Stanger Asia

QUARTERLY

ENVIRONMENTAL MONITORING AND AUDIT REPORT

FOR

CONTRACT No. CV/2002/13

FILL BANK AT TUEN MUN AREA 38

JANUARY TO MARCH 2004

(Revision No. 0)

Report No.: ET12071

Certified by: _____ Date: 15/04/2004

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EXECUTIVE SUMMARY.

This is the 3rd Quarterly Environmental Monitoring and Audit (EM&A) report for Contract No. CV/2002/13 – Fill Bank at Tuen Mun Area 38. The site has been in operation as a public filling area as part of the overall reclamation works. The site is 24 hours operated except during the Chinese New Year holidays to provide a stable outlet for public fill to serve the construction industry. This report covers the monitoring works conducted from January to March 2004.

Construction Activities for the Reported Period.

- Public filling operation.
- Modification and operation of tipping hall.
- Construction of Engineer's Principal Site Office and queuing area.
- Construction of replacement weighbridge at WP3.
- Hydroseeding to slope surface.

Air Quality Monitoring.

Two stations (A1 and A2) have been identified as the locations for the monitoring of 24-hour and 1-hour Total Suspended Particulates (TSP). The Monitoring of 24-hour TSP was carried out on sixteen occasions at A1 and on seventeen occasions at A2. Monitoring of 1-hour TSP was carried out on forty-eight occasions at A1 and on fifty-one occasions at A2. There was no exceedance to the set Action and Limit levels for both parameters at A1. Eleven non-compliances to the 1-hour TSP with six to Action and five to Limit Level and four non-compliances to the 24-hour TSP with two to Action and two to Limit Level were recorded at A2 during the reporting period. The non-compliances were attributed to the new haul road built in the vicinity of the monitoring station which causes increased vehicular activities at that area. The Contractor has increased the frequency of water spraying to keep dust generation to minimum.

Water Quality Monitoring.

Water quality in terms of turbidity, dissolved oxygen, suspended solids, temperature, and salinity, was carried out on thirty-seven occasions at FM1, FM2, FC1 and FC2. There were two limit level exceedances to the depth-averaged turbidity and two limit level exceedances to the depth-averaged suspended solids during the reporting period. Fill materials were being transferred from barges when exceedances were detected. However, no discharge from the Fill Bank was observed. Therefore, these exceedances may possibly due to materials lost into the sea during transferral or discharge from nearby shoreline and outfall. The Contractor was recommended to implement all necessary measures to avoid threatening the water quality.

Landscape Audit

Slope surfaces were being hydroseeded during this reporting period. Lighting was sit to minimize night-time glare.

Waste Management.

564,000m^3 public fill was collected to stockpiling area. 82.23t C&D waste and general refuse were disposed of at WENT Landfill. Chemical waste generated was stored in temporary storage area.

Complaints and Notifications of Summonses and Successful Prosecutions.

One complaint was received on 7th February 2004. A road user complained about the cleanliness of the section of Lung Mun Road in the vicinity of the Fill Bank. The situation was rectified by the Contractor.

Site Inspections.

Thirteen weekly site inspections were carried out by the Environmental Team (ET) in this reporting period. Three audits by the Independent Environmental Checker (IEC) were carried out in this reporting period. The major observations, action by the Contractor and the environmental outcomes are summarised in the Section 7 of this report.

1. INTRODUCTION.

1.1 Background.

Stanger Asia Ltd. has been commissioned by the Penta-Ocean Construction Co. Ltd. to provide an Environmental Team (ET) to monitor air and water quality and audit landscape works for Contract No.CV/2002/13. The team is to take a pro-active role in all issues, which may be of environmental concern during the establishment, operation and decommissioning phases of the Fill Bank at Tuen Mun Area 38.

The Independent Environmental Checker (IEC) appointed for this project is Materialab Consultants Ltd.

In this report, the air and water quality monitoring works and landscape audit conducted from January to March 2004 will be detailed and reviewed. All monitoring works were carried in accordance to "*Agreement No, PW 01/2002 Project Profile for Fill Bank at Tuen Mun Area 38, Environmental Monitoring and Audit Manual"*.

1.2 Report Structure.

The purpose of this report is to detail and review the air and water quality monitoring works and landscape audit undertaken from January to March 2004.

