China Harbour Engineering Company Limited

Contract No. DC/2007/20

Harbour Area Treatment Scheme Stage 2A – Construction of Advance Disinfection Facilities at Stonecutters Island Sewage Treatment Works

Baseline Environmental Monitoring Report

for Portions 1 & 2

(Version 1.1)

June 2008

Approved By

Dr. Priscilla Choy
(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

Page

EXECUTIVE SUMMARY 1

Noise Monitoring 1
Air Quality Monitoring 1

1. INTRODUCTION 2

Background 2

2 NOISE 3

3 AIR QUALITY 3

Monitoring Requirements 3
Monitoring Equipments 3
Monitoring Location 4
Monitoring Parameters, Frequency and Duration 4
Monitoring Methodology and QA/QC Procedure 4
Results and Observations 6
Action and Limit Levels 7

4 REVISIONS FOR INCLUSION IN THE FINAL EM&A MANUAL 8

5 CONCLUSIONS 8

LIST OF TABLES

Table 3.1 Air Quality Monitoring Equipments
Table 3.2 Location of Air Quality Monitoring Station
Table 3.3 Frequency, Period and Parameters of Baseline Air Quality Monitoring
Table 3.4 Summary of Baseline 1-hour TSP Monitoring Results
Table 3.5 Summary of Baseline 24-hour TSP Monitoring Results
Table 3.6 Guidelines for Establishing Action and Limit Levels for Air Quality
Table 3.7 Action and Limit Levels for 1-hour TSP
Table 3.8 Action and Limit Levels for 24-hour TSP

LIST OF FIGURES

Figure 1.1 Project Site Layout Plan
Figure 1.2 Location of Baseline Air Quality Monitoring Station (Portions 1 & 2)

LIST OF APPENDICES

Appendix A1	Calibration Certificate for Baseline Air Quality Monitoring Equipments
Appendix A2	1-hour TSP Baseline Monitoring Results
Appendix A3	Graphical Presentation of Baseline 1-hour TSP Levels
Appendix A4	24-hour TSP Baseline Monitoring Results
Appendix A5	Graphical Presentation of Baseline 24-hour TSP Levels
Appendix B	Weather Conditions during Baseline Monitoring Period
Appendix C	Baseline Air Quality Monitoring Schedule
Appendix D	Construction Programme

EXECUTIVE SUMMARY

This Baseline Environmental Monitoring Report (Portions 1 & 2) was prepared by Cinotech Consultants Ltd. for Portions 1 & 2 of the Project "Harbour Area Treatment Scheme Stage 2A – Construction of Advance Disinfection Facilities at Stonecutters Island Sewage Treatment Works" with Contract No. DC/2007/20. This report presents the baseline environmental monitoring works performed between 8th June 2008 and 21st June 2008.

Noise Monitoring

Not Applicable for Portions 1 & 2.

Air Quality Monitoring

The baseline 1-hour and 24-hour TSP (Total Suspended Particulates) monitoring were conducted at one monitoring location (AM1 – Rooftop, Block A of Government Dockyard) between 8th June 2008 and 21st June 2008.

The monitoring level was at the roof floor of Block A because:-

- Block A is one of the closest building to the construction site;
- The ambient air quality has less influences from Dockyard operations; and
- The whole building was air-conditioned and the fresh air intakes are placed at roof top.

During the monitoring periods, there was no construction activity undertaken in the vicinity of the monitoring station. However, white fume was observed emitted from the vessel maintenance activities inside Government Dockyard on 16th June 2008 morning. Results collected were reviewed and analyzed to determine the Action and Limit Levels for air quality during impact monitoring throughout the construction of the Project. Details of the methodology, locations and results are presented in this report.

1. INTRODUCTION

Background

1.1 "Harbour Area Treatment Scheme Stage 2A – Construction of Advance Disinfection Facilities at Stonecutters Island Sewage Treatment Works" (hereinafter called the "the Project") under Contract No. DC/2007/20 is a Designated Project under the Environmental Impact Assessment Ordinance (Cap. 499) (EIAO). A Final Environmental Impact Assessment (EIA) Report has been prepared in July 2007 to consider the key issues of noise, air quality, water quality, ecological, construction waste and human health risk, and identify possible mitigation measures. The Final EIA Report was endorsed by Environmental Protection Department (EPD) on 8 November 2007 and was included in the EIA register under the EIAO as report no. AEIAR-113/2007. Environmental Monitoring and Audit (EM&A) Manual for the Final EIA Report was also included as part of the Final EIA report in the register. An Environmental Permit (EP) No. EP-295/2007 was issued on 3rd December 2007 for the Project to the Drainage Services Department (DSD) as Permit Holder.

1.2 The Project comprises mainly the construction of the advance disinfection facilities (ADF) include:

(a) Chlorination system - provision of a sodium hypochlorite solution storage farm and associated dosing system; and

(b) Dechlorination system - provision of a sodium bisulphite storage and associated dosing system.

1.3 The Project site layout plan is shown in **Figure 1.1.**

1.4 The Project will be constructed within the existing sewage treatment works on Stonecutters Island, which is providing Chemically Enhanced Primary Treatment (CEPT) for 1.4 million cubic metres of sewage collected each day through deep tunnels from the HATS Stage 1 catchments (i.e. the whole of Kowloon peninsula, Tseung Kwan O, Kwai Chung, Tsing Yi, Chai Wan and Shau Kei Wan). The design treatment capacity of the SCISTW is 1.7 million cubic metres per day. At present, the plant has no disinfection facility and the CEPT treated effluent is now discharged to the waters southwest of Stonecutters Island through a 1.7 km long outfall.

1.5 The chlorination system of the disinfection facilities would be located within the site boundary of the existing SCISTW (**Figure 1.1** refers). The dechlorination plant would be located adjacent to the existing chamber no. 15 (**Figure 1.1** refers) at the western end of Container Port Road South.

1.6 China Harbour Engineering Company Limited (CHEC) was awarded as the main contractor of the Project and Cinotech Consultants Limited (Cinotech) was commissioned by CHEC as the Environmental Team of the Project in accordance with EP Condition 2.1.

1.7 This Baseline Environmental Monitoring Report was prepared by Cinotech for Portions 1 & 2 of the Project prior to the commencement of construction activities in accordance with the Final EM&A Manual.

1.8 For Portions 3 (Chamber 15) & 4 (Dechlorination Plant) of the Project, the construction works are supposed to be commenced at late September 2008 and the baseline monitoring corresponding to these portions is planed to be carried out on or before late August 2008.

2 NOISE

2.1 No baseline noise monitoring was required for Portions 1 & 2 of the Project.

3 AIR QUALITY

Monitoring Requirements

3.1 In accordance with the Final EM&A Manual, baseline air quality monitoring shall be carried out daily for a period of 2 weeks, in terms of 1-hour and 24-hour Total Suspended Particulates (TSP). Monitoring of 1-hour TSP was carried out three times per day while that of 24-hour TSP was conducted once everyday for 14 consecutive days.

Monitoring Equipments

3.2 Both 1-hour TSP monitoring and continuous 24-hour TSP air quality monitoring were performed using High Volume Sampler (HVS) in compliance with the specification stipulated in Section 2.8, 2.10 to 2.11 of the Final EM&A Manual. Table 3.1 summarizes the equipments used in the baseline air quality monitoring programme. Copies of the calibration certificates for the equipments are presented in **Appendix A1**.

Table 3.1 Air Quality Monitoring Equipments

Equipment	Model and Make	Qty.
HVS Samplers	Graseby GMW 2310 HVS, Model GS-2310105-1	1 (for 24-hr TSP)
	Tisch Environmental, Inc.; Model no. TE-5170	1 (for 1-hr TSP)
Calibrator	Tisch Environmental, Inc.; Model no. TE-5025A	1
Wind Anemometer	Davis Weather Monitor II, Model no. 7440	1

3.3 Wind data monitoring equipment was set up at Rooftop, Block A of Government Dockyard for logging wind speed and wind direction near the air quality monitoring location. The location of wind logger is about 15m from ground (4 floors of Block A) and the sensor was set at 2-3m above the roof top such that there will be clear of obstructions or turbulence caused by surrounding. The equipment installation location was agreed with the ER in consultation with the IEC. The wind data monitoring equipment will be re-calibrated at least once every six months and the wind direction will be divided into 16 sectors of 22.5 degrees each.

Monitoring Location

3.4 Baseline air quality monitoring was conducted at one monitoring station - AM1, as shown in **Figure 1.2**. Table 3.2 describes the location of the air quality monitoring station. The monitoring level were at the roof floor of Block A because:-

- Block A is one of the closest building to the construction site;
- The ambient air quality has less influences from Dockyard operations; and
- The whole building was air-conditioned and the fresh air intakes are placed at roof top.

Table 3.2 Location of Air Quality Monitoring Station

Monitoring Station	Location
AM1	Rooftop, Block A of Government Dockyard

Monitoring Parameters, Frequency and Duration

3.5 **Table 3.3** summarizes the monitoring parameters, period and frequency of baseline air quality monitoring.

Table 3.3 Frequency, Period and Parameters of Baseline Air Quality Monitoring

Monitoring Station	Location for Measurement	Parameters	Period	Frequency
AM1	Rooftop, Block A of Government Dockyard	1-hour TSP	0700-1900	3 times/day
		24-hour TSP	24 hours	Daily

Monitoring Methodology and QA/QC Procedure

3.6 Weather data was recorded during the baseline period and is shown in **Appendix B**. The air temperature, precipitation and the relative humidity data was obtained from Hong Kong Observatory where the wind speed and wind direction were recorded by the installed Wind Anemometer. The general weather conditions (i.e. sunny, cloudy or rainy) were recorded by the field staff's observation on the monitoring days.

Instrumentation

3.7 High volume Samplers (HVS) completed 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

3.8 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 samplers 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

3.9 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. (HOKLAS 083), was responsible for the preparation of 24-hr conditioned and pre-weighed filter papers for Cinotech's monitoring team.

3.10 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%.

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

Operating/Analytical Procedures

3.12 Operating/analytical procedures for the air quality monitoring were highlighted as follows:

- Prior to the commencement of the dust sampling, the flow rate of the two HVS were properly set (between 1.1 m^3/min. and 1.4 m^3/min.) in accordance with the manufacturer's instruction to within the range recommended in USEPA Standard Title 40, CFR Part 50.
- The power supply was checked to ensure the samplers worked properly.
- On sampling, the samplers were operated for 5 minutes to establish thermal equilibrium before placing any filter media at the designated 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. The applied pressure should be sufficient 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 temperature 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.

Maintenance/Calibration

3.13 The following maintenance/calibration was required for the HVS:

- The high volume motors and their accessories were properly maintained. Appropriate maintenance such as routine motor brushes replacement and electrical wiring checking were made to ensure that the equipments and necessary power supply are in good working condition.
- All HVS were calibrated (five point calibration) using Calibration Kit prior to the commencement of the baseline monitoring.

Results and Observations

Results

3.14 Baseline air quality monitoring was conducted at one monitoring station, namely AM1, in the period between 8th June 2008 and 21st June 2008. The detailed monitoring schedule is shown in **Appendix C**.

