

**Odour Patrol and Testing
at West Kowloon Cultural District**

for

Mott MacDonald

Submitted by

Hong Kong Productivity Council
Environmental Management Division

(Revision No.1)

Quality Index

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1. INTRODUCTION

Hong Kong Productivity Council (HKPC) was commissioned by Mott MacDonald Hong Kong Limited to undertake an odour assessment at the boundary of New Yau Ma Tei Typhoon Shelter (NYMTTS) and West Kowloon Cultural District (WKCD). Two rounds of odour patrol were carried out at 11:15 and 16:00 on 28 March 2011. Hydrogen sulphide measurement, odour intensity detection, odour hedonic determination, and air sample collection were conducted on the site at different locations of the boundary. A total of 5 air samples were collected and determined for odour concentration according to standard method BS EN13725: “Air Quality-Determination of Odour Concentration by Dynamic Olfactometry” at HKPC’s Odour Research Laboratory. The filed findings and the laboratory results are presented in this report.

2. SURVEY METHODOLOGY

2.1 Patrol Route and Sampling Schedule

A site pre-visit was carried out on 21 March 2011 and the patrol route (the blue line from P1 to P3) was decided as shown in Figure 1.

In this project, two sections of odour patrol and one sampling section were performed on 28 March 2011. The execution times of the odour patrol and sampling were summarized at Table 1.

Table 1: Schedule for odour patrol and sampling on 28 March 2011

Description	Time
First odour patrol section	11:15 – 13:00
Sampling	13:00 – 15:00
Second odour patrol section	16:00 – 17:15

2.2 Monitoring and Sampling Locations

As agreed with the representative of Mott MacDonald, 5 locations (please see Table 2 below) were selected for the on-site measurement and gaseous sampling.

Table 2: Sampling and monitoring locations in the Patrol Route

Symbol	Northing	Easting
A	818280	834151
B	818416	834335
C	818766	834521
D	819126	834524
F	819769	834438

The reasons for selecting the above 5 locations are as follows:

- (a) Locations A and B were selected because they are within the WKCD site boundary and can therefore provide indication to the odour level at WKCD.
- (b) According to the odour patrol conducted in the morning, odour was perceived and H₂S was detected at locations C, D, E and F (please see Table 14). Of these 4 locations, the H₂S levels at locations C and F are relatively higher and their hedonic tones also indicate more unpleasant odour than those of the other 2 locations D and E. As a result, locations C and F were selected for sampling. Since the H₂S levels of locations D and E and their hedonic tones are similar, one of them, i.e., location D, was selected arbitrarily for odour sampling.

2.3 On-site Measurement, Sampling and Laboratory Analysis

The sniffing team was composed of 5 olfactory qualified staffs and they processed the odour patrol along the designated routes to perceive scent taking place there. For the patrol sections, if malodour was perceived, the sniffing team would proceed site measurement of hydrogen sulphide, odour intensity and hedonic tone, but no sample would be collected. Besides, the duration, odour characteristics and possible odour generation sources were also recorded. For the sampling section, on-site measurements of H₂S, odour intensity, hedonic tone, ambient temperature, relative humidity, wind direction and wind speed was conducted. Air samples were collected at each location for testing odour concentration determination at lab. Besides, for those samples with H₂S concentration lower than 3ppb detected on-site, H₂S re-analysis was carried out in the laboratory.

The equipment items adopted for field measurement, sampling and odour measurement are summarized in Table 3.

Table 3: Equipment for Odour Survey

Description	Equipment	Model
On-site hydrogen sulphide measurement	Portable hydrogen sulphide analyzer	Jerome 631-X
Laboratory hydrogen sulphide measurement	Desktop UV fluorescence H ₂ S analyzer	TeledynAPI Model 101E
Air sample collection	Odour sampler	Ecoma
	Sampling bags	Nalophan NA, PET (8L)
Odour concentration measurement	Dynamic olfactometer	Model TO9, Ecoma
Temperature, relative humidity, wind direction and wind speed measurement	Weather Station	Davis wireless Vantage Pro 2 6152
GPS Tracking and Navigation	A handheld GPS	Garmin eTrex Vista HCx

The calibration record for Jerome 631-X portable hydrogen sulphide analyzer is shown in **Annex A**.

2.3.1 Hydrogen sulphide

H₂S concentration was measured with a portable H₂S analyzer (Jerome 631-X) (Figure 2) at each monitoring location for 15 minutes at 5-minute interval. The analyzer is able to measure hydrogen sulphide concentration in the range of 1 ppbv to 50ppmv, and the sensitivity is 0.003ppmv hydrogen sulphide.

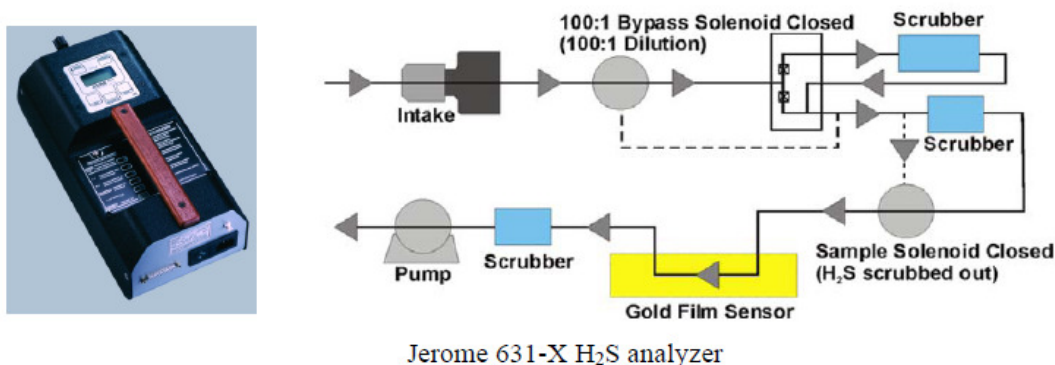


Figure 2: Jerome 631-X portable H₂S analyzer

The specification of the analyzer is shown in Table 4 below.

Table 4: Specification of Jerome 631-X portable H₂S analyzer

Items	Values
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Range	3ppb to 50 ppm
Accuracy	±3ppb (at 50ppb)
Flow rate	0.15L/min
Working temperature	0 – 40°C

2.3.2 Laboratory H₂S Analysis

For any airborne H₂S concentration lower than 1ppb, air samples would be collected and be sent to laboratory for H₂S analysis by using a desktop UV fluorescence H₂S analyzer (TeledynAPI Model 101E) (Figure 3) to confirm the H₂S concentration.



Figure 3: TeledynAPI Model 101E desktop UV fluorescence H₂S analyzer

2.3.3 Odour intensity

The odour strength in term of odour intensity at the monitoring location was determined by 3 team staffs in accordance with the classification in Table 5.

Table 5: Classification of Odour Intensity

Intensity number	Intensity	Description
4	Extreme	Severe odour
3	Strong	Identifiable odour, strong
2	Moderate	Identifiable odour, moderate
1	Slight	Identifiable odour, slight
0	Not detected	No odour perceived or an odour so weak that it cannot be easily characterized or described

2.3.4 Hedonic Tone Test

Hedonic tone was an evaluation of relatively pleasant or unpleasant of the odour samples. Five field staffs had to indicate their perceived hedonic tone at each determination as a value from

the five points hedonic tone scale (Table 6):

Table 6: Classification of Hedonic Tone Test

Hedonic tone	Description
0	Neutral odour / no odour
-1	Mildly unpleasant
-2	Moderately unpleasant
-3	Unpleasant
-4	Offensive

2.3.5 Sampling Method

Air sample was collected with an odour sampler (Figure 4) at suction rate of 0.45L/s (i.e. to fill in a 8L sampling bag in about 18 seconds) by adopting the lung principle. The sampling bag (Figure 5) inside the sampler is made with polyethyleneterephthalate (PET, Nalophan) that is one of the approved materials in compliance with BS EN13725:2003.