The report follows the format given below:

Section 1	Introduction and background information to the content of this report.
Section 2	This section gives the information of the project.
Section 3	This section summarises all the environmental permits and licenses.
Section 4	Summary of the EM&A requirements is presented.
Section 5	This section details the implemented mitigation measures.
Section 6	Details monitoring results.
Section 7	The site environmental audits are summarized in this section.
Section 8	The status for solid and liquid waste management for the site is overviewed.
Section 9	Complaints, notifications of summons and successful prosecutions are summarized.
Section 10	This section gives a conclusion in relation to all monitoring activities.

2. PROJECT INFORMATION.

2.1 Site Description.

The works mainly comprise the construction of temporary storm water system, setting up of C&D material loading/unloading facilities, setting up/ refurnishing site facilities, stockpiling of 4.9 million m^3 of public fill, and decommissioning of the temporary fill bank.

The site layout plan is shown in Figure 2.1.

2.2 Project Organization.

Mr. L.M. Chan is the Engineer's Representative for the Civil Engineering Department, Government of the HKSAR. (Tel: 2762 5602, Fax: 2714 0113).

The Independent Environmental Checker (IEC) for this project is headed by Mr. Joseph Poon - Manager of Materialab Consultants Ltd. (Tel: 2450 8238, Fax: 2450 6138).

Mr. Lok Wah Fung is the Site Agent for Penta-Ocean Construction Co., Ltd. (Tel: 2491 1584, Fax: 2496 0433).

The Environmental Team (ET) for the project is Stanger Asia Ltd. The team is headed by Mr Chris Shenfield – Senior Environmental Scientist. (Tel: 2682 1203, Fax: 2682 0046).

The Organization Chart with the key personnel contacts names and telephone numbers is given in Appendix I.

2.3 Construction Programme.

The overall construction programme is given in Appendix VI. Details of the construction activities are listed below.

- Site clearance;
- Construction of storm water drainage system;
- Stockpiling of 4.9 million m^3 of public fill;
- Construction of landscape works; and
- Removal of stockpiled public fill.

3. ENVIRONMENTAL PERMITS AND LICENSES.

The summary of the status of all environmental permits, licenses and notification for this project as at March 2004 is summarized in the following table.

Table 3.1 Summary of the Environmental Permits and Licenses

Description	Licence/Permit No.	Date of Issue	Date of Expiry	Status
Environmental Permit	EP-153/2003	13-Feb-03	--	Superseded
Registration of Chemical Waste Producer	WPN5296-421-P2800-03	05-Aug-03	--	Issued
Amended Environmental Permit	EP-153/2003/A	30-Oct-03	--	Issued
Construction Noise Permit	GW-TW0385-03	10-Nov-03	14-May-04	Issued

4. SUMMARY OF EM&A REQUIREMENTS.

4.1 Air Quality.

Monitoring Location.

The project has two designated locations (A1 & A2) for the monitoring of air quality. A1 is a fixed location in the vicinity of the site office to monitoring the TSP levels at River Trade Terminal and A2 is a movable location to the western boundary of the site that is designed to move as works progress. The air monitoring locations are shown in Figure 4.1.

Table 4.1 Coordinates of Air Quality Monitoring Stations

Station	HK Metric Grid – Easting	HK Metric Grid - Northing
A1	811368	825593
A2	811126*	825132*

** - Coordinates of present location.*

Methodology

Measurement of 24-hour and 1-hour TSP levels were carried out in accordance to the high volume sampling method as set out in the Title 40 of the Code of Federal Regulations, Chapter 1 (Part 50). The high volume samplers are calibrated at bi-monthly intervals. The calibration kit (Anderson Model G2535) comprising pressure plates and a transfer standard is traceable to the internationally recognized standard.

Laboratory Measurement.

Laboratory measurements were carried out in Stanger Asia Ltd. own HOKLAS accredited laboratory with constant temperature and humidity control, and equipped with necessary measuring and conditioning instruments.

Monitoring Parameters Frequency.

Table 4.2 Air Quality Monitoring Frequency

Monitoring Locations	Parameter	Frequency
A1 & A2	24-hr TSP	Once in every six days
	1-hr TSP	Three times in every six days

Action and Limit Levels.

The Action levels for air quality monitoring were established from the impact monitoring data of Contract No. CV/2000/01 prior to the commencement of the fill bank utilising the criteria laid out in *section 4.7* of the EM&A Manual for the project. The Limit levels for air quality monitoring has been set in line with statutory guidelines for air quality in Hong Kong. Action and Limit levels for both 24-hour and 1-hour TSP are given in the following table.

Table 4.3 Action and Limit Levels for Air Quality

Parameter Monitored	Action Level, $\mu g/m^3$	Limit Level, $\mu g/m^3$
1-hour TSP	344	500
24-hour TSP	192	260

4.2 Water Quality.

Monitoring Locations.