3.15 White fume was observed emitted from the vessel maintenance activities inside Government Dockyard on 16th June 2008 morning. The Measured 1-hour TSP on that day (start time: 09:00am of 16th June 08) is abnormally high as 1141 $\mu g/m^3$. Therefore, this data was excluded in the later sections.

3.16 The monitoring data are summarized in Tables 3.4 and 3.5. All monitoring data of 1-hour and 24-hour TSP are presented in **Appendices A2** and **A4** respectively. Graphical presentations of the 1-hour TSP and 24-hour TSP results are shown in **Appendices A3** and **A5** respectively. Detailed weather conditions during the baseline monitoring period are shown in **Appendix B**.

Table 3.4 Summary of Baseline 1-hour TSP Monitoring Results

Monitoring Station	Average TSP Concentration, μg/m^3 (Range)
AM1	88* (12 - 344)*

* The abnormal result obtained at 09:00am of 16 June 08 was excluded in calculation.

Table 3.5 Summary of Baseline 24-hour TSP Monitoring Results

Monitoring Station	Average TSP Concentration, μg/m^3 (Range)
AM1	43 (29 - 63)

Observations

3.17 The weather was generally rainy, cloudy and sometimes sunny during the baseline monitoring period.

3.18 No observable dust sources were identified for Station AM1. However, white fume was observed emitted from the vessel maintenance activities inside Government Dockyard on 16th June 2008 morning.

Action and Limit Levels

3.19 The Action and Limit Levels have been set in accordance with the Final EM&A Manual, which are summarized in Table 3.6.

Table 3.6 Guidelines for Establishing Action and Limit Levels for Air Quality

Parameters	Action Level	Limit Level
1-hour TSP	For baseline level ≤ 384μg/m^3, Action level = (Baseline level * 1.3 + Limit level)/2 For baseline level > 384μg/m^3, Action level = Limit level	500
24-hour TSP	For baseline level ≤ 200μg/m^3, Action level = (Baseline level * 1.3 + Limit level)/2 For baseline level > 200μg/m^3, Action level = Limit level	260

3.20 Following the above guidelines, the Action and Limit Levels for air quality impact monitoring have been set, as presented in Tables 3.7 and 3.8.

Table 3.7 Action and Limit Levels for 1-hour TSP

Location	Action Level, µg/m^3	Limit Level, µg/m^3
AM1	307	500

Table 3.8 Action and Limit Levels for 24-hour TSP

Location	Action Level, µg/m^3	Limit Level, µg/m^3
AM1	158	260

4 REVIEW FOR INCLUSION IN THE FINAL EM&A MANUAL

4.1 The baseline environmental monitoring was conducted according to the Final EM&A Manual for air quality.

4.2 The monitoring methodology, parameters monitored are all in line with the Final EM&A Manual.

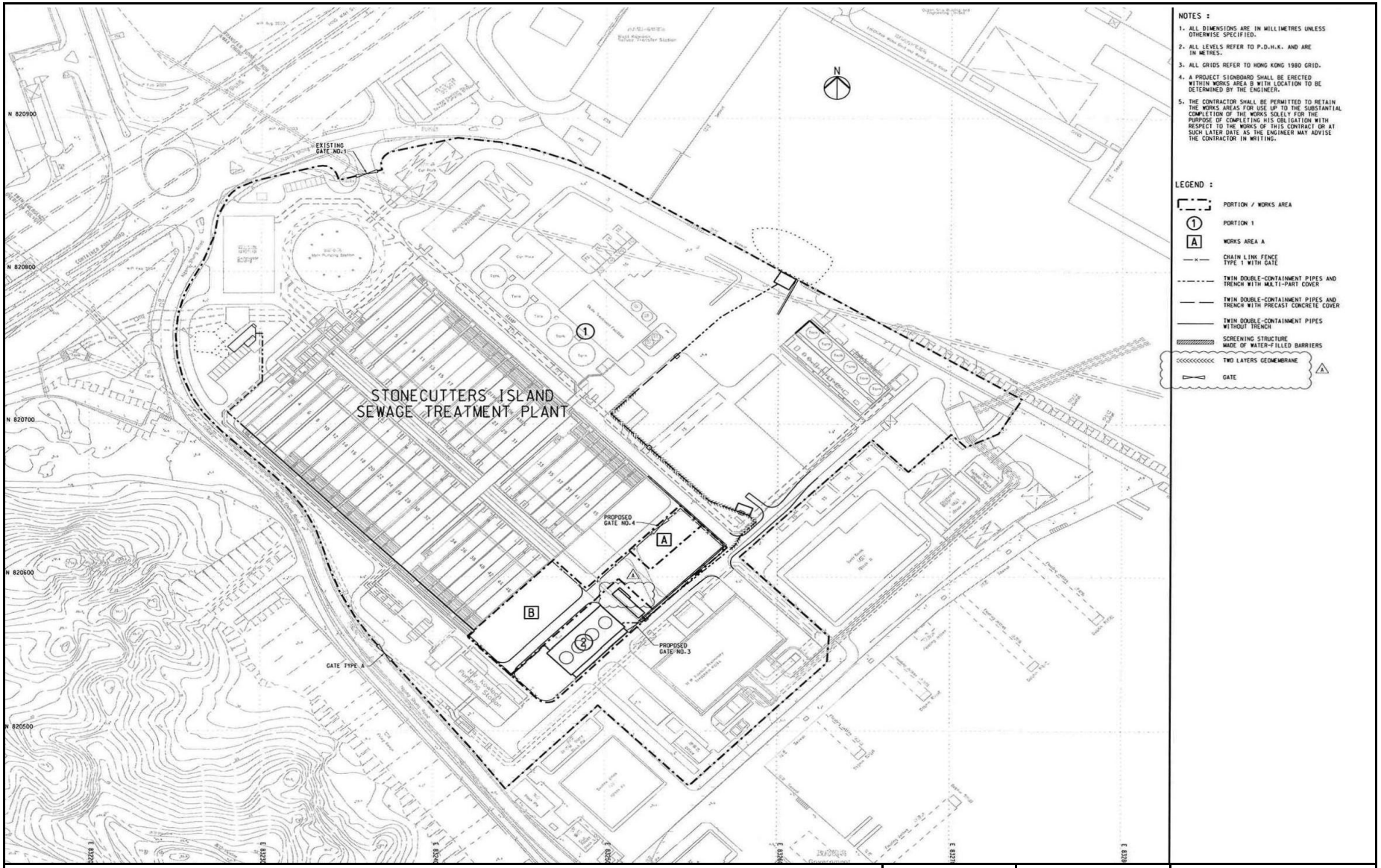
4.3 The baseline air quality monitoring was conducted at an alternative air quality monitoring station AM1 (Rooftop, Block A of Government Dockyard) which was approved by the ER and agreed with the IEC in accordance with para. 2.28 of the Final EM&A Manual.

5 CONCLUSIONS

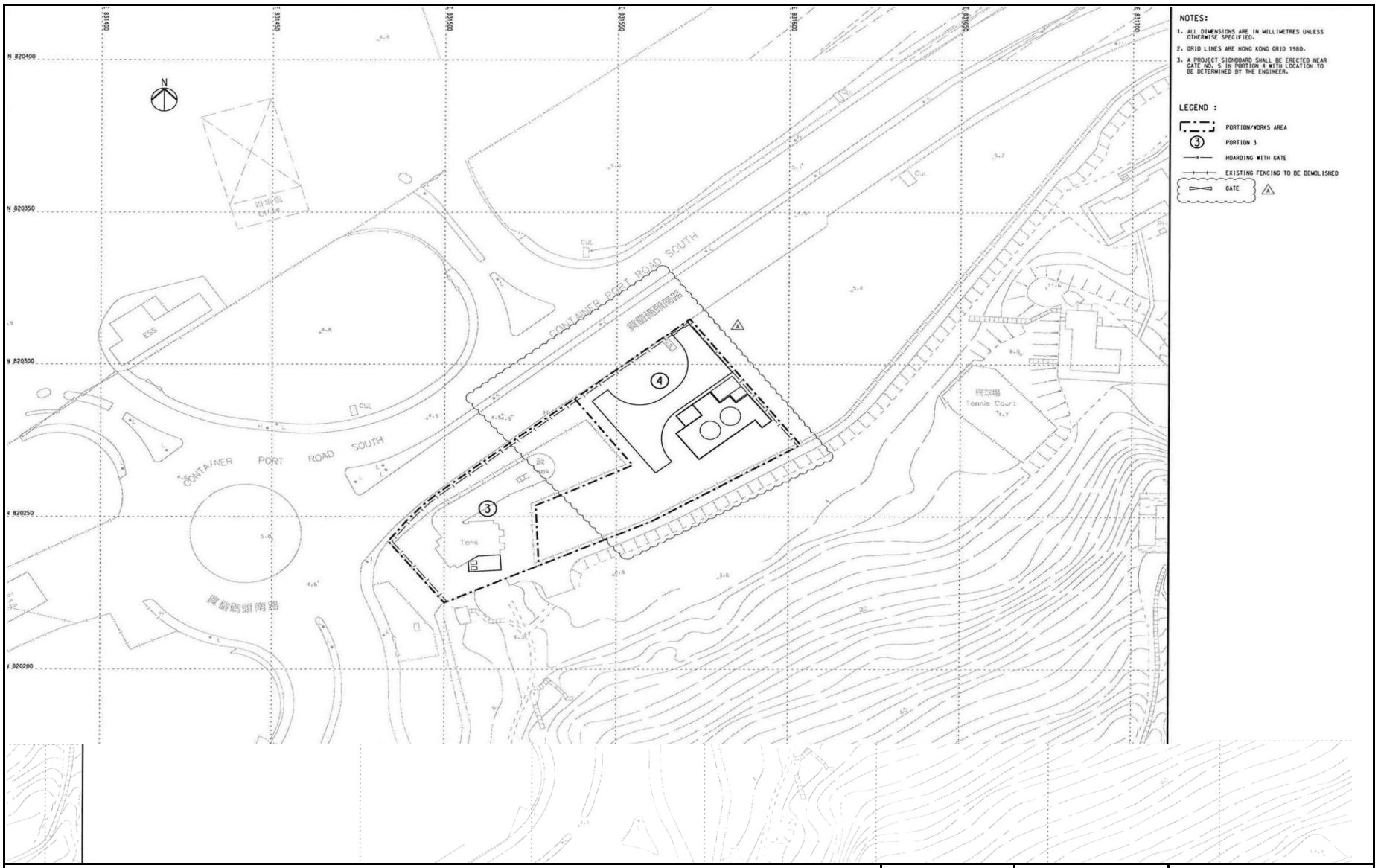
5.1 The baseline air quality monitoring was conducted between 8th June 2008 and 21st June 2008. The monitoring results were used to establish the Action and Limit Levels for the relevant parameters during impact/compliance monitoring throughout construction phase of the Project.