Figure 4: Odour Sampler



Figure 5: Sampling bag

At each monitoring location, about 24L (3 x 8L) of gaseous sample was collected for laboratory analysis.

2.3.6 Laboratory analysis by dynamic olfactometry, BS EN13725

The collected odour samples were delivered to HKPC's odour research laboratory for dynamic olfactometry analysis in 24 hours after collection.

The odour concentration determination was conducted by 4 qualified panelists with a forced-choice olfactometer. The olfactometer is an apparatus that automatically presents an odorous sample at different dilution accomplished with odour-free air to the panelists. The odour concentration is determined according to the dilution factor required to reach the detection threshold of each panelist. Figure 6 shows 4 certified panelists to determine the odour concentration of a sample.

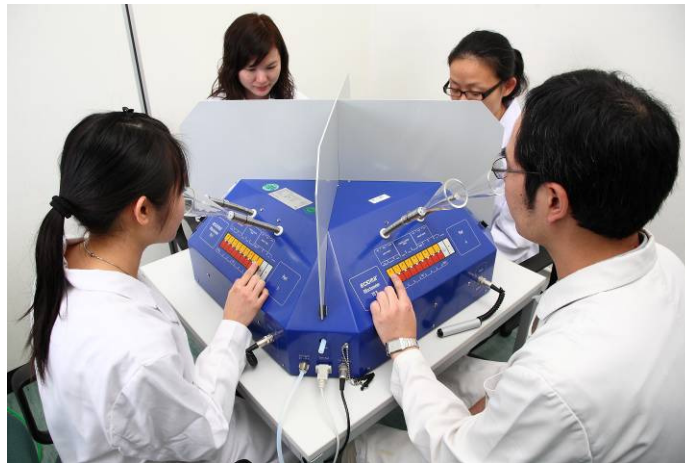


Figure 6: Four qualified panelists were measuring the odour concentration of a sample

2.5 Field Sampling Logs and Meteorological Conditions

The safety and contingency plan for sampling work are enclosed in **Annex B**. Field sampling log sheets were filled out by field staffs to record the necessary information during sampling and measurement at each site. The information included:

- Time
- Location
- GPS location
- The prevailing weather condition
- Temperature
- Relative humidity
- Wind direction
- Wind speed

- Possible source of odour
- Perceived intensity of the odour
- Hedonic test
- Duration of odour
- Characteristics of the odour detected (e.g. sewage or rotten-egg smell, etc)
- Any facility or activity will cause odour
- On-site H₂S measurement

Field logs were maintained for all survey works and the log sheets were enclosed in **Annex C**. Meteorological observations were collected with a Davis weather station during the odour patrol and the sampling work. The collected data regarding the ambient temperature, relative humidity, wind speed, and wind direction are recorded in the field record log sheet.

2.6 QA/QC for the Study

2.6.1 QA/QC for Field Sampling

- 2.6.1.1 Brand new 8 L sampling bags made with polyethyleneterephthalate (PET, Nalophan) were used for storing the air samples. This odourless material, PET is one the approved materials for making sample containers according to standard method BS EN13725:2003.
- 2.6.1.2 At least 3 samples were collected for each monitoring point to ensure the sampling precision.
- 2.6.1.3 All air samples were kept at less than 25°C during sample storage and transportation. The interval between sampling and measurement did not exceed 24h.
- 2.6.1.4 Sniffing team members have to fill in the field log sheet as shown in **Annex C** to record all necessary information, measurement results, perception and observation during the filed work. The field log sheet was checked and endorsed by the sniffing leader.
- 2.6.1.6 Before carrying out odour intensity test and hedonic tone test, all field staffs were refreshed with an air filter mask to prevent the saturation of their nose. (Figure 7)



Figure 7: Sniffing members used air filter masks to refresh their olfactory system before performing intensity and hedonic tone test

2.6.2 QA/QC for Laboratory Analysis

2.6.2.1 The panelists for odour concentration determination in the project were certified in the n-butanol test which was recommended in BS EN13725:2003. Their certified records were shown in **Annex D**.

2.6.2.2 For each batch of sample, the panelists had to conduct screening tests before and after carrying out the analysis. According to Ecoma Model TO9 olfactometer’s operation manual and the use of 59.8 ppm n-butanol as an example in panel selection in method EN13725:2003, a standard sample containing 60 ppm n-butanol was used and the acceptance criteria were shown in Table 7.

Table 7: Acceptance Criteria for the Laboratory QA/QC Samples

QA/QC Sample	Acceptance Criteria
60 ppm n-butanol test	The acceptance criteria for odour concentration of 60 ppm n-butanol was 724 – 2896 OU/m ³ .

Remarks: This is a general guideline suggested by BS EN13725:2003

2.6.2.3 The screening results before and after sample measurements were shown in Table 8 and 9 respectively.

Table 8: The screening test results before carrying out odour measurement

Certified Panelist	Odour Concentration (OU/m ³)	Pass/Fail
Fung Kam Wing	1448	Pass
Samson Fan	1448	Pass
Yeung Suk Ting	1448	Pass
Poon Ka Wo	1448	Pass

Table 9: The screening test results after carrying out odour measurement

Certified Panelist	Odour Concentration (OU/m ³)	Pass/Fail
Fung Kam Wing	1448	Pass
Samson Fan	724	Pass
Yeung Suk Ting	1448	Pass
Poon Ka Wo	724	Pass

- 2.6.2.4 The odour laboratory was well ventilated to maintain an odourless environment to the panelists during the test.
- 2.6.2.5 At least 3 rounds of analysis were conducted for each sample, which fulfilled the criteria of BS EN13725:2003.

3. ON-SITE OBSERVATIONS AND TEST RESULTS

3.1 Patrol Perception

During the patrol section, sniffing team slowly patrolled along the patrol route to discern malodour there. Several points were perceived malodour and the coordinate of these points are shown in Table 10. The perception and observation at these patrol locations during the first and second odour patrol sections are illustrated in Table 11 and Table 12 respectively.

Table 10: Patrol locations perceived malodour during the first and second patrol sections

Location	GPS Location	
First odour patrol section*		
P2	818742	834515
C	818766	834521
D	819126	834524
E	819468	834524
F	819769	834438
P3	819766	834240
Second odour patrol section*		
P2	818742	834515
C	818766	834521
F	819769	834438

*Note: During both first and second odour patrols, no malodour was perceived along the portion of the patrol route from P1 to before P2.

Table 11: Findings from the First Patrol Section at route P1 to P3 at 11:15 – 13:00

Location A (11:15 – 11:20):

1. No odour was perceived.
2. No odour generating activity was observed.



View at location A



Another view at location A



A sniffing member was filling the field log sheet

Location B (11:25 – 11:30):

1. No odour was perceived.
2. No odour generating activity was observed.



View at location B



Another view at location B



A sniffing team member was conducting H₂S measurement on the site

Location P2 (11:40 – 11:50):

1. There were a lot of loading activities at the boundary of NYMTTS.
2. Odour mixture of rotten-egg, sewage and combustion engine exhaust gas was perceived.
3. The rotten-egg odour and sewage odours would possibly emanate from the sea near location P2 (but no source of sewage discharge was observed), and the exhaust gas was likely coming from the barges operating there.