The EM&A Manual produced for this project has proposed two monitoring stations (FM1 & FM2) and two control stations (FC1 & FC2) for the carrying out of water quality monitoring. Control Station FC1 will act as upstream control station for the mid-ebb tide with control station FC2 acting as upstream control stations for the mid-flood tide.

The designated monitoring stations are shown in Figure 4.2.

Methodology.

Measurements are taken at three water depths, namely 1m below water surface, mid-water and 1m above seabed at both mid-flood and mid-ebb tides. Replicates samples and measurements of turbidity, dissolved oxygen (mg/L), dissolved oxygen (% saturation) and temperature at each depth of each station are taken. Suspended solids shall be determined in the laboratory. For the purpose of evaluating the water quality, all values for suspended solids and turbidity shall be depth-averaged. All on-site monitoring equipment was calibrated three-monthly at Stanger Asia's HOKLAS accredited laboratory.

Laboratory Analysis (Fill Bank Project).

The laboratory measurements of suspended solids were carried out at Stanger Asia Limited, a HOKLAS accredited laboratory in accordance with Method No. 2540D 17th Edition of APHA.

Stanger Asia operates a comprehensive quality assurance and quality control programmes for QA/AC procedures in accordance with the requirements of HOKLAS accreditation, all filters were equilibrated and weighted repeatedly until the difference of two consecutive results is less than 0.5 mg.

Monitoring Parameters and Frequency.

Table 4.4 Water Quality Monitoring Frequency

Monitoring Locations	Monitoring Parameters	Frequency	Requirements
Designated Control Stations: FC1 & FC2. Designated Monitoring Stations: FM1 & FM2.	Dissolved Oxygen, Salinity, Suspended Solids, Temperature and Turbidity.	Three days per week.	At three depths during mid-ebb and mid-flood tides.

Action and Limit Levels.

The Action and Limit levels for water quality monitoring were established from the impact monitoring data of Contract No. CV/2000/01 prior to the commencement of the fill bank utilising the criteria laid out in *section 6.8* of the EM&A Manual for the project.

Table 4.5 Action and Limit Level for Water Quality

Parameter	Action level	Limit level
Dissolved Oxygen in mg/L. Surface & Middle Bottom.	 <4.78mg/L <4.16mg/L	 <4mg/L <2mg/L
Suspended Solids (SS) in mg/L (depth-averaged)	>120% of upstream control station's SS at the same time of the same day.	>130% of upstream control station's SS at the same tide of the same day .
Turbidity (Tby) in NTU	>120% of upstream control station's Tby at the same tide of the same day.	>130% of upstream control station's Tby at the same tide of the same day.

All the figures given in the table are used for reference only and the EPD may amend the figures whenever necessary.

4.3 Event and Action Plans.

The Event and Action Plans for air and water are attached in Appendix II of this report.

5. IMPLEMENTATION STATUS OF ENVIRONMENTAL MITIGATION MEASURES.

The contractor implemented various environmental mitigation measures as recommended in the Project Profile and Environmental Permit. The implementation status is attached in Appendix III.

6. MONITORING RESULTS.

6.1 Air Quality Monitoring.

Monitoring of 24-hour and 1-hour TSP is summarized in the following tables. The results are present graphically in Figures 6.1 and 6.2.

Table 6.1 Results of 24-hour TSP Monitoring Data

Location	Number of Monitoring	Number of Exceedance	
		Action Level	Limit Level
A1	16	0	0
A2	17	2	2
Action Level	192 $\mu g/m^3$		
Limit Level	260 $\mu g/m^3$		

Table 6.2 Results of 1-hour TSP Monitoring Data

Location	No. of Monitoring	No. of Exceedance	
		Action Level	Limit Level
A1	48	0	0
A2	51	6	5
Action Level	344 $\mu g/m^3$		
Limit Level	500 $\mu g/m^3$		

All non-compliances were attributed to the new haul road built in the vicinity of the monitoring station which causes increased vehicular activities at that area. The Contractor has increased the frequency of water spraying to keep dust generation to minimum.

6.2 Water Quality Monitoring.

Water quality in terms of turbidity, dissolved oxygen and suspended solids was conducted at FM1, FM2, FC1 and FC2 at a frequency of three days per week, at mid-flood and mid-ebb tides. Results for water quality monitoring are summarised in the following table. Graphical presentations of the results are shown in Figure 6.3 – Figure 6.10.