5.2 The baseline air quality (1-hour and 24-hour TSP levels) monitoring was conducted at one monitoring station - AM1. During the monitoring period, no observable dust sources were identified for Station AM1 except white fume was observed emitted from the vessel maintenance activities inside Government Dockyard on 16th June 2008 morning. The baseline air quality monitoring results were reviewed and processed. An abnormal result of 1-hour TSP monitoring (start time: 09:00am of 16th June 08), which was probably influenced by Government Dockyard's activities, was identified and excluded during the establishment of Action Level for the air quality. Apart from the excluded result, the baseline air quality monitoring results are considered representative to the ambient air quality conditions of the respective sensitive receiver. The Action and Limit Levels for the air quality were established based on the baseline monitoring results.

FIGURES



Contract No. DC/2007/20 HARBOUR AREA TREATMENT SCHEME STAGE 2A - CONSTRUCTION OF ADVANCE DISINFECTION FACILITIES AT STONECUTTERES ISLAND SEWAGE TREATMENT WORKS	Scale N.T.S	Proposa No. MA8009	CINOTECH
Project Site Layout Plan (Page 1 of 2)	Date Jun-08	Figure 1.1	



Contract No. DC/2007/20 HARBOUR AREA TREATMENT SCHEME STAGE 2A - CONSTRUCTION OF ADVANCE DISINFECTION FACILITIES AT STONECUTTERES ISLAND SEWAGE TREATMENT WORKS	Scale N.T.S	Proposa No. MA8009	CINOTECH
Project Site Layout Plan (Page 2 of 2)	Date Jun-08	Figure 1.1	

APPENDIX A1
CALIBRATION CERTIFICATE FOR BASELINE AIR QUALITY MONITORING EQUIPMENTS

High-Volume TSP Sampler
5-POINT CALIBRATION DATA SHEET

CINOTECH

File No. MA8009/45/0001

Station: Rooftop of Block A, Government Dockyard (1hr) Operator: WK

Date: 6-Jun-08 Next Due Date: 5-Aug-08

Equipment No.: A-01-45 Serial No. 1309

Ambient Condition			
Temperature, Ta (K)	296.5	Pressure, Pa (mmHg)	758.9

Orifice Transfer Standard Information					
Equipment No.:	A-04-06	Slope, mc	0.0575	Intercept, bc	0.0395
Last Calibration Date:	10-Mar-08	$mc \times Qstd + bc = [\Delta H \times (Pa/760) \times (298/Ta)]^{1/2}$			
Next Calibration Date:	9-Mar-09	$Qstd = \{[\Delta H \times (Pa/760) \times (298/Ta)]^{1/2} - bc\} / mc$			

Calibration of TSP Sampler

Calibration Point	Orfice			HVS	
	ΔH (orifice), in. of water	$[\Delta H \times (Pa/760) \times (298/Ta)]^{1/2}$	Qstd (CFM) X - axis	ΔW (HVS), in. of oil	$[\Delta W \times (Pa/760) \times (298/Ta)]^{1/2}$ Y-axis
1	12.2	3.50	60.17	8.0	2.83
2	10.2	3.20	54.96	6.5	2.55
3	7.7	2.78	47.66	5.1	2.26
4	4.9	2.22	37.88	3.3	1.82
5	3.0	1.74	29.49	2.0	1.42

By Linear Regression of Y on X

Slope, mw = 0.0454 **Intercept, bw =** 0.0858

Correlation coefficient* = 0.9995

*If Correlation Coefficient < 0.990, check and recalibrate.

Set Point Calculation

From the TSP Field Calibration Curve, take Qstd = 43 CFM

From the Regression Equation, the "Y" value according to

$$mw \times Qstd + bw = [\Delta W \times (Pa/760) \times (298/Ta)]^{1/2}$$

Therefore, Set Point; $W = (mw \times Qstd + bw)^2 \times (760 / Pa) \times (Ta / 298) =$ 4.15

Remarks:

Conducted by: W.K. Tang Signature: Date: 6-June 2008.

Checked by: Signature: Date: 6/6/2008

High-Volume TSP Sampler
5-POINT CALIBRATION DATA SHEET

CINOTECH

File No. MA8009/17/0001

Station: Rooftop of Block A, Government Dockyard (24 hr) Operator: WK

Date: 6-Jun-08 Next Due Date: 5-Aug-08

Equipment No.: A-01-17 Serial No. 3460

Ambient Condition			
Temperature, Ta (K)	297.1	Pressure, Pa (mmHg)	758.6

Orifice Transfer Standard Information					
Equipment No.:	A-04-06	Slope, mc	0.0575	Intercept, bc	0.0395
Last Calibration Date:	10-Mar-08	$mc \times Qstd + bc = [\Delta H \times (Pa/760) \times (298/Ta)]^{1/2}$			
Next Calibration Date:	9-Mar-09	$Qstd = \{[\Delta H \times (Pa/760) \times (298/Ta)]^{1/2} - bc\} / mc$			

Calibration of TSP Sampler

Calibration Point	Orfice			HVS	
	ΔH (orifice), in. of water	$[\Delta H \times (Pa/760) \times (298/Ta)]^{1/2}$	Qstd (CFM) X - axis	ΔW (HVS), in. of oil	$[\Delta W \times (Pa/760) \times (298/Ta)]^{1/2}$ Y-axis
1	9.6	3.10	53.23	6.0	2.45
2	7.5	2.74	46.97	5.0	2.24
3	5.6	2.37	40.49	3.5	1.87
4	3.5	1.87	31.87	2.2	1.48
5	2.1	1.45	24.53	1.3	1.14

By Linear Regression of Y on X

Slope , mw = 0.0466 **Intercept, bw =** 0.0014

Correlation coefficient* = 0.9985

*If Correlation Coefficient < 0.990, check and recalibrate.

Set Point Calculation

From the TSP Field Calibration Curve, take Qstd = 43 CFM

From the Regression Equation, the "Y" value according to

$$mw \times Qstd + bw = [\Delta W \times (Pa/760) \times (298/Ta)]^{1/2}$$

Therefore, Set Point; $W = (mw \times Qstd + bw)^2 \times (760 / Pa) \times (Ta / 298) =$ 4.01

Remarks:

Conducted by: N.K. Tang Signature: Date: 6-June 2008.

Checked by: Signature: Date: 6/6/2008

TISCH ENVIROMENTAL, INC.
145 SOUTH MIAMI AVE.
VILLAGE OF CLEVES, OH 45002
513.467.9000
877.263.7610 TOLL FREE
513.467.9009 FAX
WWW.TISCH-ENV.COM

AIR POLLUTION MONITORING EQUIPMENT

ORIFICE TRANSFER STANDARD CERTIFICATION WORKSHEET TE-5025A

Date - Mar 10, 2008 Rootsmeter S/N 9833640 Ta (K) - 295
Operator Tisch Orifice I.D. - 0999 Pa (mm) - 746.76

PLATE OR Run #	VOLUME START (m3)	VOLUME STOP (m3)	DIFF VOLUME (m3)	DIFF TIME (min)	METER DIFF Hg (mm)	ORFICE DIFF H2O (in.)
1	NA	NA	1.00	1.3890	3.2	2.00
2	NA	NA	1.00	0.9850	6.3	4.00
3	NA	NA	1.00	0.8810	7.8	5.00
4	NA	NA	1.00	0.8410	8.6	5.50
5	NA	NA	1.00	0.6950	12.5	8.00

DATA TABULATION

Vstd	(x axis) Qstd	(y axis)		Va	(x axis) Qa	(y axis)
0.9917	0.7139	1.4113		0.9957	0.7168	0.8874
0.9876	1.0026	1.9959		0.9916	1.0067	1.2549
0.9854	1.1185	2.2315		0.9894	1.1231	1.4030
0.9844	1.1706	2.3405		0.9884	1.1753	1.4715
0.9792	1.4090	2.8227		0.9832	1.4147	1.7747
Qstd slope (m) =		2.03154		Qa slope (m) =		1.27212
intercept (b) =		-0.03970		intercept (b) =		-0.02496
coefficient (r) =		0.99999		coefficient (r) =		0.99999
y axis = SQRT[H2O(Pa/760)(298/Ta)]				y axis = SQRT[H2O(Ta/Pa)]		

CALCULATIONS

Vstd = Diff. Vol[(Pa-Diff. Hg)/760](298/Ta)
Qstd = Vstd/Time

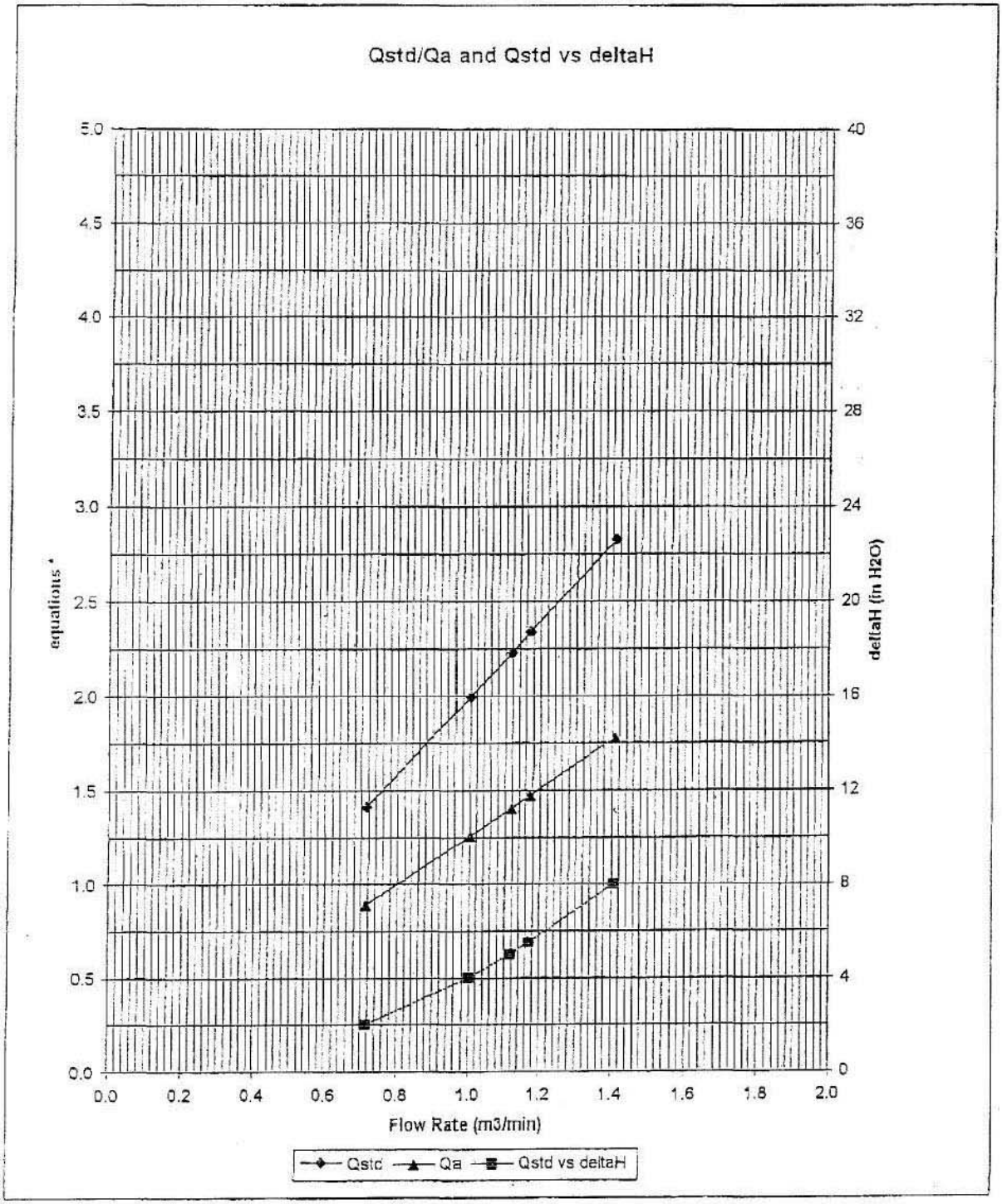
Va = Diff Vol [(Pa-Diff Hg)/Pa]
Qa = Va/Time