Photos showing the loading work processed at location P2

Table 11: Findings from the First Patrol Section at route P1 to P3 at 11:15 – 13:00 (Con't)

Location C (11:51 – 12:01):

1. A cargo ship was at location C.
2. Odour mixture of rotten-egg, sewage and engine exhaust gas was perceived.
3. The rotten-egg and sewage odours would possibly emanate from the sea near location C (but no source of sewage discharge was observed), and the exhaust gas was likely coming from the barges operating there.



Photos showing the cargo ship was parking at location C

Three sniffing team members were carrying out the odour intensity measurement

Location D (12:02 – 12:12):

1. There were a lot of loading activities around this location.
2. Odour mixture of rotten-egg, sewage and engine exhaust gas was perceived
3. The rotten-egg and sewage odours would possibly emanate from the sea near location D (but no source of sewage discharge was observed), and the exhaust gas was likely coming from the barges operating there.



Loading was in process at Location D



A loading cargo ship exhausted dark smoke

Location E (12:13 – 12:23):

1. A cargo ship was at location E.
2. Odour mixture of rotten-egg, sewage and engine exhaust gas was perceived.
3. The rotten-egg and sewage odours would possibly emanate from the sea near location E (but no source of sewage discharge was observed), and the exhaust gas was likely coming from the barges operating there.



The cargo ship was parking at location E



Exhausted smoke from the loading cargo ship



Four sniffing members were conducting the hedonic tone test

Location F (12:24 – 12:34):

1. A barge was grabbing sediment from the sea. Besides, drainage outfalls were observed.
2. Odour mixture of rotten-egg, sewage and diesel was perceived.
3. The rotten-egg and sewage odours would possibly emanate from the barge grabbing sediment from sea, and the drainage outfall near location F, and the diesel smell would likely come from the ships travelling there.



Drainage outfall near location F



A barge was grabbing sediment from sea near location F

Location P3 (12:35 – 12:45):

1. A green belt was at location P3.
2. Grass smell was perceived.
3. Odour may be caused by the plants in the green belt.



Plants were found at location P3



Another photo showed plants were found




Table 12: Findings from the Second Patrol Section at route P1 to P3 at 16:00 – 17:15



Monitoring Location (Time)	Perception & Observation
Along P1 to P2 (16:00 – 16:20)	No odour was perceived.
Along P2 to C (16:20 – 16:35)	<ol style="list-style-type: none"> 1. During this time interval, no loading activity was found at the boundary of NYMTTS. 2. Along P2 to C, very low malodour strength was perceived drainage from sea. 3. The odour would possibly emanate from the sea (but no source of sewage discharge was observed).
Along D to E (16:40 – 16:55)	No odour was perceived.
Along F to P3 (17:00 – 17:15)	<ol style="list-style-type: none"> 1. Very low malodour strength was perceived drainage from sea. 2. The barge stopped grabbing sediments from sea. 3. The odour would possibly emanate from the drainage outfall near location F.

3.2 Sampling

The observation and perception during the gaseous sampling were illustrated in Table 13.

Table 13: Sampling and on-site measurement at the 5 locations

Monitoring Location	Time	Photo and description
A	13:07	<p>1. No odour was perceived. 2. No odour generating activity was observed.</p> <div style="display: flex; justify-content: space-around;">   </div> <p style="display: flex; justify-content: space-around;"> A sniffing member was collecting air sample at location A A sniffing member was collecting the meteorological data using the weather station </p>
B	13:29	<p>1. No odour was perceived. 2. No odour generating activity was observed.</p> <div style="text-align: center;">  </div> <p style="text-align: center;">A sniffing member was collecting air sample at location B</p>

<p>C</p>	<p>14:13</p>	<ol style="list-style-type: none"> 1. No odour generating activity was observed. 2. High concentration of H₂S was detected. 3. Rotten-egg and sewage smell was perceived. 4. The odour would possibly emanate from the sea near location C (but no source of sewage discharge was observed).  <p>A sniffing member was collecting air sample at location C</p>
<p>D</p>	<p>14:31</p>	<ol style="list-style-type: none"> 1. No odour was perceived. 2. No odour generating activity was observed.  <p>A sniffing member was collecting air sample at location D</p>

<p>F</p>	<p>14:48</p>	<ol style="list-style-type: none"> 1. A barge was grabbing sediment from the sea. 2. Drainage outfalls were observed. 3. Odour mixture of rotten-egg, sewage and diesel was perceived. . 4. The rotten-egg and sewage odour would possibly emanate from the barge grabbing sediment from sea and the drainage outfall near location F, and the diesel smell would likely come from the ships travelling and operating there. <div data-bbox="890 575 1235 1030" data-label="Image"> </div> <p>A sniffing member was collecting air sample at location F</p>
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The on-site measurement data and test results are summarized in Table 14 and 15 for the patrol sections and sampling sections respectively on 28 March 2011.

Table 14: Summarized on-site measurement data and laboratory test results for the odour patrol

Location	Time	H ₂ S (ppb)	OI	HT	Duration	Odour characteristics	Possible source
The first patrol section, 11:15 – 13:00							
P2	11:40	51 ,58, 58	1 to 2	-2	Continuous	Rotten-egg + sewage smell + engine exhausted gas smell	Emanated from the sea* + exhaust from barges
C	11:51	9, 34, 11	1	-2	Continuous	Rotten-egg + sewage smell + engine exhausted gas smell	Emanated from the sea* + exhaust from barges
D	12:02	7, 5, 7	1	-1	Continuous	Rotten-egg + sewage smell + engine exhausted gas smell	Emanated from the sea* + exhaust from barges
E	12:13	6, 5, 7	1	-1	Continuous	Rotten-egg + sewage smell + engine exhausted gas smell	Emanated from the sea* + exhaust from barges
F	12:24	8, 11, 10	1	-1 to -2	Continuous	Rotten-egg + sewage smell + diesel smell	Emanated from barge grabbing sediment and drainage outfall + diesel smell from ships
P3	12:35	<1, <1, <1	0 to 1	0	Continuous	Grass smell	Grass
The second patrol section, 16:00 – 17:15							
P2	16:18	11 ,11, 15	1	-2	Continuous	Rotten-egg + sewage smell	Emanated from the sea*
C	16:32	2900,3100, 2600	3 to 4	-3 to -4	Continuous	Rotten-egg + sewage smell	Emanated from the sea*
F	17:00	12, 15, 10	1	-1 to -2	Continuous	Rotten-egg + sewage smell	Emanated from the drainage outfall