Table 6.3 Summary of Water Quality Monitoring Data

Parameter	Number of Occasions Monitored	Exceedance Level		Total
		Action	Limit	
Surface & Middle Dissolved Oxygen	148	0	0	0
Bottom Dissolved Oxygen	148	0	0	0
Turbidity	148	0	2	2
Suspended Solids	148	0	2	2
Total	592	0	4	4

There were two limit level exceedances to the depth-averaged turbidity and two limit level exceedances to the depth-averaged suspended solids during the reporting period. Fill materials were being transferred from barges when exceedances were detected. However, no discharge from the Fill Bank was observed. Therefore, these exceedances may possibly due to materials lost into the sea during transferral or discharge from nearby shoreline and outfall.

The IEC, ER, and contractor were notified about these non-compliances. The Contractor was recommended to implement all necessary measures to avoid threatening the water quality.

Quarterly Assessment of Impacts from Construction Activities

A quarterly assessment of impacts on suspended solids from construction activities at the project site, including comparison of the difference between the quarterly mean and 1.3 times of the ambient mean for each monitoring station, which is defined as 30% increase of the baseline data of the parameter is summarized in Table 6.4. All quarterly assessment analytical results demonstrate that the quarterly means of suspended solids at all stations are significantly higher than the 1.3 on water quality times of the ambient means ($p<0.05$). The quarterly means of suspended solids at both monitoring and control stations increased to about 1.4 to 1.5 times of the ambient means. Therefore, the changes were not considered to be related to the Fill Bank Project. These were possibly due to variation of ambient condition.

Table 6.4 Quarterly Assessment of Impacts on Suspended Solids

Monitoring Station	Significant Difference?	SS Level Increased to more than 1.3 Times of Ambient Mean?
FM1	Y	Y
FM2	Y	Y
FC1	Y	Y
FC2	Y	Y

7. ENVIRONMENTAL AUDIT.

7.1 Site Inspections.

Thirteen site inspections were carried out by the Environmental Team (ET) in this reporting period. Three audits by the Independent Environmental Checker (IEC) were carried out in this reporting period. The major observations by the ET and IEC, actions by the Contractor and outcomes are summarised in the following tables.

Environmental Team.

Table 7.1 Summary of Findings, Actions and Outcomes of Site Inspection by the ET

Observations	Actions by Contractor	Outcome
January 2004		
Lubricant container was found on bare ground. (20th January 2004)	Placed the lubricant containers in drip trays.	Lubricant containers were placed in drip trays. (30th January 2004)
Debris was found in the sedimentation tanks. (20th January 2004)	Clear the debris in the sedimentation tanks	The sedimentation tanks were cleaned up. (5th February 2004)
C&D waste was observed along haul road near the reception office. (2nd January 2004)	Stored the waste in skips and cleared it regularly.	The waste was stored in skips. (14th January 2004)
February 2004		
Chemical drum was found on bare ground. (5th February 2004)	Placed the chemical drum in drip tray.	Chemical drum was placed in drip tray. (12th February 2004)
The automatic wheel washing facility was undergoing maintenance. (5th February 2004)	Ensured all vehicles leaving the site were clean.	The facility was operating. (12th February 2004)
Public highway around the site entrance was muddy. (5th February 2004)	Carried out road sweeping more frequently.	The public highway was kept clean. (12th February 2004)
Sediment accumulated in the sedimentation tanks. (12th February 2004)	Cleaned out the sedimentation tanks.	The sedimentation tanks were cleared. (26th February 2004)
Leakage was observed from drip tray. (18th February 2004)	Cleared the oil stains and sealed up the drip tray.	The drip tray was bunged up. (26th February 2004)
Haul road near River Trade Terminal was dry. (18th February 2004)	Arranged water trucks to dampen that portion.	Situation improved. (26th February 2004)
Fugitive dust was generated from site traffic. (26th February 2004)	Ensure haul roads were thoroughly dampened.	Situation improved. (26th March 2004)

Table 7.1 (cont'd) Summary of Findings, Actions and Outcomes of Site Inspection by the ET

Observations	Actions by Contractor	Outcome
March 2004		
Haul road near River Trade Terminal and the seafront were dry. (4th March 2004)	Arranged water trucks to dampen that portion.	Situation improved. (26th March 2004)
Dust generation was observed during loading of fill materials. (11th March 2004)	Dampened the fill materials to reduce dust generation.	Dust generation was reduced. (26th March 2004)
Fill materials accumulated on the sea blocks. (11th March 2004)	Cleared the fill materials.	The fill materials were cleared. (18th March 2004)
Fugitive dust was generated from site traffic. (18th March 2004)	Ensured haul roads were thoroughly dampened.	Dust generation was reduced. (26th March 2004)
Public roads around the site entrance were slightly muddy. (26th March 2004)	Carried out road sweeping more frequently and ensure all vehicles leaving the site be free of mud..	To be observed in next reporting period.