For subsequent flow rate calculations:

Qstd = 1/m{[SQRT(H2O(Pa/760)(298/Ta))]- b}
Qa = 1/m{[SQRT H2O(Ta/Pa)]- b}

TISCH ENVIROMENTAL, INC.
145 SOUTH MIAMI AVE.
VILLAGE OF CLEVES, OH 45002
513.467.9000
877.263.7610 TOLL FREE
513.467.9009 FAX
WWW.TISCH-ENV.COM

AIR POLLUTION MONITORING EQUIPMENT



* y-axis equations:

Qstd series: $\sqrt{\Delta H \left(\frac{Pa}{Pstd}\right)\left(\frac{Tstd}{Ta}\right)}$

Qa series: $\sqrt{(\Delta H\ (Ta\ /\ Pa))}$

WELLAB 匯力
Testing and Research

Unit C, 1/F., Goldlion Holdings Center,
13-15 Yuen Shun Circuit, Shatin, NT, HK.
Tel: 2898 7388 Fax: 2898 7076
Website: www.wellab.com.hk

TEST REPORT

APPLICANT: **Cinotech Consultants Limited**
Room 1710, Technology Park,
18 On Lai Street,
Shatin, NT, Hong Kong

ATTN: **Mr. Henry Leung**

Test Report No.:	C/06/80602A
Date of Issue:	2008-06-05
Date Received:	2008-06-02
Date Tested:	2008-06-03
Date Completed:	2008-06-05
Page:	1 of 2

Certificate of Calibration

Item for calibration:

Description	: Weather Monitor II
Manufacturer	: Davis Instruments
Model No.	: 7440
Serial No.	: MC20813A11

Test conditions:

Room Temperature	: 22 degree Celsius
Relative Humidity	: 56%

Test Specifications:

1. Performance check of anemometer
2. Performance check of wind direction sensor

Methodology:

In-house method with reference anemometer (RS232 Integral Vane Digital Anemometer)

PREPARED AND CHECKED BY:
For and On Behalf of **WELLAB Ltd.**

PATRICK TSE
Laboratory Manager

This report may not be reproduced except with prior written approval from WELLAB LIMITED and the results relate only to the items calibrated or tested.

WELLAB 匯力
Testing and Research

Unit C, 1/F., Goldlion Holdings Center,
13-15 Yuen Shun Circuit, Shatin, NT, HK.
Tel: 2898 7388 Fax: 2898 7076
Website: www.wellab.com.hk

TEST REPORT

Test Report No.:	C/06/80602A
Date of Issue:	2008-06-05
Date Received:	2008-06-02
Date Tested:	2008-06-03
Date Completed:	2008-06-05
Page:	2 of 2

Results:

1. Performance check of anemometer

Air Velocity, m/s		Difference D (m/s)
Instrument Reading (V1)	Reference Value (V1)	D = V1 – V2
2.00	2.00	0.00

2. Performance check of wind direction sensor

Wind Direction (°)		Difference D (°)
Instrument Reading (W1)	Reference Value (W2)	D = W1 - W2
0.0	0.0	0.0
44.5	45.0	-0.5
90.5	90.5	0.0
136.0	135.0	1.0
180.1	180.0	0.1
225.6	225.0	0.6
270.4	270.0	0.4
314.6	315.0	-0.4
359.5	360.0	-0.5

**********END OF REPORT**********

This report may not be reproduced except with prior written approval from WELLAB LIMITED and the results relate only to the items calibrated or tested.

APPENDIX A2
1-HOUR TSP BASELINE MONITORING RESULTS

Appendix A2 - 1-hour TSP Monitoring Results

Station AM1 - Rooftop, Block A of Government Dockyard

Date	Sampling Time	Weather Condition	Air Temp. (K)	Atmospheric Pressure (Pa)	Filter Weight (g)		Particulate weight (g)	Elapse Time		Sampling Time(hrs.)	Flow Rate (m^3/min.)		Av. flow (m^3/min)	Total vol. (m^3)	Conc. (μg/m^3)
					Initial	Final		Initial	Final		Initial	Final			
8-Jun-08	08:00	Cloudy	298.6	760.7	2.8290	2.8373	0.0083	1225.6	1226.6	1.0	1.22	1.22	1.22	73.4	113.1
	09:10	Cloudy	298.8	760.5	2.8642	2.8661	0.0019	1226.6	1227.6	1.0	1.22	1.22	1.22	73.4	25.9
	10:15	Cloudy	299.0	760.3	2.8755	2.8808	0.0053	1227.6	1228.6	1.0	1.22	1.22	1.22	73.3	72.3
9-Jun-08	08:00	Sunny	301.7	761.1	2.8503	2.8544	0.0041	1228.6	1229.6	1.0	1.22	1.22	1.22	73.0	56.1
	09:05	Sunny	301.9	760.8	2.8223	2.8285	0.0062	1229.6	1230.6	1.0	1.22	1.22	1.22	73.0	85.0
	10:10	Sunny	302.1	760.6	2.8567	2.8720	0.0153	1230.6	1231.6	1.0	1.22	1.22	1.22	72.9	209.7
10-Jun-08	08:00	Sunny	302.7	759.3	2.8933	2.9025	0.0092	1231.6	1232.6	1.0	1.21	1.21	1.21	72.8	126.4
	09:10	Sunny	302.9	759.1	2.8670	2.8882	0.0212	1232.6	1233.6	1.0	1.21	1.21	1.21	72.8	291.3
	10:20	Sunny	303.1	758.9	2.8230	2.8348	0.0118	1233.6	1234.6	1.0	1.21	1.21	1.21	72.7	162.2
11-Jun-08	09:00	Cloudy	296.9	759.5	2.8389	2.8472	0.0083	1234.6	1235.6	1.0	1.23	1.23	1.23	73.6	112.8
	10:00	Cloudy	297.1	759.3	2.8418	2.8456	0.0038	1235.6	1236.6	1.0	1.23	1.23	1.23	73.5	51.7
	11:00	Cloudy	297.3	759.1	2.8249	2.8396	0.0147	1236.6	1237.6	1.0	1.23	1.22	1.22	73.5	200.0
12-Jun-08	09:00	Cloudy	300.3	758.1	2.8585	2.8630	0.0045	1237.6	1238.6	1.0	1.22	1.22	1.22	73.0	61.6
	10:00	Cloudy	300.5	758.0	2.8538	2.8572	0.0034	1238.6	1239.6	1.0	1.22	1.22	1.22	73.0	46.6
	11:10	Cloudy	300.7	757.8	2.8295	2.8348	0.0053	1239.6	1240.6	1.0	1.22	1.22	1.22	73.0	72.6
13-Jun-08	09:00	Rainy	300.1	755.8	2.8777	2.8843	0.0066	1240.6	1241.6	1.0	1.22	1.22	1.22	73.0	90.5
	10:05	Rainy	300.1	755.8	2.8762	2.8844	0.0082	1241.6	1242.6	1.0	1.22	1.22	1.22	73.0	112.4
	11:10	Rainy	300.3	755.6	2.8456	2.8517	0.0061	1242.6	1243.6	1.0	1.22	1.22	1.22	72.9	83.7
14-Jun-08	09:00	Rainy	297.6	756.5	2.7820	2.7893	0.0073	1243.6	1244.6	1.0	1.22	1.22	1.22	73.3	99.6
	10:00	Rainy	297.6	756.5	2.8418	2.8489	0.0071	1244.6	1245.6	1.0	1.22	1.22	1.22	73.3	96.8
	11:05	Rainy	297.8	756.3	2.8383	2.8472	0.0089	1245.6	1246.6	1.0	1.22	1.22	1.22	73.3	121.5
15-Jun-08	09:00	Cloudy	297.8	756.2	2.8376	2.8440	0.0064	1246.6	1247.6	1.0	1.22	1.22	1.22	73.3	87.3
	10:00	Cloudy	298.0	756.0	2.8456	2.8529	0.0073	1247.6	1248.6	1.0	1.22	1.22	1.22	73.2	99.7
	11:00	Cloudy	298.2	755.8	2.8561	2.8628	0.0067	1248.6	1249.6	1.0	1.22	1.22	1.22	73.2	91.5
16-Jun-08	08:00	Cloudy	299.2	755.6	2.8471	2.8543	0.0072	1249.6	1250.6	1.0	1.22	1.22	1.22	73.1	98.5
	09:00	Cloudy	299.2	755.6	2.8041	2.8875	0.0834	1250.6	1251.6	1.0	1.22	1.22	1.22	73.1	1141.5
	10:00	Cloudy	299.2	755.6	2.8310	2.8561	0.0251	1251.6	1252.6	1.0	1.22	1.22	1.22	73.1	343.5
17-Jun-08	08:00	Rainy	298.1	756.3	2.8010	2.8065	0.0055	1252.6	1253.6	1.0	1.22	1.22	1.22	73.2	75.1
	09:05	Rainy	298.2	756.2	2.8182	2.8241	0.0059	1253.6	1254.6	1.0	1.22	1.22	1.22	73.2	80.6
	10:10	Rainy	298.4	756.1	2.8330	2.8363	0.0033	1254.6	1255.6	1.0	1.22	1.22	1.22	73.2	45.1
18-Jun-08	08:00	Rainy	298.9	758.2	2.8091	2.8107	0.0016	1255.6	1256.6	1.0	1.22	1.22	1.22	73.2	21.8
	09:05	Rainy	299.1	758.1	2.8204	2.8228	0.0024	1256.6	1257.6	1.0	1.22	1.22	1.22	73.2	32.8
	10:10	Rainy	299.3	757.9	2.8491	2.8512	0.0021	1257.6	1258.6	1.0	1.22	1.22	1.22	73.2	28.7
19-Jun-08	08:00	Cloudy	299.4	760.5	2.7940	2.7950	0.0010	1258.6	1259.6	1.0	1.22	1.22	1.22	73.3	13.6
	09:45	Cloudy	299.6	760.5	2.7432	2.7474	0.0042	1259.6	1260.6	1.0	1.22	1.22	1.22	73.3	57.3
	10:50	Cloudy	299.8	760.3	2.8074	2.8099	0.0025	1260.6	1261.6	1.0	1.22	1.22	1.22	73.2	34.1
20-Jun-08	08:00	Sunny	301.1	760.9	2.7763	2.7799	0.0036	1261.6	1262.6	1.0	1.22	1.22	1.22	73.1	49.3
	09:10	Sunny	301.3	760.7	2.8553	2.8568	0.0015	1262.6	1263.6	1.0	1.22	1.22	1.22	73.1	20.5
	10:30	Sunny	301.1	760.9	2.8788	2.8801	0.0013	1263.6	1264.6	1.0	1.22	1.22	1.22	73.1	17.8
21-Jun-08	08:00	Sunny	302.3	758.7	2.8304	2.8338	0.0034	1264.6	1265.6	1.0	1.21	1.21	1.21	72.8	46.7
	09:20	Sunny	302.3	758.5	2.8437	2.8446	0.0009	1265.6	1266.6	1.0	1.21	1.21	1.21	72.8	12.4
	10:30	Sunny	302.5	758.3	2.8018	2.8049	0.0031	1266.6	1267.6	1.0	1.21	1.21	1.21	72.8	42.6
														Min	12.4
														*Max	*343.5
														*Average	*87.6

