

**China Harbour Engineering Company (Group)**


**Contract No. CV/2002/09**

**Tai O Development  
Sheltered Boat Anchorage**

**Environmental Monitoring and Audit  
Monthly Report (October 2003)**

**(Version 1.0)**

Certified By

  
(Environmental Team Leader)

REMARKS:

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

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## **ABBREVIATION AND ACRONYM**

AL Levels	Action and Limit Levels
E / ER	Engineer/Engineer's Representative
EIA	Environmental Impact Assessment
EM&A	Environmental Monitoring and Audit
EMIS	Environmental Mitigation Implementation Schedule
EP	Environmental Permit
EPD	Environmental Protection Department
ET	Environmental Team
IEC	Independent Environmental Checker
RE	Resident Engineer
QA/QC	Quality Assurance / Quality Control
SLM	Sound Level Meter
WMP	Waste Management Plan

**EXECUTIVE SUMMARY****Introduction**

1. This is the seventh monthly Environmental Monitoring and Audit (EM&A) Report prepared by Cinotech Consultants Limited (the ET) for the project “Tai O Development – Sheltered Boat Anchorage” (the Project). This document reported the findings of EM&A Works conducted in October 2003.
2. The construction activities undertaken in this reporting month were:
  - Site investigation at seawall and promenade deck
  - Dredging works at Breakwater and loading jetty No. 3 by grab dredger and derrick lighter
  - Sheet piling by oscillator
  - Dismantle steel-structure police guard house
  - Fencing the preserved mangrove
  - Installation of tidal exchange along seawall
  - Pre-drilling at seawall
  - Rock filling at seawall

**Environmental Monitoring Works**

3. Environmental monitoring for the Project was performed regularly as stipulated in the EM&A Manual and the results were checked and reviewed. Site audits were conducted once a week. The implementation of the environmental mitigation measures, Event Action Plans and environmental complaint handling procedures were also checked.
4. Summary of the non-compliance of the reporting month is tabulated Table I.

**Table I Summary Table for Non-compliance Recorded in the Reporting Month**

Media / Nature	No of Exceedances		Action Taken	Results of action taken	Remarks
	Action Level	Limit Level			
Noise	0	0	N.A.	N.A.	-
Water Quality					
DO	44	136	N.A.	N.A.	The exceedances were not due to the Project works.
Turbidity	3	26			
SS	1	29			

*Construction Noise*

5. All construction noise monitoring was conducted as scheduled in the reporting month.
6. As the Contractor has granted the Construction Noise permit on restricted hours including 1900 – 2300 on weekdays and General Holidays including Sundays (CNP no. GW-UW0285-03), noise monitoring works on restricted hour were conducted.
7. No noise limit level exceedance was recorded in the reporting month.

*Water Quality*

8. Water quality monitoring was conducted as scheduled in this reporting month.
9. A total of 44 Action Level exceedances and 136 Limit Level exceedances for DO levels were reported on 4<sup>th</sup>, 6<sup>th</sup>, 8<sup>th</sup>, 10<sup>th</sup>, 13<sup>th</sup>, 15<sup>th</sup>, 16<sup>th</sup>, 20<sup>th</sup>, 22<sup>nd</sup>, 24<sup>th</sup>, 27<sup>th</sup>, 29<sup>th</sup> and 30<sup>th</sup> October 2003. However, the exceedances were due to the seasonal effect and no direct evidence showed that the exceedances were due to the Project works. The exceedances were all considered to be invalid.
10. A total of 3 Action Level exceedances and 26 Limit Level exceedances of the Control Station for turbidity were recorded. For SS, 1 Action Level exceedance and 29 Limit Level exceedances were recorded. The exceedances were recorded at monitoring stations W1, W2, W3 and W4 on 2<sup>nd</sup>, 4<sup>th</sup>, 8<sup>th</sup>, 13<sup>th</sup>, 15<sup>th</sup>, 16<sup>th</sup>, 20<sup>th</sup>, 22<sup>nd</sup>, 24<sup>th</sup>, 29<sup>th</sup> and 30<sup>th</sup> October 2003. However, the exceedances were due to the influence from Pearl River and no direct evidence showed that the exceedances were due to the Project works. The exceedances were all considered to be invalid.

**Environmental Licenses and Permits**

11. License/Permits granted to the Project include the Environmental Permit (EP), Waste Disposal (Chemical Waste) License, Marine Dumping Permits and Construction Noise Permit.

