Stanger Asia

QUARTERLY

ENVIRONMENTAL MONITORING AND AUDIT REPORT

FOR

CONTRACT No. CV/2002/13

FILL BANK AT TUEN MUN AREA 38

OCTOBER TO DECEMBER 2003

(Revision No. 0)

Report No.: ET11976

Certified by: ____________ Date: 7/01/2004

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EXECUTIVE SUMMARY.

This is the 2nd 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 Environmental Permit was amended by the Director of Environmental Protection as requested by the Permit Holder. 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 October to December 2003.

Construction Activities for the Reported Period.

- Public filling operation.
- Tree planting.
- Construction of combined reception and exit offices, weighbridges, recorder house and queuing area.
- Erection of hoarding.

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 both stations during the reporting period.

Water Quality Monitoring.

Water quality in terms of turbidity, dissolved oxygen, suspended solids, temperature, and salinity, was carried out on forty occasions at FM1, FM2, FC1 and FC2. There were 4 Action Level (two for surface and middle averaged dissolved oxygen and two for Turbidity) exceedances during the reporting period. Although there was surface runoff generated on-site due to rainfall, this runoff was desilted via catchpits, sand and silt removal facilities and intercepting channels. Hence the aforementioned exceedances are not believed to be associated with the works at the Fill Bank.

Landscape Audit

In this reporting period, there was no specific site observation regarding the landscape aspect.

Waste Management.

571,400m^3 public fill was collected to stockpiling area. 73.91t C&D waste and general refuse were disposed of at WENT Landfill. 36L spent lube oil and 100kg waste battery were disposed of at SENT Landfill by licensed waste collector.

Complaints and Notifications of Summonses and Successful Prosecutions.

No complaints or notification of summonses received this reported period.

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 October to December 2003 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 October to December 2003.

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 December 2003 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.

In accordance with the EM&A Manual, the water quality monitoring data obtained from Stage 2 Reclamation Works (Contract No. CV/2000/01) was used as the impact monitoring data. It is not necessary to repeat the water quality monitoring. The water quality monitoring of the Reclamation Project (CV/2000/01) was completed on 24.09.2003 and that of the Fill Bank Project (CV/2002/13) commenced on 27.09.2003.

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	0	0
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	0	0
Action Level	344 $\mu g/m^3$		
Limit Level	500 $\mu g/m^3$		

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	160	2	0	2
Bottom Dissolved Oxygen	160	0	0	0
Turbidity	160	2	0	2
Suspended Solids	160	0	0	0
Total	640	4	0	4

There were 4 Action Level exceedances during the reporting period. No exceedance to Limit Level was reported.

Exceedances of surface and middle averaged dissolved oxygen to the Action Level were reported twice. These exceedances were not attributed to the Project, as for the cases the water at the control station was also depleted of oxygen.

Two exceedances to the Action Level of depth-averaged turbidity were reported during this quarter. These exceedances were not attributed to the Project, as there was no transfer of fill materials and no discharge from the Fill Bank was observed during the monitoring session when exceedances were reported. These exceedances were possibly due to discharge from nearby shoreline and outfall.

Although the exceedances for this reporting period were not considered to be related to the Fill Bank Project, the IEC, ER, and contractor were notified and the Contractor was reminded to implement and maintain all necessary mitigation measures to avoid deteriorating 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 1.5 to 1.6 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
October 2003		
Accumulation of sediment was found in the desilting system. (15th October 2003)	Cleared the desilting system.	Situation improved. (22nd October 2003)
Some haul roads with regular traffic were not covered by the water trucks. (2nd, 22nd and 29th October 2003)	Increase the frequency of watering on those haul roads.	To be observed in the next reporting period.
Temporary stockpiling of materials near the seafront. (2nd, 15th, 22nd & 29th October 2003)	Removed and reduced the stockpiles and stored them as far away from the seafront as practicable.	Situation improved. (29th October 2003)
Chemical drums were stored on bare ground. (29th October 2003)	Place chemical drums in drip trays.	To be observed in the next reporting period.
Stagnant water was observed near the site entrance. (15th October 2003)	Drained away stagnant water.	Most stagnant water was drained away. (22nd October 2003)
C&D waste and excavated materials were stockpiled near the site office. (22nd October 2003)	Removed the waste.	C&D waste was removed. (29th October 2003)
November 2003		
Some portions of the drainage system were filled with sediment. (5th , 14th , 20th November 2003)	Cleared the drainage system.	The drainage system was being cleared. (28th November 2003)
Some haul roads were not dampened by the water trucks. (14th and 28th November 2003)	Ensure all haul roads are dampened regularly.	To be observed in the next reporting period.
Chemical drums and generators were placed on bare ground. (November 2003)	Place chemical drums and generators in drip trays.	To be observed in the next reporting period.
The wheel washing water was muddy. (14th November 2003)	Reviewed the frequency of cleaning.	Situation improved. (20th November 2003)
General refuse was noted at the roadside near the recorder house. (14th November 2003)	Cleared the refuse.	General refuse was cleared. (20th November 2003)

