequate hygiene and washing facilities, and preventing smoking and eating during such activities; • The Contractor shall ensure that rainfall and surface run-off is diverted around any area currently being worked; • The use of clean fill shall be considered to bring the site to finished grade; • Stockpiling of contaminated soils shall be prohibited unless covered; • The Contractor shall be obtain the necessary waste disposal permits from the appropriate authority, if they are required , in accordance to the *Waste Disposal Ordinance* (Cap 354), and *Waste Disposal (Chemical) Regulations*; • The Constructor shall obtain an admission ticket from the Facilities Management Group of EPD for disposal of contaminated soil at landfills; and • Only licensed waste hauliers shall be employed for contaminated wastes and disposal of waste to appropriately licensed waste facilities.	N/A

Note:
√ – Compliance of mitigation measures
X – Non-compliance of mitigation measures
N/A – Not applicable

APPENDIX I
WASTE GENERATION IN THE CONSTRUCTION PERIOD

APPENDIX I – WASTE GENERATION IN THE REPORTING MONTH

TPSTW - Monthly Summary Waste Flow Table 2008 (Year)

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	Plastic (see Note 3)	Chemical Waste	Others, e.g. general refuse
	(in '000m^3)	(in '000m^3)	(in '000m^3)	(in '000m^3)	(in '000m^3)	(in '000kg)	(in '000kg)	(in '000kg)	(in '000kg)	(in '000m3)
Jan										
Feb										
Mar										
Apr										
May										
June	0	0	0	0	0	0	0	0	0	0
Sub-total	0	0	0	0	0	0	0	0	0	0
July	0	0	0	0	0	0	0.1	0	0	0.1
Aug	0.457	0.05	0	0	0.407	0	0.06	0	0	0.2
Sept	0	0	0	0	0	0	0.05	0	0	0.2
Oct	0	0	0	0	0	0	0.05	0	0	0.05
Nov	0	0	0	0	0	0	0.06	0	0	0.05
Dec	0.068	0	0	0	0.068	0	0.04	0	0	0.04
Total	0.525	0.05	0	0	0.475	0	0.36	0	0	0.64

Note 1: The performance targets are given in PS Sub-clause 1.135 (4) (a);

Note 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;

Note 3: Plastics refer to plastic bottles/containers, plastic sheets/foam from packaging material;

Note 4: Broken concrete for recycling into aggregates.

APPENDIX I – WASTE GENERATION IN THE REPORTING MONTH

TPSTW Monthly Summary Waste Flow Table 2009 (Year)

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	Plastic (see Note 3)	Chemical Waste	Others, e.g. general refuse
	(in '000m^3)	(in '000m^3)	(in '000m^3)	(in '000m^3)	(in '000m^3)	(in '000kg)	(in '000kg)	(in '000kg)	(in '000kg)	(in '000m3)
Jan	0.032	0	0	0	0.032	0	0.05	0	0	0.04
Feb	0.075	0	0	0	0.075	0	0.05	0	0	0.05
Mar	0.005	0	0	0	0.005	0	0.04	0	0	0.05
Apr	0	0	0	0	0	0	0.04	0	0	0.03
May	0.405	0	0	0	0.405	0	0.04	0	0	0.04
June	0.354	0	0	0	0.354	0	0.03	0	0	0.03
Sub-total	0.871	0	0	0	0.871	0	0.25	0	0	0.24
July	0.025	0	0	0	0.025	0	0.01	0	0	0.02
Aug	0.90	0	0	0	0.90	0	0.02	0	0	0.16
Sept	0.02	0	0	0	0.02	0	0.02	0	0	0.01
Oct	0.10	0	0	0	0.10	0	0.01	0	0	0.01
Nov	0.03	0	0	0	0.03	0	0.01	0	0	0.01
Dec	0.12	0	0	0	0.12	0	0.045	0	0	0.01
Total	2.066	0	0	0	2.066	0	0.365	0	0	0.46

Notes : (1) The performance targets are given in PS Sub-clause 1.135 (4)(a).

(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.

APPENDIX I – WASTE GENERATION IN THE REPORTING MONTH

TPSTW Monthly Summary Waste Flow Table 2010 (Year)

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	Plastic (see Note 3)	Chemical Waste	Others, e.g. general refuse
	(in '000m^3)	(in '000m^3)	(in '000m^3)	(in '000m^3)	(in '000m^3)	(in '000kg)	(in '000kg)	(in '000kg)	(in '000kg)	(in '000m3)
Jan	0.01	0	0	0	0.01	0	1.31	0	0	0.002
Feb	0.004	0	0	0	0.004	0	2.43	0.01	0	0.001
Mar	0	0	0	0	0	0	1.53	0	0	0
Apr	0.004	0	0	0	0.004	0	0	0	0	0.001
May										
June										
Sub-total	0.018	0	0	0	0.018	0	5.27	0.01	0	0.004
July										
Aug										
Sept										
Oct										
Nov										
Dec										
Total										

Notes : (1) The performance targets are given in PS Sub-clause 1.135 (4)(a).

(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.

APPENDIX J
SUMMARY OF EXCEEDANCE

APPENIDX J – SUMMARY OF EXCEEDANCE

Reporting Quarter: July 2008 to April 2010

a) Exceedance Report for 1-hr TSP (NIL)

b) Exceedance Report for 24-hr TSP (NIL)

c) Exceedance Report for Construction Noise (NIL)

d) Exceedance Report for Landfill Gas (NIL)

APPENDIX K
COMPLAINT LOG

APPENDIX K – COMPLAINT LOG

Construction Period: July 2008 to April 2010

Log Ref.	Location	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
N/A	N/A	N/A	N/A	N/A	N/A

Remarks: No environmental complaint was received in the reporting quarter.