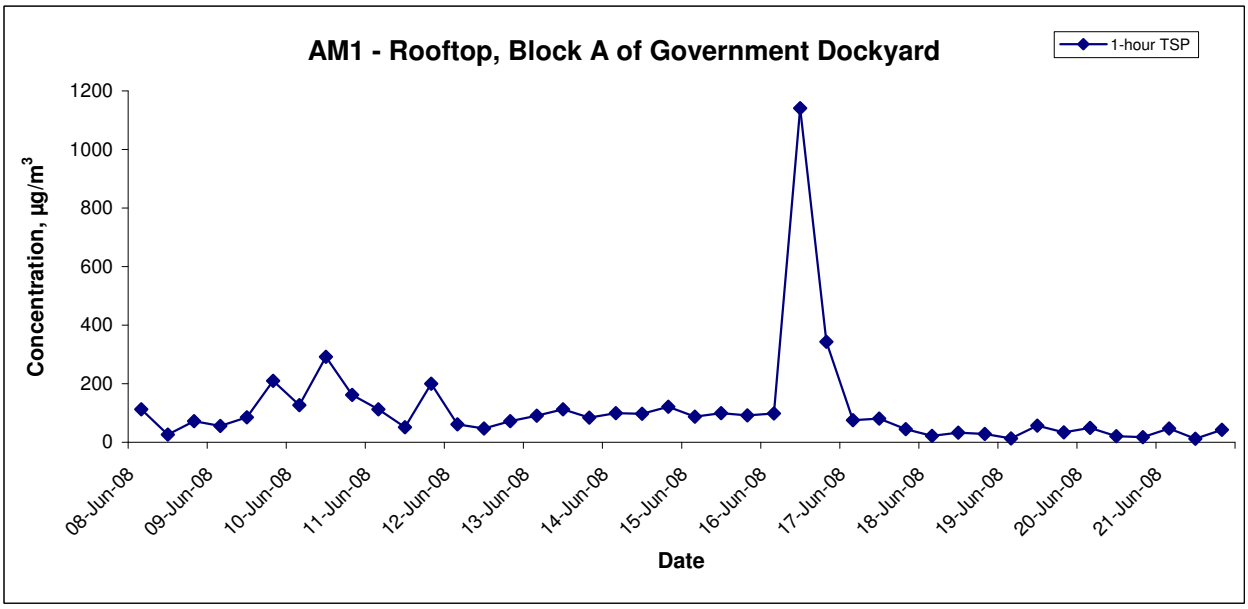
Notes:

(Shaded Cells) - Abnormal result probably due to Governmental Dockyard operation.

* The abnormal result obtained at 09:00am of 16 June 08 was excluded in calculation.

APPENDIX A3
GRAPHICAL PRESENTATION OF
BASELINE 1-HOUR TSP LEVELS

1-hr TSP Concentration Levels



Title	Contract No. DC/2007/20 HATS Stage 2A – Construction of Advance Disinfection Facilities at SCISTW Graphical Presentation of 1-hour TSP Monitoring Results	Scale N.T.S Date Jun 08	Project No. MA8009 Appendix A3	CINOTECH

APPENDIX A4
24-HOUR TSP BASELINE MONITORING RESULTS

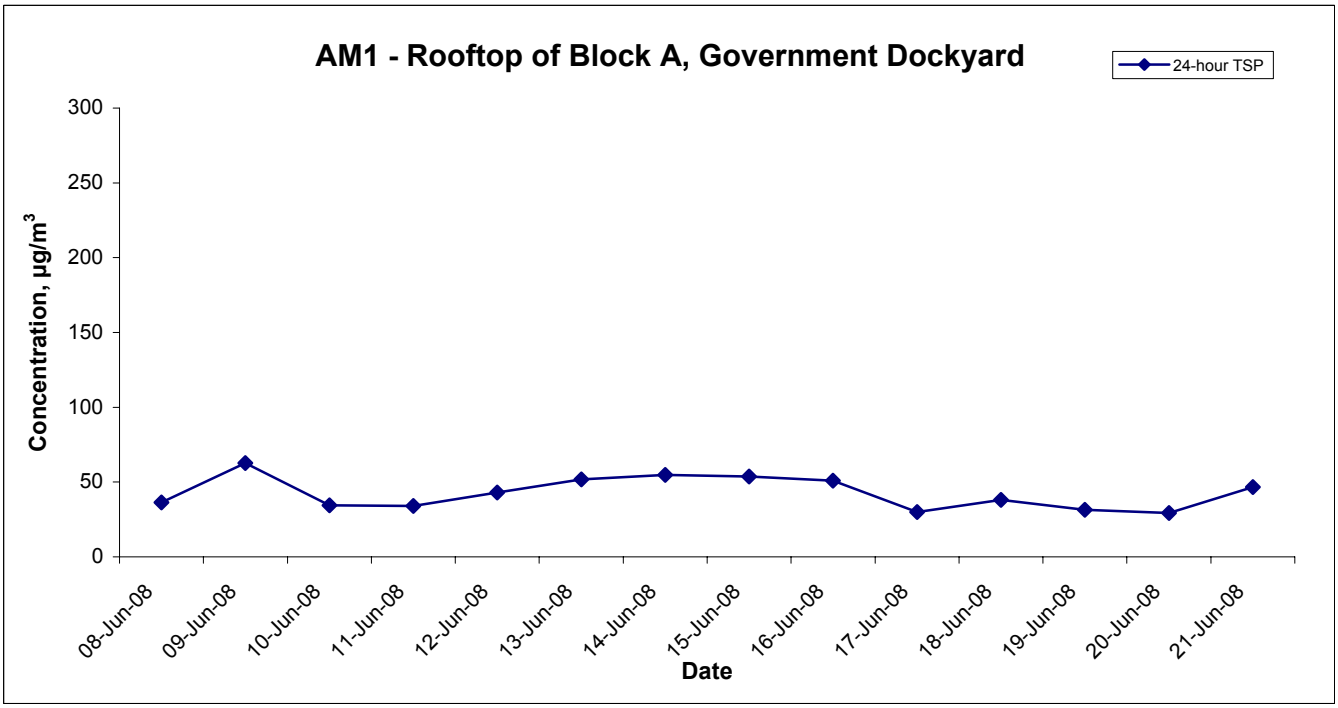
Appendix A4 - 24-hour TSP Monitoring Results

Station AM1 - Rooftop, Block A of Government Dockyard

Start Date	Weather Condition	Air Temp. (K)	Atmospheric Pressure (Pa)	Filter Weight (g)		Particulate weight (g)	Elapse Time		Sampling Time(hrs.)	Flow Rate (m^3/min.)		Av. flow (m^3/min)	Total vol. (m^3)	Conc. ($\mu g/m^3$)
				Initial	Final		Initial	Final		Initial	Final			
8-Jun-08	Cloudy	298.4	760.9	2.8164	2.8799	0.0635	4934.9	4958.9	24.0	1.21	1.21	1.21	1747.7	36.3
9-Jun-08	Sunny	301.9	760.8	2.8456	2.9547	0.1091	4958.9	4982.9	24.0	1.21	1.21	1.21	1737.4	62.8
10-Jun-08	Sunny	301.6	759.0	2.8981	2.9580	0.0599	4982.9	5006.9	24.0	1.21	1.20	1.21	1736.2	34.5
11-Jun-08	Cloudy	297.1	759.3	2.8539	2.9134	0.0595	5006.9	5030.9	24.0	1.22	1.21	1.22	1749.6	34.0
12-Jun-08	Cloudy	300.5	758.0	2.8148	2.8894	0.0746	5030.9	5054.9	24.0	1.21	1.21	1.21	1738.1	42.9
13-Jun-08	Rainy	300.1	755.8	2.8628	2.9527	0.0899	5054.9	5078.9	24.0	1.21	1.21	1.21	1736.8	51.8
14-Jun-08	Rainy	297.6	756.5	2.8442	2.9397	0.0955	5078.9	5102.9	24.0	1.21	1.21	1.21	1744.9	54.7
15-Jun-08	Rainy	298.0	756.0	2.8584	2.9520	0.0936	5102.9	5126.9	24.0	1.21	1.21	1.21	1743.2	53.7
16-Jun-08	Rainy	299.6	755.3	2.8210	2.9095	0.0885	5126.9	5150.9	24.0	1.21	1.21	1.21	1737.7	50.9
17-Jun-08	Rainy	298.4	756.1	2.8266	2.8788	0.0522	5150.9	5174.9	24.0	1.21	1.21	1.21	1742.1	30.0
18-Jun-08	Rainy	299.3	757.9	2.8201	2.8866	0.0665	5174.9	5198.9	24.0	1.21	1.21	1.21	1741.6	38.2
19-Jun-08	Cloudy	299.8	760.1	2.7993	2.8541	0.0548	5198.9	5222.9	24.0	1.21	1.21	1.21	1742.6	31.4
20-Jun-08	Sunny	301.5	760.6	2.8394	2.8902	0.0508	5222.9	5246.9	24.0	1.21	1.21	1.21	1738.3	29.2
21-Jun-08	Sunny	302.5	758.3	2.8701	2.9511	0.0810	5246.9	5270.9	24.0	1.20	1.20	1.20	1732.8	46.7
													Min	29.2
													Max	62.8
													Average	42.7

APPENDIX A5
GRAPHICAL PRESENTATION OF
BASELINE 24-HOUR TSP LEVELS

24-hr TSP Concentration Levels



Title: Graphical Presentation of 24-hour TSP Monitoring Results	Contract No. DC/2007/20 HATS Stage 2A – Construction of Advance Disinfection Facilities at SCISTW	Scale: N.T.S Date: Jun 08	Project No.: MA8009 Appendix: A5

CINOTECH

APPENDIX B
WEATHER CONDITIONS DURING BASELINE MONITORING PERIOD

APPENDIX B –
WEATHER CONDITIONS DURING THE MONITORING PERIOD

I. General Information

Date	Mean Air Temperature (°C)	Mean Relative Humidity (%)	Precipitation (mm)
8 June 2008	26.3 – 29.2	81 - 92	0
9 June 2008	26.7 – 30.6	72 - 88	0
10 June 2008	27.3 – 30.3	73 - 88	4.5
11 June 2008	24.9 – 30.6	66 - 89	1.7
12 June 2008	25.2 – 30.3	72 - 94	7.2
13 June 2008	23.7 – 28.6	81 - 97	62.5
14 June 2008	23.6 – 26.8	83 - 99	80.8
15 June 2008	24.4 – 29.5	82 - 100	41.3
16 June 2008	25.3 – 27.8	89 - 99	32.3
17 June 2008	24.3 – 25.7	88 - 100	86.9
18 June 2008	24.6 – 27.7	84 - 98	24.8
19 June 2008	24.5 – 30.3	76 - 99	7.6
20 June 2008	26.5 – 32.6	63 - 90	0
21 June 2008	26.4 – 32.9	62 - 92	0

* The above information was extracted from the daily weather summary by Hong Kong Observatory.