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

Observations	Actions by Contractor	Outcome
December 2003		
Vehicles' speeding lead to fugitive dust generation. (4th, 12th and 17th December 2003)	Posted more warning sign to remind drivers and increase the frequency of watering.	Situation improved. (23rd December 2003)
Chemical drums and lubricant containers were placed on bare ground. (4th December 2003)	Placed chemical drums and lubricant containers in drip trays.	Chemical drums and lubricant containers were placed in drip trays. (23rd December 2003)
The rock bunds on the seawall were covered with fill materials. (4th and 12th December 2003)	Cleared the fill materials on the rock bunds.	The rock bunds on the top of the seawall were kept clear of fill materials. (23rd December 2003)
Soil contamination was observed next to the site office. (12th and 17th December 2003)	Cleared the contaminated soil.	The contaminated soil was cleared. (23rd December 2003)
The wheel washing water was muddy. (12th December 2003)	Observed the quality of the water and cleared it when necessary.	Situation improved. (23rd December 2003)
General refuse was noted at the top of the stockpiling area. (23rd December 2003)	To clear the refuse.	To be observed in the 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
15th October 2003		
There was potential debris falling into the sea at the seafront.	Install debris catching facility between the seawall and the barge.	On-going, to be observed in the next reporting period.
Stagnant water was observed in drainage system.	Cleaned out the blockage to drain away the stagnant water.	Most stagnant water was drained away. (22nd October 2003)
Continuous dark smokes from plants were observed.	Maintained the plants.	To be observed in the next reporting period.
Debris was observed in the u-channel and the catchpits.	Cleared the u-channel channels and the catchpits.	Situation improved. (22nd October 2003)
Road sweeper was not operating.	Repaired the road sweeper.	Road sweeper was in operation. (22nd October 2003)

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

Observations	Actions by Contractor	Outcome
20th November 2003		
There was potential debris falling into the sea at the seafront.	To install sea blocks on the sea wall.	To be observed in the next reporting period.
Permanent slope surfaces were not hydroseeded.	To complete slope trimming works as soon as possible and hydroseed the slope surfaces.	Slope trimming works was in progress. (28th November 2003)
Vehicles were travelling in excess of 10km/hr speed limit.	Posted more warning sign to remind drivers and increase the frequency of watering.	To be observed in the next reporting period.
Debris was observed in the u-channel and the catchpits.	Cleared the u-channels and the catchpits.	The drainage system was being cleared. (28th November 2003)
Water sprinklers at the reception point were not operating.	Dampened the fill materials to minimize dust generation.	Fill materials were wetted prior to unloading and transfer.
17th December 2003		
The sea wall was not completely installed with sea blocks.	Fill materials were only temporary stockpiled at the portion with sea blocks.	No fill materials were stockpiled at the portion without sea blocks. (23rd December 2003)
The tops of the sea blocks were covered with debris.	Cleared the debris.	The tops of the sea blocks were kept clear of debris. (23rd December 2003)
Vehicles were travelling in excess of 10km/hr speed limit.	Posted more warning sign to remind drivers and increase the frequency of watering.	Situation improved. (23rd December 2003)
The drip tray next to the site office was not bunged and oil contamination to the surrounding area was observed.	Bunged the drip tray and cleared the contaminated soil.	The drip tray was bunged and contaminated soil was cleared. (23rd December 2003)

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. As indicated by the Contractor, slopes of the fill bank will be hydroseeded once slope-trimming works were completed.

8. WASTE MANAGEMENT.

571,400m^3 public fill was collected to stockpiling area. 73.91t C&D waste and general refuse were disposed of at WENT Landfill. 36L spent lube oil and 100kg waste battery were disposed of at SENT Landfill by licensed waste collector.

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.

No complaint was received this quarter. Complaint Log is attached in Appendix IV. 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 October to December 2003. 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 were acceptable with no exceedance to set Action or Limit levels for either 24 or 1-Hour TSP level being recorded at monitoring locations A1 (vicinity of Engineer's Office) and A2 (western site boundary). However some elevated results, when compared to baseline data, were noted in this reported period. The Contractor was reminded to implement and maintain all the required mitigation measures in relation to air quality.

In relation to the monitoring of water quality, there were 4 Action Level exceedances during the reporting period. No exceedance to Limit Level was reported. Since surface runoff generated on-site due to rainfall would have been desilted via catchpits, sand and silt removal facilities and intercepting channels, these exceedances were not considered to be associated with the Fill Bank Project. However, the contractor was reminded to implement and maintain all necessary mitigation measures to avoid deteriorating the water quality.

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