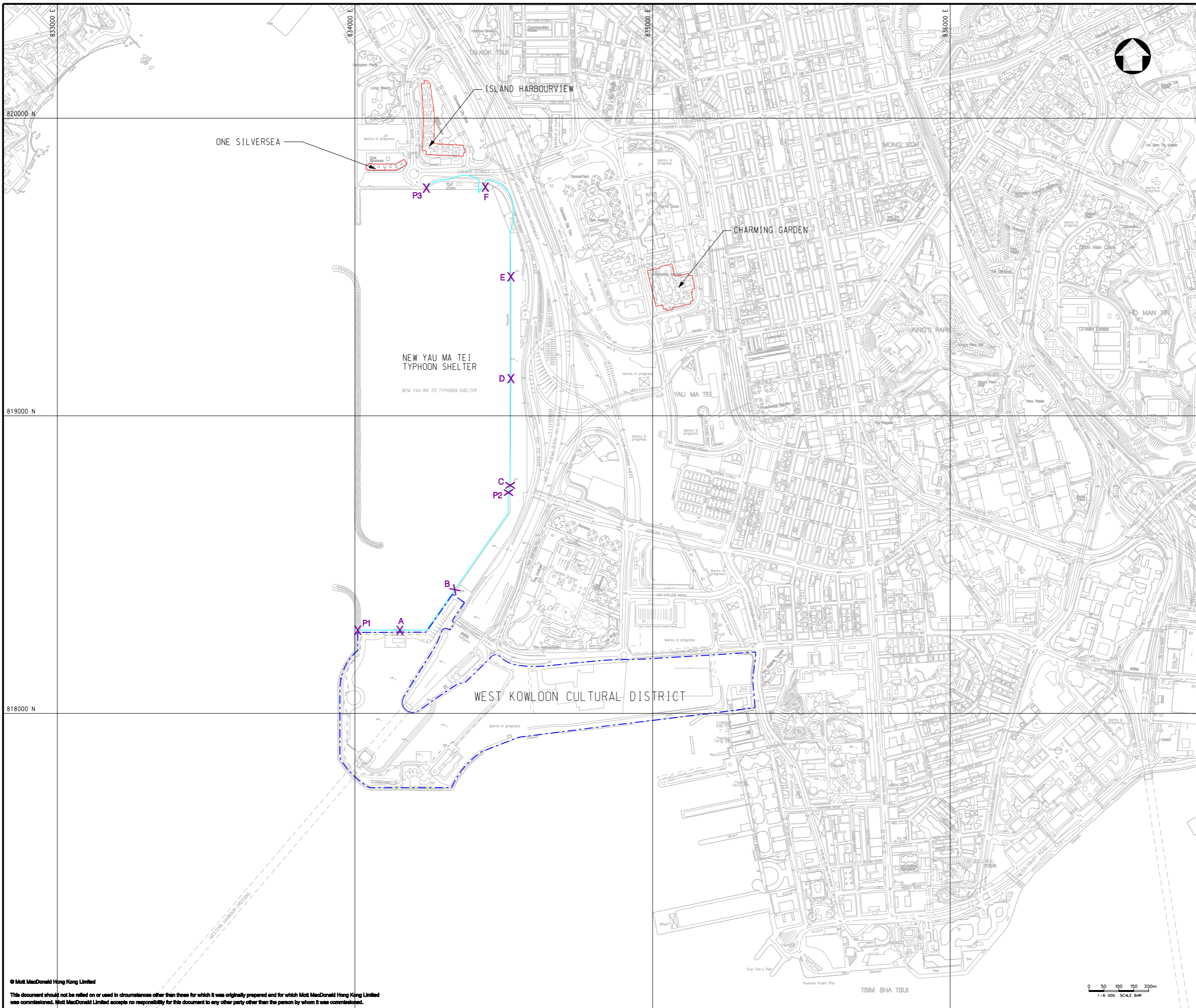
Remarks: AT = Ambient temperature; RH = Relative humidity; WS = Wind speed; WD = Wind direction; OI = Odour intensity; HT = Hedonic tone

*No source of sewage discharge was observed

Table 15: Summarized on-site measurement data and laboratory test results for the sampling section at 13:00 – 15:00 on 28 March 2011

Location	Time	AT (°C)	RH (%)	WS (m/s)	WD	H ₂ S (ppb)	OI	HT	OC (OU/m ³)	Duration	Odour characteristics	Possible source
A	13:07	26	38	0	Calm	<1, <1, <1	0	0	< 5	No odour perceived		
B	13:29	29	26	0	Calm	<1, <1, <1	0	0	< 5	No odour perceived		
C	14:13	28	36	0	Calm	3600,4100, 2800	3 to 4	-3 to -4	575	Continuous	Rotten-egg + sewage smell	Emanated from the sea (but no source of sewage discharge was observed)
D	14:31	27	36	0	Calm	5, 5, 5	0	0	< 5	No odour perceived		
F	14:48	27	34	0	Calm	11, 6, 8	1	-1	64	Continuous	Rotten-egg + sewage smell + diesel smell	Emanated from the barge grabbing sediment from sea and the drainage outfall + diesel smell from ships

Remarks: AT = Ambient temperature; RH = Relative humidity; WS = Wind speed; WD = Wind direction; OI = Odour intensity; HT = Hedonic tone; OC = Odour concentration



- LEGEND:**
- 500m ASSESSMENT AREA
 - PROJECT AREA
 - ODOUR PATROL ROUTE
 - ODOUR COMPLAINANT
 - X ODOUR PATROL POINT

P2	APR 11	MING	GENERAL REVISION	HC	AFK
P1	MAR 11	MING	FIRST ISSUE	EC	AFK
Rev	Date	Drawn	Description	Ch'kd	App'd

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 DONNELL | LD ASIA | BMT

Project
PROJECT CONSULTANCY STUDY FOR WEST KOWLOON CULTURAL DISTRICT DEVELOPMENT PLAN

Title
LOCATIONS OF ODOUR COMPLAINANTS AND ODOUR PATROL ROUTE

Designed	EC	Eng check	EC
Drawn	MING	Coordination	EC
Dwg check	EC	Approved	AFK
Scale at A1	Status	Rev	
1:6000	PRE	P2	
Drawing Number	FIGURE 1		

ANNEX A
CALIBRATION CERTIFICATION OF JEROME 631-X PORTABLE H₂S ANALYZER



**Hong Kong
Productivity Council**
香港生產力促進局

Environmental Management Division

Calibration record for Jerome 631-X portable H₂S analyzer

H₂S gas is used as calibration Gas

Calibration date	Person-in-charge	Concentration of calibration gas (ppm)	Meter reading (ppm)	P/F	Next calibration	Checked by
18 March 2011	Wo	0.500	0.499	P	March 2012	WJ

Remarks: The tolerance specification for the analyzer is $\pm 5\%$ (i.e. 0.475 – 0.525)

ANNEX B
SAFETY PRECAUTION AND CONTINGENCY PLAN FOR SAMPLING WORK

SAFETY PRECAUTION AND CONTINGENCY PLAN FOR SAMPLING WORK

1. INTRODUCTION

This section of the Site Health and Safety Plan (HASP) document defines general applicability and general responsibilities with respect to compliance with Health and Safety programs. It should be acknowledged that the employees of other consulting and contracted companies will work in accordance with their own independent Health and Safety Plans, provided that the minimum requirements of this plan are fulfilled. All personnel on site, contractors and subcontractors included, shall be informed of the site emergency response procedures and any potential fire, explosion, health, or safety hazards of the operation, protective measures planned for the site. This plan must be reviewed by all personnel prior to entering and conducting activities at the site.

2. PERSONNEL TRAINING REQUIREMENTS

Site personnel may be required to be trained in accordance with applicable work tasks to be conducted and instrumentation/equipment to be used. At a minimum, all personnel are required to be trained to recognize the hazards on-site, the provisions of this HASP, and the responsible personnel.

3. SAFETY AND HEALTH PROCEDURES

Safety and health procedures in the field include both preventive measures and steps to take during an emergency. If an injury or other health-related situation occurs, emergency medical assistance may be required. The following subsections of this HASP present safety and health procedures for specific conditions applicable to the sampling activities in addition to the hazard prevention procedures

3.1 Protective Clothing and Equipment

Protective clothing and equipment will be worn when work activities involve known or suspected biological, chemical or physical hazards.

Steel-toed safety footwear and hardhats should be worn when there is a risk of injury from falling objects/equipment. The level of protection provided by clothing and equipment may be upgraded or downgraded based upon a change in site conditions or findings of investigations. When a significant change occurs, the hazards should be reassessed.

In situations where the type of contaminant, concentration, and possibilities of contact are not known, the appropriate protective clothing and equipment must be selected based on professional experience and judgment until the hazards can be better identified.