Independent Environmental Checker.

Table 7.2 Summary of Findings, Actions and Outcomes of Site Inspection by the IEC

Observations	Actions by Contractor	Outcome
20th January 2004		
Debris was observed in the desilting chamber at the seafront, u-channel and the sand traps.	Cleared the debris regularly.	The debris is being removed regularly.
The automatic wheel washing facility was filled with deposits.	Cleaned up the deposits.	The situation was rectified. (30th January 2004)
Slope surfaces have not been hydroseeded.	To hydroseed the slope surfaces once they are suitable for hydroseeding.	Hydroseeding is planned to be carried out in the next reporting period.

Table 7.2 (cont'd) Summary of Findings, Actions and Outcomes of Site Inspection by the IEC

Observations	Actions by Contractor	Outcome
18th February 2004		
Haul roads along River Trade Terminal and along the sea front was dry and dusty.	Arranged water trucks to dampen these portions.	Situation improved. (26th February 2004)
A cut open oil drum that was filled with oil was not placed in a drip tray.	Placed the oil drum in a drip tray.	The oil drum was placed in a drip tray. (26th February 2004)
The drip tray next to the site office was not bunged properly and has contaminated the soil directly underneath.	Cleared the oil stains and sealed up the drip tray.	The drip tray was bunged up. (26th February 2004)
Debris was observed in the desilting chambers at the seafront, u-channel and the sand traps.	Cleared the debris regularly.	The debris is being removed regularly and the desilting chambers at the seafront were cleared. (26th February 2004)
The automatic wheel washing facility was filled with deposits.	Cleaned up the deposits.	Situation improved. (26th February 2004)
18th March 2004		
The new stone road and haul road along River Trade Terminal were dry and dusty and there were no speed signs posted.	Arranged water trucks to dampen these portions and posted speed signs to remind drivers.	Situation improved. (26th March 2004)
Haul road accessing to the stockpiling area was observed generating high quantity of dust.	Dampened the haul road thoroughly at an increased frequency.	Situation improved. (26th March 2004)
Debris and general waste was observed in the u-channel and the sand traps with stagnant water and insect larva.	Cleared the debris and drained away the stagnant water regularly.	The debris was being removed regularly and stagnant water was drained away to prevent insect larva from breeding. (26th March 2004)

7.2 Landscape and Visual.

Three landscape audits was conducted during the reporting period. Buffer trees have been planted along the northern perimeter of the site. Slope surfaces of the fill bank were being hydroseeded and lighting was sit to minimize night-time glare.

8. WASTE MANAGEMENT.

564,000m^3 public fill was collected to stockpiling area. 82.23t C&D waste and general refuse were disposed of at WENT Landfill. Chemical waste generated was stored in temporary storage area.

The contractor is reminded to store all chemical drums in drip trays to avoid land contamination from spillage of chemicals. The valve of the trays shall be sealed. Covers can also be provided to reduce accumulation of standing water from rainfall inside the trays.

9. COMPLAINTS, NOTIFICATIONS OF SUMMONSES AND SUCCESSFUL PROSECUTIONS.

One complaint was received on 7th February 2004. A road user complained about the cleanliness of the section of Lung Mun Road in the vicinity of the Fill Bank. The situation was rectified by the Contractor.

Cumulative statistics on complaints, notifications of summonses and successful prosecutions are attached in Appendix V.

10. CONCLUSION.

This Quarterly Environmental Monitoring and Audit Report details the monitoring works carried out during the period from January to March 2004. The monitoring works were effective to generate data to identify or confirm the absence of impact attributable to the works.

All results for the air quality monitoring conducted this quarter at monitoring station A1 were acceptable. However, eleven non-compliances to the 1-hour TSP and four non-compliances to 24-hour TSP were recorded at monitoring station A2. The Contractor has increased the frequency of water spraying to keep dust generation to minimum.

In relation to the monitoring of water quality, there were two limit level exceedances to the depth-averaged turbidity and two limit level exceedances to the depth-averaged suspended solids during the reporting period. The Contractor was recommended to implement all necessary measures to avoid threatening the water quality.

No specific observation was reported from landscape audit. There was one environmental complaint but no summon was received during this quarter.