II. 10-Minute Mean Wind Speed and Wind Direction

Date	Time	Wind Speed m/s	Wind Direction
8-Jun-2008	00:00	0.9	SE
8-Jun-2008	01:00	0.4	SE
8-Jun-2008	02:00	1.8	SE
8-Jun-2008	03:00	0.4	SSE
8-Jun-2008	04:00	0.4	SSE
8-Jun-2008	05:00	0.0	SE
8-Jun-2008	06:00	0.0	W
8-Jun-2008	07:00	0.0	---
8-Jun-2008	08:00	0.4	SE
8-Jun-2008	09:00	2.2	WSW
8-Jun-2008	10:00	1.8	WSW
8-Jun-2008	11:00	1.3	S
8-Jun-2008	12:00	1.8	WSW
8-Jun-2008	13:00	1.2	W
8-Jun-2008	14:00	1.1	SW
8-Jun-2008	15:00	1.1	WSW
8-Jun-2008	16:00	1.2	WSW
8-Jun-2008	17:00	1.3	WSW
8-Jun-2008	18:00	0.0	W
8-Jun-2008	19:00	0.0	S
8-Jun-2008	20:00	0.0	S
8-Jun-2008	21:00	0.9	SE
8-Jun-2008	22:00	0.9	SE
8-Jun-2008	23:00	0.4	SE
9-Jun-2008	00:00	1.8	W
9-Jun-2008	01:00	0.9	W
9-Jun-2008	02:00	0.4	WSW
9-Jun-2008	03:00	0.9	WSW
9-Jun-2008	04:00	0.9	WSW
9-Jun-2008	05:00	0.9	WSW
9-Jun-2008	06:00	1.3	SW
9-Jun-2008	07:00	0.9	SW
9-Jun-2008	08:00	1.3	W
9-Jun-2008	09:00	2.2	W

Date	Time	Wind Speed m/s	Wind Direction
9-Jun-2008	10:00	2.2	SW
9-Jun-2008	11:00	1.8	SW
9-Jun-2008	12:00	2.2	S
9-Jun-2008	13:00	1.8	WSW
9-Jun-2008	14:00	2.2	WSW
9-Jun-2008	15:00	2.2	W
9-Jun-2008	16:00	3.1	W
9-Jun-2008	17:00	2.7	WSW
9-Jun-2008	18:00	1.8	WSW
9-Jun-2008	19:00	2.2	W
9-Jun-2008	20:00	1.8	W
9-Jun-2008	21:00	2.2	W
9-Jun-2008	22:00	1.8	W
9-Jun-2008	23:00	1.8	W
10-Jun-2008	00:00	1.3	WSW
10-Jun-2008	01:00	0.9	WSW
10-Jun-2008	02:00	0.4	WSW
10-Jun-2008	03:00	1.3	SSW
10-Jun-2008	04:00	0.0	S
10-Jun-2008	05:00	0.4	SSW
10-Jun-2008	06:00	0.9	SW
10-Jun-2008	07:00	0.0	S
10-Jun-2008	08:00	0.0	S
10-Jun-2008	09:00	0.0	---
10-Jun-2008	10:00	0.0	S
10-Jun-2008	11:00	0.0	---
10-Jun-2008	12:00	0.0	S
10-Jun-2008	13:00	0.0	S
10-Jun-2008	14:00	0.4	SW
10-Jun-2008	15:00	1.3	S
10-Jun-2008	16:00	1.3	SW
10-Jun-2008	17:00	1.8	SW
10-Jun-2008	18:00	3.1	SW
10-Jun-2008	19:00	2.7	WSW
10-Jun-2008	20:00	3.1	SW
10-Jun-2008	21:00	2.7	WSW

Date	Time	Wind Speed m/s	Wind Direction
10-Jun-2008	22:00	2.2	SW
10-Jun-2008	23:00	1.8	SW
11-Jun-2008	00:00	0.4	NE
11-Jun-2008	01:00	0.0	---
11-Jun-2008	02:00	0.4	NE
11-Jun-2008	03:00	1.3	N
11-Jun-2008	04:00	0.9	N
11-Jun-2008	05:00	0.4	SW
11-Jun-2008	06:00	1.3	W
11-Jun-2008	07:00	1.8	E
11-Jun-2008	08:00	2.2	SSE
11-Jun-2008	09:00	2.5	SSE
11-Jun-2008	10:00	1.3	N
11-Jun-2008	11:00	1.3	N
11-Jun-2008	12:00	1.8	SSE
11-Jun-2008	13:00	3.6	SSE
11-Jun-2008	14:00	2.5	SSE
11-Jun-2008	15:00	3.6	SSE
11-Jun-2008	16:00	2.5	SSE
11-Jun-2008	17:00	2.7	SSE
11-Jun-2008	18:00	2.2	SSE
11-Jun-2008	19:00	1.3	ESE
11-Jun-2008	20:00	0.4	WSW
11-Jun-2008	21:00	0.4	E
11-Jun-2008	22:00	0.4	E
11-Jun-2008	23:00	2.7	SSE
12-Jun-2008	00:00	0.4	S
12-Jun-2008	01:00	0.4	SSW
12-Jun-2008	02:00	0.0	W
12-Jun-2008	03:00	0.0	---
12-Jun-2008	04:00	0.0	---
12-Jun-2008	05:00	0.0	ESE
12-Jun-2008	06:00	0.4	W
12-Jun-2008	07:00	0.4	N
12-Jun-2008	08:00	0.0	NNE
12-Jun-2008	09:00	0.0	---

Date	Time	Wind Speed m/s	Wind Direction
12-Jun-2008	10:00	0.0	NNE
12-Jun-2008	11:00	0.4	NE
12-Jun-2008	12:00	1.8	SSW
12-Jun-2008	13:00	1.3	E
12-Jun-2008	14:00	0.9	W
12-Jun-2008	15:00	1.3	W
12-Jun-2008	16:00	2.1	SSE
12-Jun-2008	17:00	2.6	SSE
12-Jun-2008	18:00	2.2	SSE
12-Jun-2008	19:00	3.6	SSE
12-Jun-2008	20:00	0.9	SSE
12-Jun-2008	21:00	0.0	NNW
12-Jun-2008	22:00	0.4	WSW
12-Jun-2008	23:00	0.4	E
13-Jun-2008	00:00	1.8	W
13-Jun-2008	01:00	2.2	WSW
13-Jun-2008	02:00	2.2	WSW
13-Jun-2008	03:00	0.4	SSE
13-Jun-2008	04:00	0.9	SSE
13-Jun-2008	05:00	1.3	W
13-Jun-2008	06:00	1.3	W
13-Jun-2008	07:00	1.8	SW
13-Jun-2008	08:00	2.2	WSW
13-Jun-2008	09:00	1.8	W
13-Jun-2008	10:00	1.3	S
13-Jun-2008	11:00	1.3	W
13-Jun-2008	12:00	1.8	W
13-Jun-2008	13:00	1.8	W
13-Jun-2008	14:00	1.8	W
13-Jun-2008	15:00	1.3	WSW
13-Jun-2008	16:00	0.4	SSW
13-Jun-2008	17:00	0.9	SW
13-Jun-2008	18:00	1.8	SW
13-Jun-2008	19:00	1.8	S
13-Jun-2008	20:00	3.1	SW
13-Jun-2008	21:00	2.7	WSW

Date	Time	Wind Speed m/s	Wind Direction
13-Jun-2008	22:00	3.1	SW
13-Jun-2008	23:00	2.7	WSW
14-Jun-2008	00:00	1.3	ENE
14-Jun-2008	01:00	2.2	NNE
14-Jun-2008	02:00	0.9	N
14-Jun-2008	03:00	1.8	SSE
14-Jun-2008	04:00	2.7	SE
14-Jun-2008	05:00	3.1	SSE
14-Jun-2008	06:00	1.3	SSE
14-Jun-2008	07:00	0.9	SSE
14-Jun-2008	08:00	0.4	ESE
14-Jun-2008	09:00	0.9	ESE
14-Jun-2008	10:00	2.7	SSE
14-Jun-2008	11:00	2.2	ESE
14-Jun-2008	12:00	1.3	NW
14-Jun-2008	13:00	0.4	SE
14-Jun-2008	14:00	0.4	NE
14-Jun-2008	15:00	3	S
14-Jun-2008	16:00	3	S
14-Jun-2008	17:00	3	SSE
14-Jun-2008	18:00	2.0	W
14-Jun-2008	19:00	3.1	WNW
14-Jun-2008	20:00	0.0	---
14-Jun-2008	21:00	0.0	---
14-Jun-2008	22:00	0.4	ENE
14-Jun-2008	23:00	1.3	WSW
15-Jun-2008	00:00	0.4	ESE
15-Jun-2008	01:00	1.3	SE
15-Jun-2008	02:00	0.0	W
15-Jun-2008	03:00	0.0	NNE
15-Jun-2008	04:00	0.4	SW
15-Jun-2008	05:00	1.8	E
15-Jun-2008	06:00	3.1	SSE
15-Jun-2008	07:00	3.1	ESE
15-Jun-2008	08:00	2.7	ESE
15-Jun-2008	09:00	1.3	W