3.2 Personal Hygiene Practices

The following personal hygiene practices are required during sampling:

- Do not eat, drink, or smoke during sampling.
- Wash hands thoroughly after sampling, before eating or drinking.
- Shower thoroughly as soon as possible after completion of work.
- Launder clothes after sampling.

3.3 Weather and Environmental Hazard Guidelines

Weather and environmental conditions can present a considerable challenge to conducting field activities in a safe manner. Sampling during adverse weather conditions (e.g., excessive heat or cold, storm events with precipitation, lightning, high winds) and where environmental hazards (e.g.,

poison ivy, biting insects, unstable slopes, falling tree limbs) are present requires an additional level of preparation, precaution and awareness.

- Monitor your surroundings for weather and physical environmental hazards.
- Never approach any wild animals, such as dog and snake.

- Be aware of the risks involved in exploring remote and non-designated trails. Sampling team should stay away from cliffs and avoid paths that may be extremely slippery or vulnerable to flooding after a heavy rain.
- Handle glassware with care to avoid cut hurt.
- Wear clothing that is appropriate for protection from the elements (e.g., hot and cold weather, direct sun exposures, wind, rain, hail) and also appropriate for protection from biological, chemical or physical hazards associated with the field activities to be conducted.
- Consider the appropriateness of using sunscreens or bug repellents in light of the potential for introducing contaminants from these substance into the samples. Often suitable clothing can provide adequate protection in lieu of these products.
- Have a readily available source of potable water for personal hydration, especially during hot weather conditions.
- Monitor team members for signs of heat exhaustion, heat stroke, or hypothermia.
- Take cover during thunder and lightning storms.
- Field sampling work should be stopped when No. 3 or above typhoon signal or red/black severe storm warning signal is in effect.
- Take extra precautions to avoid slipping or tripping during wet conditions.

4. CONTINGENCY PLAN

4.1 Emergency Procedures and Medical Assistance

If an injury occurs, take the following steps:

- Prevent further injury and notify the sampling team leader and/or other appropriate personnel.
- Initiate first aid and get medical attention for the injured person immediately
- Report to supervisor and phone 999 to police if necessary.

If an illness occurs, take the following steps:

- Cease or postpone sampling activities and inform supervisor.
- Seek medical attention.

4.2 Emergency Contact/Notification System

The following list provides names and telephone numbers for emergency contact personnel.

Mr. K.H.Ma (EMD) : 2788 5614

Mr. K.W.Fung (EMD): 2788 5607 (Mobile : 9237 1304)

ANNEX C
FIELD LOG SHEETS



Field Record log sheet

Project Name : Odour Assessment for West Kowloon Cultural District
 Client : Mott MacDonald Hong Kong Limited
 Sampling team : H. S. Fan Samson, (HS), K. W. Fung (KF), P. K. Wong (PK), S.T Yeung Sally (ST), K.W. Poon (KW)
 Sampling day : 28/03/2011



Parameters	Observations
Time	11:40
Location	f 818762 : 834515 P2
GPS location	818742 : 834515
The prevailing weather condition	Sunny
Temperature	/
Relative humidity	/
Wind direction	/
Wind Speed	/
Possible source of odour	Sediment + sewage in sea + loading machine
Peceived intensity of the odour (0 to 4)	HS: 1 ST: 2 KW: 2
Hedonic test (0 to -4)	HS: -2 KF: -2 PK: -2 ST: -2 KW: -2
Duration of odour	(continuous)
Characteristics of the odour	Rotten-egg + sewage smell + Exhausted gas smell
Any facility or activity will cause odour	loading
On-site H ₂ S measurement (ppm)	0.051 , 0.051 , 0.058
Sunny	f
Recorded by: (Name & Signature) <i>Yeung Suk Ting</i>	Checked by: (Name & Signature) <i>K.W. Poon</i>



Field Record log sheet

Project Name : Odour Assessment for West Kowloon Cultural District
 Client : Mott MacDonald Hong Kong Limited
 Sampling team : H. S. Fan Samson, (HS), K. W. Fung (KF), P. K. Wong (PK), S.T Yeung Sally (ST), K.W. Poon (KW)
 Sampling day : 28/03/2011

Parameters	Observations
Time	11:51
Location	C
GPS location	818766 : 834521
The prevailing weather condition	Sunny
Temperature	/
Relative humidity	/
Wind direction	/
Wind Speed	/
Possible source of odour	Sediment & sewage in sea + loading nearby
Perceived intensity of the odour (0 to 4)	HS: 1 ST: 1 KW: 1
Hedonic test (0 to -4)	HS: -2 KF: -2 PK: -2 ST: -2 KW: -2
Duration of odour	Continuous
Characteristics of the odour	Rotten-egg & sewage smell + exhausted gas smell
Any facility or activity will cause odour	loading
On-site H ₂ S measurement (ppm)	0.009, 0.034, 0.011

	
Recorded by: (Name & Signature) Yung Suk Ting	Checked by: (Name & Signature) Kung



Field Record log sheet

Project Name : Odour Assessment for West Kowloon Cultural District
 Client : Mott MacDonald Hong Kong Limited
 Sampling team : H. S. Fan Samson, (HS), K. W. Fung (KF), P. K. Wong (PK), S.T Yeung Sally (ST), K.W. Poon (KW)
 Sampling day : 28/03/2011

Parameters	Observations
Time	12:00
Location	D
GPS location	819126 : 834824
The prevailing weather condition	Sunny
Temperature	/
Relative humidity	/
Wind direction	/
Wind Speed	/
Possible source of odour	Sediment + sewage tank + cooling machine
Perceived intensity of the odour (0 to 4)	HS: 1 ST: 1 KW: 1
Hedonic test (0 to -4)	HS: -1 KF: -1 PK: -1 ST: -1 KW: -1
Duration of odour	Continuous
Characteristics of the odour	Rottn-egg + sewage smell + exhausted gas smell
Any facility or activity will cause odour	Cooling
On-site H ₂ S measurement (ppm)	0.007, 0.005, 0.007

Recorded by: (Name & Signature) Yung Suk Ting	Checked by: (Name & Signature) P. K. Wong



Field Record log sheet

Project Name : Odour Assessment for West Kowloon Cultural District
 Client : Mott MacDonald Hong Kong Limited
 Sampling team : H. S. Fan Samson, (HS), K. W. Fung (KF), P. K. Wong (PK), S.T Yeung Sally (ST), K.W. Poon (KW)
 Sampling day : 28/03/2011

Parameters	Observations
Time	12:13
Location	Food T
GPS location	819726 : 834524
The prevailing weather condition	Sunny
Temperature	/
Relative humidity	/
Wind direction	/
Wind Speed	/
Possible source of odour	Sediment + Sewage in street loading machine
Perceived intensity of the odour (0 to 4)	HS: 1 ST: 1 KW: 1
Hedonic test (0 to -4)	HS: -1 KF: -1 PK: -2 ST: -2 KW: -2
Duration of odour	Continuous
Characteristics of the odour	Rotten egg + sewage smell + Exhausted gas smell
Any facility or activity will cause odour	loading
On-site H ₂ S measurement (ppm)	0.006, 0.005, 0.007

Recorded by: (Name & Signature) Yung Suk Ting	Checked by: (Name & Signature) K.W. Poon



Field Record log sheet

Project Name : Odour Assessment for West Kowloon Cultural District
 Client : Mott MacDonald Hong Kong Limited
 Sampling team : H. S. Fan Samson, (HS), K. W. Fung (KF), P. K. Wong (PK), S.T Yeung Sally (ST), K.W. Poon (KW)
 Sampling day : 28/03/2011

Parameters	Observations
Time	12:24
Location	F
GPS location	819769 : 836438
The prevailing weather condition	Sunny
Temperature	/
Relative humidity	/
Wind direction	/
Wind Speed	/
Possible source of odour	sediment & sewage in sea & ship engine
Perceived intensity of the odour (0 to 4)	HS: 1 ST: 1 KW: 1
Hedonic test (0 to -4)	HS: -1 KF: -2 PK: -1 ST: -2 KW: -2
Duration of odour	Continuous
Characteristics of the odour	Rotten egg & sewage smell & diesel smell
Any facility or activity will cause odour	Harbour is gathering up sediment in sea & discharge point
On-site H ₂ S measurement (ppm)	0.008, 0.011, 0.010

Recorded by: (Name & Signature) Yung Sub Ty	Checked by: (Name & Signature) K.W. Poon



Field Record log sheet

Project Name : Odour Assessment for West Kowloon Cultural District
 Client : Mott MacDonald Hong Kong Limited
 Sampling team : H. S. Fan Samson, (HS), K. W. Fung (KF), P. K. Wong (PK), S.T Yeung Sally (ST), K.W. Poon (KW)
 Sampling day : 28/03/2011

Parameters	Observations
Time	12:35
Location	P3
GPS location	879706 : 834240
The prevailing weather condition	Sunny
Temperature	/
Relative humidity	/
Wind direction	/
Wind Speed	/
Possible source of odour	Grass
Perceived intensity of the odour (0 to 4)	HS: 0 ST: 0 KW: 1
Hedonic test (0 to -4)	HS: 0 KF: 0 PK: 0 ST: 0 KW: 0
Duration of odour	continuous
Characteristics of the odour	Grass smell
Any facility or activity will cause odour	/
On-site H ₂ S measurement (ppm)	0, 0, 0

Recorded by: (Name & Signature) <i>Yeung Subing</i>	Checked by: (Name & Signature) <i>K.W. Poon</i>



Field Record log sheet

Project Name : Odour Assessment for West Kowloon Cultural District
 Client : Mott MacDonald Hong Kong Limited
 Sampling team : H. S. Fan Samson, (HS), K. W. Fung (KF), P. K. Wong (PK), S.T Yeung Sally (ST), K.W. Poon (KW)
 Sampling day : 28/03/2011

Parameters	Observations
Time	13:20
Location	A
GPS location	818280 : 834151
The prevailing weather condition	Sunny
Temperature	26°C
Relative humidity	38%
Wind direction	/
Wind Speed	calm
Possible source of odour	/
Perceived intensity of the odour (0 to 4)	HS: 0 ST: 0 KW: 0
Hedonic test (0 to -4)	HS: 0 KF: 0 PK: 0 ST: 0 KW: 0
Duration of odour	/
Characteristics of the odour	/
Any facility or activity will cause odour	/
On-site H ₂ S measurement (ppm)	0, 0, 0

Recorded by: (Name & Signature) <i>Yeung Suk Ting</i>	Checked by: (Name & Signature) <i>P. K. Wong</i>



Field Record log sheet

Project Name : Odour Assessment for West Kowloon Cultural District
 Client : Mott MacDonald Hong Kong Limited
 Sampling team : H. S. Fan Samson, (HS), K. W. Fung (KF), P. K. Wong (PK), S.T Yeung Sally (ST), K.W. Poon (KW)
 Sampling day : 28/03/2011

Parameters	Observations
Time	13:29
Location	B
GPS location	D18416 : 834335
The prevailing weather condition	Sunny
Temperature	29°C
Relative humidity	26%
Wind direction	/
Wind Speed	calm
Possible source of odour	/
Perceived intensity of the odour (0 to 4)	HS: 0 ST: 0 KW: 0
Hedonic test (0 to -4)	HS: 0 KF: 0 PK: 0 ST: 0 KW: 0
Duration of odour	/
Characteristics of the odour	/
Any facility or activity will cause odour	/
On-site H ₂ S measurement (ppm)	0, 0, 10

<i>Sunny</i>	<i>f</i>
Recorded by: (Name & Signature) <i>Yeung Suk Ting</i>	Checked by: (Name & Signature) <i>K.W. Poon</i>



Field Record log sheet

Project Name : Odour Assessment for West Kowloon Cultural District
 Client : Mott MacDonald Hong Kong Limited
 Sampling team : H. S. Fan Samson, (HS), K. W. Fung (KF), P. K. Wong (PK), S.T Yeung Sally (ST), K.W. Poon (KW)
 Sampling day : 28/03/2011

Parameters	Observations
Time	14:13
Location	C
GPS location	818766 : 8365v1
The prevailing weather condition	Sunny
Temperature	21°C
Relative humidity	26%
Wind direction	/
Wind Speed	calm
Possible source of odour	Sediment + sewage in sea
Perceived intensity of the odour (0 to 4)	HS: 4 ST: 3 KW: 3
Hedonic test (0 to -4)	HS: -4 KF: -4 PK: -3 ST: -3 KW: -3
Duration of odour	continuous
Characteristics of the odour	rotten egg + sewage smell
Any facility or activity will cause odour	/
On-site H ₂ S measurement (ppm)	3.6, 4.1, 2.8

Sunny	f
Recorded by: (Name & Signature) <i>Yeung Suk Ting</i>	Checked by: (Name & Signature) <i>K.W. Poon</i>



Field Record log sheet

Project Name : Odour Assessment for West Kowloon Cultural District
 Client : Mott MacDonald Hong Kong Limited
 Sampling team : H. S. Fan Samson, (HS), K. W. Fung (KF), P. K. Wong (PK), S.T Yeung Sally (ST), K.W. Poon (KW)
 Sampling day : 28/03/2011

Parameters	Observations
Time	14:31
Location	D
GPS location	819126 : 834524
The prevailing weather condition	Sunny
Temperature	27°C
Relative humidity	36%
Wind direction	/
Wind Speed	calm
Possible source of odour	/
Perceived intensity of the odour (0 to 4)	HS: 0 ST: 0 KW: 0
Hedonic test (0 to -4)	HS: 0 KF: 0 PK: 0 ST: 0 KW: 0
Duration of odour	/
Characteristics of the odour	/
Any facility or activity will cause odour	/
On-site H ₂ S measurement (ppm)	0.005 0.005 0.005

Sunny	f
Recorded by: (Name & Signature) <i>Yenny Suk Ting</i>	Checked by: (Name & Signature) <i>K.W. Poon</i>



Field Record log sheet

Project Name : Odour Assessment for West Kowloon Cultural District
 Client : Mott MacDonald Hong Kong Limited
 Sampling team : H. S. Fan Samson, (HS), K. W. Fung (KF), P. K. Wong (PK), S.T Yeung Sally (ST), K.W. Poon (KW)
 Sampling day : 28/03/2011

Parameters	Observations
Time	14:48
Location	F
GPS location	819789 : 136438
The prevailing weather condition	Sunny
Temperature	27°C
Relative humidity	34%
Wind direction	—
Wind Speed	calm
Possible source of odour	Sediment + sewage in sea + ship engine
Perceived intensity of the odour (0 to 4)	HS: 1 ST: 1 KW: 1
Hedonic test (0 to -4)	HS: -1 KF: -1 PK: -1 ST: -1 KW: -1
Duration of odour	Continuous
Characteristics of the odour	Rotten egg + sewage smell + diesel smell
Any facility or activity will cause odour	A dredger was gathering up bottom sediment
On-site H ₂ S measurement (ppm)	0.011, 0.006, 0.008 0.011