Date	Time	Wind Speed m/s	Wind Direction
15-Jun-2008	10:00	1.8	WSW
15-Jun-2008	11:00	0.0	---
15-Jun-2008	12:00	0.0	---
15-Jun-2008	13:00	0.4	W
15-Jun-2008	14:00	0.0	NE
15-Jun-2008	15:00	2.2	NE
15-Jun-2008	16:00	2.7	S
15-Jun-2008	17:00	2.7	S
15-Jun-2008	18:00	2.7	S
15-Jun-2008	19:00	0.4	S
15-Jun-2008	20:00	1.3	WSW
15-Jun-2008	21:00	0.9	ESE
15-Jun-2008	22:00	0.0	W
15-Jun-2008	23:00	1.3	WSW
16-Jun-2008	00:00	1.8	W
16-Jun-2008	01:00	0.4	W
16-Jun-2008	02:00	0.9	WSW
16-Jun-2008	03:00	2.7	SW
16-Jun-2008	04:00	2.7	WSW
16-Jun-2008	05:00	2.7	W
16-Jun-2008	06:00	1.8	WSW
16-Jun-2008	07:00	0.4	WSW
16-Jun-2008	08:00	1.8	SW
16-Jun-2008	09:00	1.8	SW
16-Jun-2008	10:00	3.1	SW
16-Jun-2008	11:00	2.2	SW
16-Jun-2008	12:00	1.3	ESE
16-Jun-2008	13:00	0.9	S
16-Jun-2008	14:00	0.0	E
16-Jun-2008	15:00	1.8	NE
16-Jun-2008	16:00	0.4	E
16-Jun-2008	17:00	0.4	SSW
16-Jun-2008	18:00	0.4	SSW
16-Jun-2008	19:00	0.0	W
16-Jun-2008	20:00	0.0	---
16-Jun-2008	21:00	0.4	SSE

Date	Time	Wind Speed m/s	Wind Direction
16-Jun-2008	22:00	0.0	NNW
16-Jun-2008	23:00	0.9	NNW
17-Jun-2008	00:00	2.7	SSE
17-Jun-2008	01:00	0.0	W
17-Jun-2008	02:00	0.0	---
17-Jun-2008	03:00	0.0	---
17-Jun-2008	04:00	0.4	NE
17-Jun-2008	05:00	0.0	NE
17-Jun-2008	06:00	0.0	---
17-Jun-2008	07:00	0.4	NE
17-Jun-2008	08:00	1.3	N
17-Jun-2008	09:00	1.3	WSW
17-Jun-2008	10:00	0.9	N
17-Jun-2008	11:00	1.3	W
17-Jun-2008	12:00	2.2	E
17-Jun-2008	13:00	2.2	SSE
17-Jun-2008	14:00	4.0	SSE
17-Jun-2008	15:00	2.2	NNE
17-Jun-2008	16:00	0.9	N
17-Jun-2008	17:00	2.7	SE
17-Jun-2008	18:00	2.7	E
17-Jun-2008	19:00	4.9	SSE
17-Jun-2008	20:00	2.2	E
17-Jun-2008	21:00	4.0	SSE
17-Jun-2008	22:00	2.2	SSE
17-Jun-2008	23:00	1.3	SSE
18-Jun-2008	00:00	0.9	SSE
18-Jun-2008	01:00	0.4	WSW
18-Jun-2008	02:00	0.9	ENE
18-Jun-2008	03:00	0.9	ESE
18-Jun-2008	04:00	1.3	S
18-Jun-2008	05:00	2.2	SSE
18-Jun-2008	06:00	0.4	NE
18-Jun-2008	07:00	1.8	ESE
18-Jun-2008	08:00	2.7	ESE
18-Jun-2008	09:00	3.1	ESE

Date	Time	Wind Speed m/s	Wind Direction
18-Jun-2008	10:00	2.7	ESE
18-Jun-2008	11:00	4.0	S
18-Jun-2008	12:00	1.3	NW
18-Jun-2008	13:00	3.1	WSW
18-Jun-2008	14:00	0.0	SSE
18-Jun-2008	15:00	1.3	WNW
18-Jun-2008	16:00	0.0	---
18-Jun-2008	17:00	2.7	S
18-Jun-2008	18:00	4.5	SSE
18-Jun-2008	19:00	4.0	W
18-Jun-2008	20:00	1.3	W
18-Jun-2008	21:00	0.0	---
18-Jun-2008	22:00	0.0	---
18-Jun-2008	23:00	0.0	SSE
19-Jun-2008	00:00	0.0	W
19-Jun-2008	01:00	0.4	W
19-Jun-2008	02:00	0.4	WNW
19-Jun-2008	03:00	0.4	NW
19-Jun-2008	04:00	0.0	WSW
19-Jun-2008	05:00	1.3	SSE
19-Jun-2008	06:00	0.4	SE
19-Jun-2008	07:00	1.3	ENE
19-Jun-2008	08:00	0.9	E
19-Jun-2008	09:00	1.8	SSE
19-Jun-2008	10:00	1.8	SE
19-Jun-2008	11:00	3.6	S
19-Jun-2008	12:00	1.8	S
19-Jun-2008	13:00	1.3	S
19-Jun-2008	14:00	2.7	S
19-Jun-2008	15:00	2.2	S
19-Jun-2008	16:00	3.1	S
19-Jun-2008	17:00	1.8	S
19-Jun-2008	18:00	1.8	SE
19-Jun-2008	19:00	0.4	SSE
19-Jun-2008	20:00	0.9	SE
19-Jun-2008	21:00	0.0	SE

Date	Time	Wind Speed m/s	Wind Direction
19-Jun-2008	22:00	0.4	ESE
19-Jun-2008	23:00	1.3	SE
20-Jun-2008	00:00	1.3	SE
20-Jun-2008	01:00	0.9	SE
20-Jun-2008	02:00	0.9	SSE
20-Jun-2008	03:00	0.4	SE
20-Jun-2008	04:00	0.0	---
20-Jun-2008	05:00	0.4	S
20-Jun-2008	06:00	0.0	---
20-Jun-2008	07:00	0.0	---
20-Jun-2008	08:00	0.0	---
20-Jun-2008	09:00	1.8	WSW
20-Jun-2008	10:00	1.3	S
20-Jun-2008	11:00	1.3	WSW
20-Jun-2008	12:00	1.3	S
20-Jun-2008	13:00	2.2	SW
20-Jun-2008	14:00	2.7	SW
20-Jun-2008	15:00	2.7	WSW
20-Jun-2008	16:00	2.7	WSW
20-Jun-2008	17:00	1.8	W
20-Jun-2008	18:00	1.3	W
20-Jun-2008	19:00	1.3	W
20-Jun-2008	20:00	0.4	S
20-Jun-2008	21:00	0.4	SSW
20-Jun-2008	22:00	0.4	SE
20-Jun-2008	23:00	0.0	ESE
21-Jun-2008	00:00	0.4	SE
21-Jun-2008	01:00	0.0	---
21-Jun-2008	02:00	0.4	S
21-Jun-2008	03:00	0.0	SSE
21-Jun-2008	04:00	0.9	SW
21-Jun-2008	05:00	1.3	W
21-Jun-2008	06:00	0.4	W
21-Jun-2008	07:00	0.9	W
21-Jun-2008	08:00	0.4	WSW
21-Jun-2008	09:00	2.2	SW

Date	Time	Wind Speed m/s	Wind Direction
21-Jun-2008	10:00	2.2	SSW
21-Jun-2008	11:00	2.2	SW
21-Jun-2008	12:00	3.1	WSW
21-Jun-2008	13:00	3.6	SW
21-Jun-2008	14:00	3.1	WSW
21-Jun-2008	15:00	3.6	WSW
21-Jun-2008	16:00	3.1	WSW
21-Jun-2008	17:00	3.1	W
21-Jun-2008	18:00	2.7	WSW
21-Jun-2008	19:00	2.2	W
21-Jun-2008	20:00	2.2	W
21-Jun-2008	21:00	0.9	W
21-Jun-2008	22:00	1.3	WSW
21-Jun-2008	23:00	1.3	W

APPENDIX C
BASELINE AIR QUALITY MONITORING SCHEDULE

Contract No. DC/2007/20

HATS Stage 2A – Construction of Advance Disinfection Facilities at SCISTW

Baseline Environmental Monitoring Schedule for June 2008

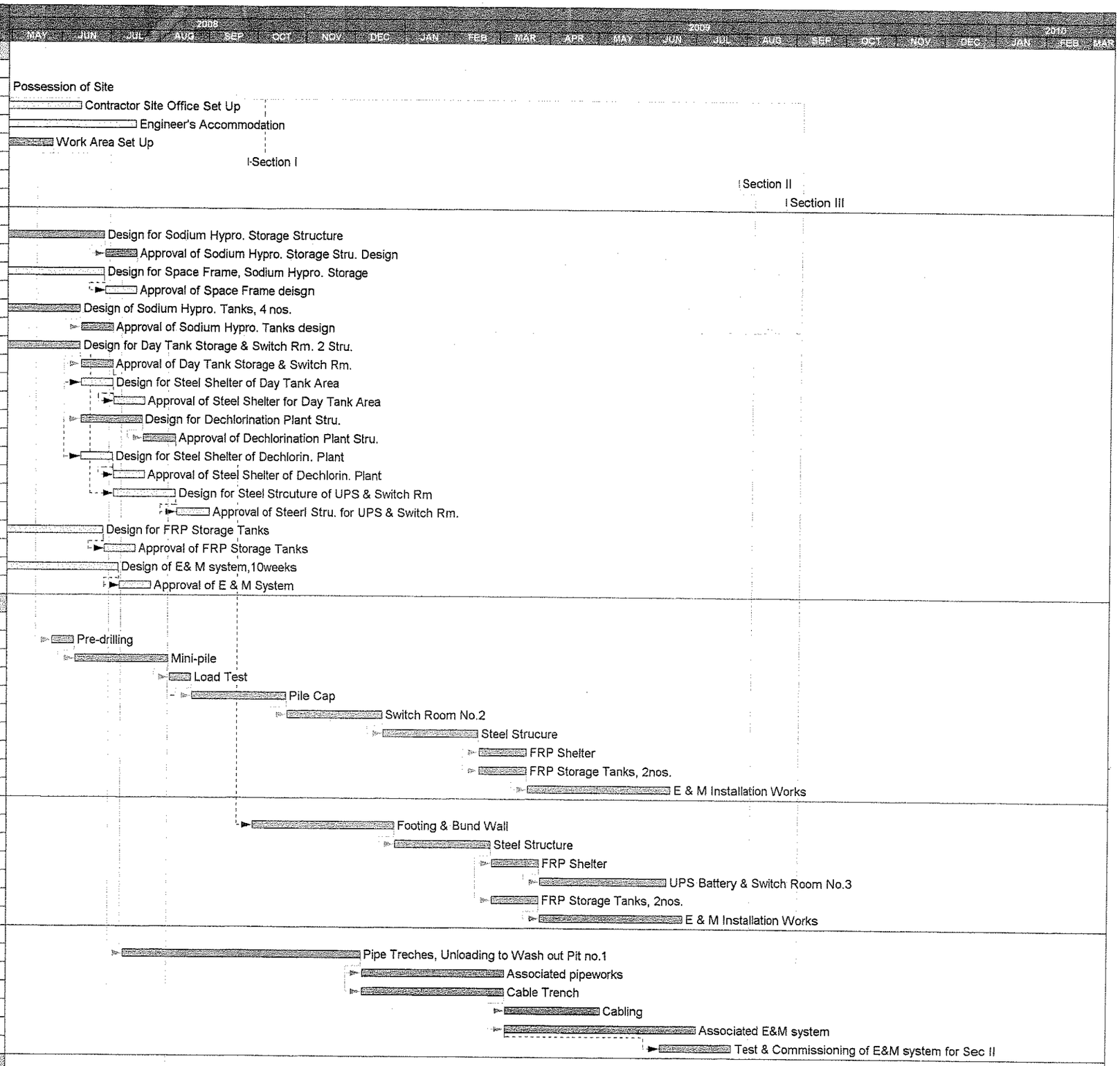
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1-Jun	2-Jun	3-Jun	4-Jun	5-Jun	6-Jun	7-Jun
8-Jun	**9-Jun**	10-Jun	11-Jun	12-Jun	13-Jun	14-Jun
1-hr & 24-hrs TSP Monitoring at AM1	1-hr & 24-hrs TSP Monitoring at AM1	1-hr & 24-hrs TSP Monitoring at AM1	1-hr & 24-hrs TSP Monitoring at AM1	1-hr & 24-hrs TSP Monitoring at AM1	1-hr & 24-hrs TSP Monitoring at AM1	1-hr & 24-hrs TSP Monitoring at AM1
15-Jun	16-Jun	17-Jun	18-Jun	19-Jun	20-Jun	21-Jun
1-hr & 24-hrs TSP Monitoring at AM1	1-hr & 24-hrs TSP Monitoring at AM1	1-hr & 24-hrs TSP Monitoring at AM1	1-hr & 24-hrs TSP Monitoring at AM1	1-hr & 24-hrs TSP Monitoring at AM1	1-hr & 24-hrs TSP Monitoring at AM1	1-hr & 24-hrs TSP Monitoring at AM1
22-Jun	23-Jun	24-Jun	25-Jun	26-Jun	27-Jun	28-Jun
29-Jun	30-Jun	1-Jul	2-Jul	3-Jul	4-Jul	5-Jul