Discharge point



Sunny	f
Recorded by: (Name & Signature) <i>Yeung Suk Ting</i>	Checked by: (Name & Signature) <i>K. W. Poon</i>



Field Record log sheet

Project Name : Odour Assessment for West Kowloon Cultural District
 Client : Mott MacDonald Hong Kong Limited
 Sampling team : H. S. Fan Samson, (HS), K. W. Fung (KF), P. K. Wong (PK), S.T Yeung Sally (ST), K.W. Poon (KW)
 Sampling day : 28/03/2011

Parameters	Observations
Time	16:18
Location	P2
GPS location	D11742: 834575
The prevailing weather condition	Sunny
Temperature	/
Relative humidity	/
Wind direction	/
Wind Speed	/
Possible source of odour	Sediment + Sewage in sea
Perceived intensity of the odour (0 to 4)	HS: 1 ST: 1 KW: 1
Hedonic test (0 to -4)	HS: -2 KF: -2 PK: -2 ST: -2 KW: -2
Duration of odour	Continuous
Characteristics of the odour	rotten-egg + sewage smell
Any facility or activity will cause odour	/
On-site H ₂ S measurement (ppm)	0.011, 0.011, 0.015

	
Recorded by: (Name & Signature) Yung Suk Ting	Checked by: (Name & Signature) K.W. Poon



Field Record log sheet

Project Name : Odour Assessment for West Kowloon Cultural District
 Client : Mott MacDonald Hong Kong Limited
 Sampling team : H. S. Fan Samson, (HS), K. W. Fung (KF), P. K. Wong (PK), S.T Yeung Sally (ST), K.W. Poon (KW)
 Sampling day : 28/03/2011

Parameters	Observations
Time	16:30
Location	C
GPS location	818766 : 834521
The prevailing weather condition	Sunny
Temperature	/
Relative humidity	/
Wind direction	/
Wind Speed	/
Possible source of odour	Sediment + sewage in sea
Perceived intensity of the odour (0 to 4)	HS: 4 ST: 3 KW: 3
Hedonic test (0 to -4)	HS: -4 KF: -3 PK: -4 ST: -3 KW: -3
Duration of odour	continuous
Characteristics of the odour	Rotten-egg + sewage smell
Any facility or activity will cause odour	/
On-site H ₂ S measurement (ppm)	2.9, 3.1, 2.6

Sunny	f
Recorded by: (Name & Signature) <i>Yeung Suk Ting</i>	Checked by: (Name & Signature) <i>K.W. Poon</i>



Field Record log sheet

Project Name : Odour Assessment for West Kowloon Cultural District
 Client : Mott MacDonald Hong Kong Limited
 Sampling team : H. S. Fan Samson, (HS), K. W. Fung (KF), P. K. Wong (PK), S.T Yeung Sally (ST), K.W. Poon (KW)
 Sampling day : 28/03/2011

Parameters	Observations
Time	17:00
Location	F
GPS location	118709 : 134438
The prevailing weather condition	Sunny
Temperature	/
Relative humidity	/
Wind direction	/
Wind Speed	/
Possible source of odour	sediment - sewage in sea + ship engine
Perceived intensity of the odour (0 to 4)	HS: 1 ST: 1 KW: 1
Hedonic test (0 to -4)	HS: -1 KF: -1 PK: -1 ST: -2 KW: -2
Duration of odour	continuous
Characteristics of the odour	rotten-egg + sewage smell + diesel smell
Any facility or activity will cause odour	/
On-site H ₂ S measurement (ppm)	0.012, 0.015, 0.010

Sunny	f
Recorded by: (Name & Signature) <i>Yeung Salsy</i>	Checked by: (Name & Signature) <i>K.W. Poon</i>

ANNEX D
RECORDS OF CERTIFIED PANELIST FOR THE STUDY

Name panelist: **Fung Kam Wing**

Reference material: **60.00** ppm n-Butanol in nitrogen

Date	Odour concentration OU _E / m ³	ppb V/V	log ppb V/V	n-Butanol μmol/mol (ppm)
11/6/2009	724	82.9	1.9184	60.00
12/6/2009	724	82.9	1.9184	60.00
12/6/2009	1448	41.4	1.6174	60.00
12/6/2009	1448	41.4	1.6174	60.00
20/8/2009	724	82.9	1.9184	60.00
20/8/2009	724	82.9	1.9184	60.00
18/12/2009	724	82.9	1.9184	60.00
29/1/2010	2896	20.7	1.3164	60.00
29/1/2010	1448	41.4	1.6174	60.00
29/1/2010	724	82.9	1.9184	60.00
29/1/2010	1448	41.4	1.6174	60.00
12/2/2010	1448	41.4	1.6174	60.00
19/2/2010	724	82.9	1.9184	60.00
24/2/2010	1448	41.4	1.6174	60.00
1/3/2010	1448	41.4	1.6174	60.00
3/3/2010	1448	41.4	1.6174	60.00
3/3/2010	1448	41.4	1.6174	60.00
3/3/2010	1448	41.4	1.6174	60.00
3/3/2010	1448	41.4	1.6174	60.00
3/3/2010	2896	20.7	1.3164	60.00
13/7/2010	1448	41.4	1.6174	60.00
29/9/2010	724	82.9	1.9184	60.00
29/9/2010	1448	41.4	1.6174	60.00
12/10/2010	1448	41.4	1.6174	60.00
18/10/2010	724	82.9	1.9184	60.00
10/11/2010	724	82.9	1.9184	60.00
19/11/2010	724	82.9	1.9184	60.00
18/1/2011	724	82.9	1.9184	60.00
4/3/2011	724	82.9	1.9184	60.00
8/3/2011	1448	41.4	1.6174	60.00
11/3/2011	1448	41.4	1.6174	60.00
15/3/2011	724	82.9	1.9184	60.00
		#DIV/0!	#DIV/0!	60.00

standard dev. s_{ITE} 0.1833
mean value \bar{y}_{ITE} 1.7303

repeatability requirement		$10^{s_{ITE}} \leq 2.3$
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accuracy requirement		$20 \leq 10^{y_{ITE}} \leq 80$
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repeatability	1.525	$10^{s_{ITE}}$	Pass
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accuracy	53.74	$10^{y_{ITE}}$	Pass
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Wing

Name panelist: Poon Ka Wo

Reference material: 60.00 ppm n-Butanol in nitrogen

Date	Odour concentration OU _E / m ³	ppb V/V	log ppb V/V	n-Butanol μmol/mol (ppm)
12/6/2009	1448	41.4	1.6174	60.00
12/6/2009	1448	41.4	1.6174	60.00
12/6/2009	1448	41.4	1.6174	60.00
14/8/2009	724	82.9	1.9184	60.00
14/8/2009	1448	41.4	1.6174	60.00
18/8/2009	2896	20.7	1.3164	60.00
18/8/2009	1448	41.4	1.6174	60.00
18/8/2009	2896	20.7	1.3164	60.00
18/8/2009	2896	20.7	1.3164	60.00
20/8/2009	1448	41.4	1.6174	60.00
20/8/2009	1448	41.4	1.6174	60.00
3/9/2009	1448	41.4	1.6174	60.00
3/9/2009	1448	41.4	1.6174	60.00
3/9/2009	1448	41.4	1.6174	60.00
9/9/2009	1448	41.4	1.6174	60.00
9/9/2009	724	82.9	1.9184	60.00
18/12/2009	724	82.9	1.9184	60.00
15/2/2010	1448	41.4	1.6174	60.00
19/2/2010	724	82.9	1.9184	60.00
22/2/2010	724	82.9	1.9184	60.00
26/2/2010	1448	41.4	1.6174	60.00
3/3/2010	1448	41.4	1.6174	60.00
3/3/2010	1448	41.4	1.6174	60.00
3/3/2010	1448	41.4	1.6174	60.00
3/3/2010	1448	41.4	1.6174	60.00
3/3/2010	2896	20.7	1.3164	60.00
13/7/2010	1448	41.4	1.6174	60.00
29/9/2010	724	82.9	1.9184	60.00
29/9/2010	1448	41.4	1.6174	60.00
12/10/2010	1448	41.4	1.6174	60.00
18/10/2010	1448	41.4	1.6174	60.00
10/11/2010	724	82.9	1.9184	60.00
19/11/2010	724	82.9	1.9184	60.00
18/1/2011	724	82.9	1.9184	60.00
		#DIV/0!	#DIV/0!	60.00
		#DIV/0!	#DIV/0!	60.00