* The schedule may be changed due to unforeseen circumstances (adverse weather, etc)

AM1 - Air monitoring station at Rooftop, Block A of Government Dockyard

APPENDIX D
CONSTRUCTION PROGRAMME

Act ID	Description	Orig Dur	Rem Dur	Early Start	Early Finish
Preliminaries					
1000	Possession of Site	1d	1d	29APR08	29APR08
1010	Contractor Site Office Set Up	45d	45d	29APR08	12JUN08
1020	Engineer's Accommodation	80d	80d	29APR08	17JUL08
1030	Work Area Set Up	28d	28d	29APR08	26MAY08
1040	Section I	1d	1d	25SEP08	25SEP08
1090	Section II	1d	1d	27JUL09	27JUL09
1570	Section III	1d	1d	26AUG09	26AUG09
Design Submission					
1050	Design for Sodium Hypro. Storage Structure	60d	60d	29APR08	27JUN08
1055	Approval of Sodium Hypro. Storage Stru. Design	21d	21d	28JUN08	18JUL08
1060	Design for Space Frame, Sodium Hypro. Storage	60d	60d	29APR08	27JUN08
1065	Approval of Space Frame deisgn	21d	21d	28JUN08	18JUL08
1070	Design of Sodium Hypro. Tanks, 4 nos.	45d	45d	29APR08	12JUN08
1075	Approval of Sodium Hypro. Tanks design	21d	21d	13JUN08	03JUL08
1080	Design for Day Tank Storage & Switch Rm. 2 Stru.	45d	45d	29APR08	12JUN08
1085	Approval of Day Tank Storage & Switch Rm.	21d	21d	13JUN08	03JUL08
1100	Design for Steel Shelter of Day Tank Area	21d	21d	13JUN08	03JUL08
1105	Approval of Steel Shelter for Day Tank Area	21d	21d	04JUL08	24JUL08
1110	Design for Dechlorination Plant Stru.	40d	40d	13JUN08	22JUL08
1115	Approval of Dechlorination Plant Stru.	21d	21d	23JUL08	12AUG08
1120	Design for Steel Shelter of Dechlorin. Plant	21d	21d	13JUN08	03JUL08
1125	Approval of Steel Shelter of Dechlorin. Plant	21d	21d	04JUL08	24JUL08
1130	Design for Steel Strcuture of UPS & Switch Rm	40d	40d	04JUL08	12AUG08
1135	Approval of Steerl Stru. for UPS & Switch Rm.	21d	21d	13AUG08	02SEP08
1140	Design for FRP Storage Tanks	60d	60d	29APR08	27JUN08
1470	Approval of FRP Storage Tanks	21d	21d	28JUN08	18JUL08
1560	Design of E& M system,10weeks	70d	70d	29APR08	07JUL08
1565	Approval of E & M System	21d	21d	08JUL08	28JUL08
Day Tank Storage Area					
1150	Pre-drilling	14d	14d	27MAY08	09JUN08
1160	Mini-pile	60d	60d	10JUN08	08AUG08
1170	Load Test	14d	14d	09AUG08	22AUG08
1180	Pile Cap	60d	60d	23AUG08	21OCT08
1190	Switch Room No.2	60d	60d	22OCT08	20DEC08
1200	Steel Strucure	60d	60d	21DEC08	18FEB09
1210	FRP Shelter	30d	30d	19FEB09	20MAR09
1220	FRP Storage Tanks, 2nos.	30d	30d	19FEB09	20MAR09
1280	E & M Installation Works	90d	90d	21MAR09	18JUN09
Dechlorination Plant					
1230	Footing & Bund Wall	90d	90d	30SEP08 *	28DEC08
1240	Steel Structure	60d	60d	29DEC08	26FEB09
1250	FRP Shelter	30d	30d	27FEB09	28MAR09
1260	UPS Battery & Switch Room No.3	80d	80d	29MAR09	16JUN09
1270	FRP Storage Tanks, 2nos.	30d	30d	27FEB09	28MAR09
1290	E & M Installation Works	90d	90d	29MAR09	26JUN09
Associated Pipeworks & Utilities					
1300	Pipe Treches, Unloading to Wash out Pit no.1	150d	150d	11JUL08	07DEC08
1310	Associated pipeworks	90d	90d	08DEC08	07MAR09
1320	Cable Trench	90d	90d	08DEC08	07MAR09
1330	Cabling	60d	60d	08MAR09	06MAY09
1580	Associated E&M system	120d	120d	08MAR09	05JUL09
1590	Test & Commissioning of E&M system for Sec II	45d	45d	13JUN09	27JUL09



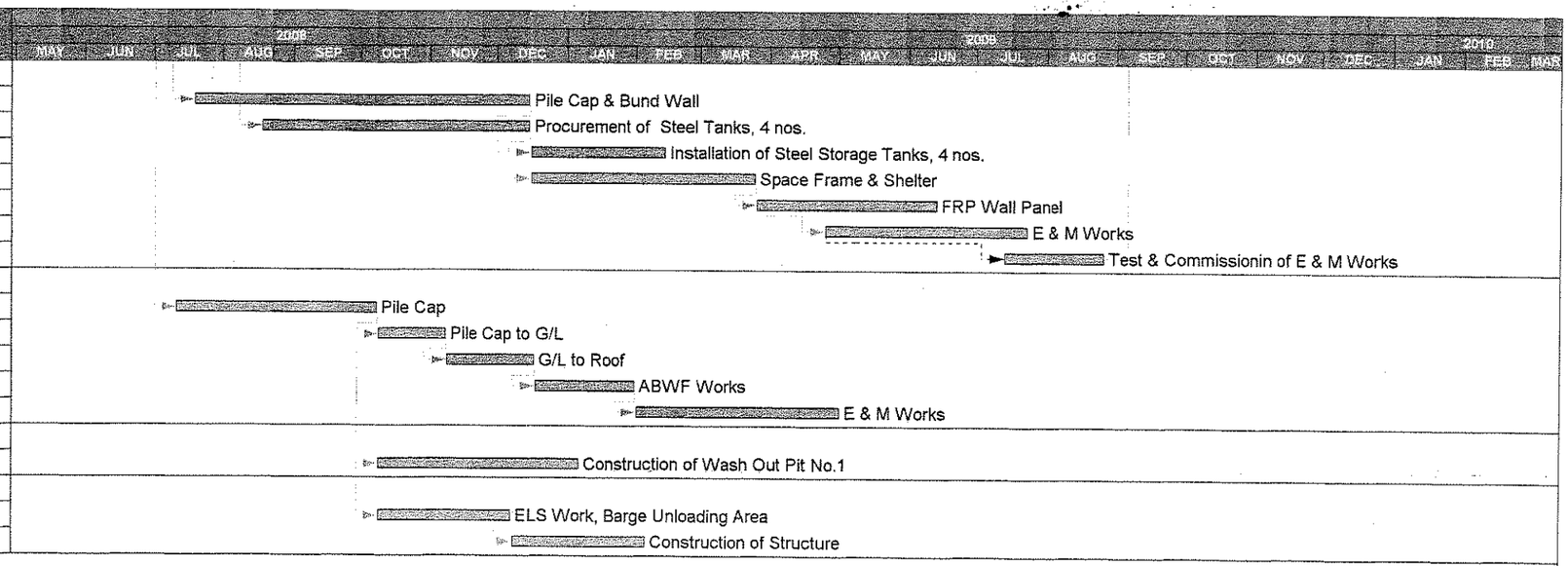
Start date	29APR08
Finish date	26AUG09
Data date	29APR08
Run date	18MAY08
Page number	1A

© Primavera Systems, Inc.

Outline Programme
for
Stonecutters Island Sewage Treatment Works

Early bar
Progress bar
Critical bar
Summary bar
Start milestone point
Finish milestone point

Act ID	Description	Orig Dur	Rem Dur	Early Start	Early Finish
Sodium Hypochlorite Storage Compund					
1340	Pile Cap & Bund Wall	150d	150d	19JUL08	15DEC08
1345	Procurement of Steel Tanks, 4 nos.	120d	120d	18AUG08	15DEC08
1350	Installation of Steel Storage Tanks, 4 nos.	60d	60d	16DEC08	13FEB09
1360	Space Frame & Shelter	100d	100d	16DEC08	25MAR09
1370	FRP Wall Panel	80d	80d	26MAR09	13JUN09
1380	E & M Works	90d	90d	25APR09	23JUL09
1480	Test & Commissionin of E & M Works	45d	45d	13JUL09	26AUG09
Switch Room No.1					
1390	Pile Cap	90d	90d	11JUL08	08OCT08
1400	Pile Cap to G/L	30d	30d	09OCT08	07NOV08
1410	G/L to Roof	40d	40d	08NOV08	17DEC08
1420	ABWF Works	45d	45d	18DEC08	31JAN09
1430	E & M Works	90d	90d	01FEB09	01MAY09
Washout Pit No.1					
1440	Construction of Wash Out Pit No.1	90d	90d	09OCT08	06JAN09
Barge Unloading Area					
1450	ELS Work, Barge Unloading Area	60d	60d	09OCT08	07DEC08
1460	Construction of Structure	60d	60d	08DEC08	05FEB09



Start date	29APR08
Finish date	26AUG09
Data date	29APR08
Run date	18MAY08
Page number	2A

© Primavera Systems, Inc.

Outline Programme
for
Stonecutters Island Sewage Treatment Works

Early bar
Progress bar
Critical bar
Summary bar
Start milestone point
Finish milestone point