standard dev. S_{ITE} 0.1835
mean value Y_{ITE} 1.6617

repeatability requirement		$10^{S_{ITE}} \leq 2.3$
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accuracy requirement		$20 \leq 10^{Y_{ITE}} \leq 80$
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repeatability	1.526	$10^{S_{ITE}}$	Pass
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accuracy	45.88	$10^{Y_{ITE}}$	Pass
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Wo

Name panelist: **Yeung Suk Ting Sally**

Reference material: **60.00** ppm n-Butanol in nitrogen

Date	Odour concentration OU _E / m ³	ppb V/V	log ppb V/V	n-Butanol μmol/mol (ppm)
12/8/2009	1448	41.4	1.6174	60.00
14/8/2009	724	82.9	1.9184	60.00
14/8/2009	2896	20.7	1.3164	60.00
20/8/2009	1448	41.4	1.6174	60.00
20/8/2009	724	82.9	1.9184	60.00
18/12/2009	724	82.9	1.9184	60.00
20/1/2010	1448	41.4	1.6174	60.00
29/1/2010	2896	20.7	1.3164	60.00
29/1/2010	2896	20.7	1.3164	60.00
29/1/2010	724	82.9	1.9184	60.00
29/1/2010	1448	41.4	1.6174	60.00
15/2/2010	724	82.9	1.9184	60.00
17/2/2010	2896	20.7	1.3164	60.00
22/2/2010	1448	41.4	1.6174	60.00
24/2/2010	1448	41.4	1.6174	60.00
26/2/2010	1448	41.4	1.6174	60.00
3/3/2010	724	82.9	1.9184	60.00
3/3/2010	1448	41.4	1.6174	60.00
3/3/2010	1448	41.4	1.6174	60.00
3/3/2010	1448	41.4	1.6174	60.00
3/3/2010	2896	20.7	1.3164	60.00
13/7/2010	1448	41.4	1.6174	60.00
29/9/2010	724	82.9	1.9184	60.00
29/9/2010	1448	41.4	1.6174	60.00
12/10/2010	724	82.9	1.9184	60.00
18/10/2010	724	82.9	1.9184	60.00
10/11/2010	724	82.9	1.9184	60.00
19/11/2010	724	82.9	1.9184	60.00
18/1/2011	724	82.9	1.9184	60.00
4/3/2011	1448	41.4	1.6174	60.00
8/3/2011	1448	41.4	1.6174	60.00
11/3/2011	1448	41.4	1.6174	60.00
15/3/2011	724	82.9	1.9184	60.00
		#DIV/0!	#DIV/0!	60.00
		#DIV/0!	#DIV/0!	60.00

standard dev. s_{ITE} 0.2133
mean value \bar{y}_{ITE} 1.6904

repeatability requirement		$10^{s_{ITE}} \leq 2.3$
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accuracy requirement		$20 \leq 10^{y_{ITE}} \leq 80$
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repeatability	1.634	$10^{s_{ITE}}$	Pass
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accuracy	49.02	$10^{y_{ITE}}$	Pass
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Sally

Name panelist: **PKWong**

Reference material: **60.00** ppm n-Butanol in nitrogen

Date	Odour concentration OU _E / m ³	ppb V/V	log ppb V/V	n-Butanol μmol/mol (ppm)
15/2/2010	724	82.9	1.9184	60.00
17/2/2010	1448	41.4	1.6174	60.00
19/2/2010	1448	41.4	1.6174	60.00
22/2/2010	724	82.9	1.9184	60.00
24/2/2010	1448	41.4	1.6174	60.00
26/2/2010	724	82.9	1.9184	60.00
1/3/2010	1448	41.4	1.6174	60.00
3/3/2010	1448	41.4	1.6174	60.00
3/3/2010	1448	41.4	1.6174	60.00
3/3/2010	1448	41.4	1.6174	60.00
13/7/2010	1448	41.4	1.6174	60.00
29/9/2010	724	82.9	1.9184	60.00
29/9/2010	1448	41.4	1.6174	60.00
12/10/2010	724	82.9	1.9184	60.00
18/10/2010	1448	41.4	1.6174	60.00
10/11/2010	724	82.9	1.9184	60.00
19/11/2010	724	82.9	1.9184	60.00
18/1/2011	1448	41.4	1.6174	60.00
4/3/2011	1448	41.4	1.6174	60.00
8/3/2011	1448	41.4	1.6174	60.00
11/3/2011	1448	41.4	1.6174	60.00
15/3/2011	724	82.9	1.9184	60.00
		#DIV/0!	#DIV/0!	60.00
		#DIV/0!	#DIV/0!	60.00
		#DIV/0!	#DIV/0!	60.00
		#DIV/0!	#DIV/0!	60.00

standard dev. S_{ITE} 0.1482
 mean value Y_{ITE} 1.7268

repeatability requirement		$10^{S_{ITE}} \leq$	2.3
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accuracy requirement		$20 \leq 10^{Y_{ITE}} \leq$	80
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repeatability	1.407	$10^{S_{ITE}}$	Pass
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accuracy	53.31	$10^{Y_{ITE}}$	Pass
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PKWong

Name panelist: Samson Fan

Reference material: 60.00 ppm n-Butanol in nitrogen

Date	Odour concentration OU _E / m ³	ppb V/V	log ppb V/V	n-Butanol μmol/mol (ppm)
18/8/2010	724	82.9	1.9184	60.00
18/8/2010	724	82.9	1.9184	60.00
18/8/2010	2896	20.7	1.3164	60.00
18/8/2010	1448	41.4	1.6174	60.00
20/8/2010	1448	41.4	1.6174	60.00
20/8/2010	724	82.9	1.9184	60.00
20/8/2010	1448	41.4	1.6174	60.00
1/9/2010	724	82.9	1.9184	60.00
1/9/2010	724	82.9	1.9184	60.00
1/9/2010	724	82.9	1.9184	60.00
3/9/2010	724	82.9	1.9184	60.00
3/9/2010	1448	41.4	1.6174	60.00
3/9/2010	1448	41.4	1.6174	60.00
4/3/2011	1448	41.4	1.6174	60.00
8/3/2011	1448	41.4	1.6174	60.00
11/3/2011	1448	41.4	1.6174	60.00
15/3/2011	724	82.9	1.9184	60.00
		#DIV/0!	#DIV/0!	60.00
		#DIV/0!	#DIV/0!	60.00
		#DIV/0!	#DIV/0!	60.00

standard dev. S_{ITE} 0.1861
 mean value Y_{ITE} 1.7413

repeatability requirement		$10^{S_{ITE}} \leq 2.3$
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accuracy requirement		$20 \leq 10^{Y_{ITE}} \leq 80$
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repeatability	1.535	$10^{S_{ITE}}$	Pass
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accuracy	55.12	$10^{Y_{ITE}}$	Pass
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