**Complaints and Prosecutions**

12. No environmental complaint and prosecution was received in this reporting month.

**Future Key Issues**

13. Pilling and dredging works at anchorage area and South Marine Channel, and site investigation works will be the major construction activities for the coming month. The anticipated environmental impacts will be mainly on noise and water quality due to dredging works.

## 1. INTRODUCTION

### Background

- 1.1 Tai O was formerly one of the largest fishing villages in Hong Kong and was a historical case for fishing boats in the western approaches of Lantau Island and the Pearl River estuary. However, the importance of the fishing industry in Tai O has declined in recent decades, which has resulted in a degradation of its population base.
- 1.2 The formation of the Tai O sheltered boat anchorage is fully supported by the Islands Provisional District Board members and is widely seen as a means of reviving the town's local fishing industry and contributing to the revitalization of Tai O.
- 1.3 Previous consultancies undertaken on behalf of the Civil Engineering Department (CED) to determine the feasibility of construction a sheltered boat anchorage (Agreement No. CE 41/98) Environmental and Drainage Impact Assessment for the Tai O Sheltered Boat Anchorage Study. The original development scheme comprised an 8 ha anchorage for 220 vessels and about 1 ha reclamation for boat maintenance facilities, parking area, bus terminus and a loading/unloading bay.
- 1.4 The original development scheme has been gazette under the Foreshore & Sea-bed (Reclamations) Ordinance in December 2000. Following public consultation and interdepartmental discussion, the scope of the scheme was revised in the adoption of the current development scheme with a reduced area of boat anchorage, shortened breakwater and reduced area of reclamation.
- 1.5 The project now comprises construction of a 4 ha sheltered boat anchorage for small boats/fishing vessels and a breakwater of about 350 m length, formation of about 0.22 ha of land for a future bus terminus, construction of a 0.23 ha promenade, site formation and associated engineering works for a mangrove planting area and restoration of the existing historic seawall.
- 1.6 An Environmental Permit No. EP-144/2002 was issued on 11 Sep 2002 for this project (EP) to the Civil Engineering Department as Permit Holder. An updated Environmental Monitoring and Audit Manual (the EM&A Manual) was prepared to fulfill requirement stipulated in Condition 2.3 of the EP.
- 1.7 The works of the Project is constructed under CED's construction Contract No. CV/2002/09 "Tai O Development – Sheltered Boat Anchorage". The site layout of the Project is shown in Figure 1.1. The Project works were commenced on 14<sup>th</sup> April 2003.
- 1.8 Cinotech Consultants Limited was commissioned by the China Harbour Engineering Company (Group) (the Contractor) to undertake the Environmental Team (ET) Services for the Project. This is the seventh monthly EM&A report summarizes the EM&A works for the Project in October 2003.

**Project Organizations**

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

- Project Proponent – Civil Engineering Department
- Engineer or Engineer’s Representative (E/ER) – Maunsell Consultants Asia Limited (MCAL)
- Contractor – China Harbour Engineering Company (Group)
- Environmental Team (ET) – Cinotech Consultants Limited
- Independent Environmental Checker (IEC) – CH2M-IDC Hong Kong Limited

1.10 The responsibilities of respective parties are detailed in Section 1.19 of the EM&A Manual. The project organization chart is presented in Figure 1.2.

1.11 The key contacts of the Project are shown in Table 1.1.

**Table 1.1 Key Project Contacts**

Party	Name	Role	Phone No.	Fax No.
CED	Mr. William Ng	Project Coordinator	2760 5821	2714 1294
MCAL	Mr. Paul Lau	Engineer	2685 6504	2375 6455
	Ir. Frankie Fan		2985 5199	2985 5181
Contractor	Mr. Peter Kwan	Project Manager	2985 6800	2985 6881
ET	Dr. Priscilla Choy	The ET Leader	2151 2083	3107 1388
	Mr. KK Chan	Audit Team Leader	2151 2083	3107 1388
	Mr. Henry Leung	Monitoring Team Leader	2151 2083	3107 1388
IEC	Mr. David Yeung	Independent Environmental Checker	2507 2203	2507 2293

**Construction Programme**

1.12 The construction activities undertaken in this reporting month were:

- Site investigation at seawall and promenade deck
- Dredging works at Breakwater and loading jetty No. 3 by grab dredger and derrick lighter
- Sheet piling by oscillator
- Dismantle steel-structure police guard house
- Fencing the preserved mangrove
- Installation of tidal exchange along seawall
- Pre-drilling at seawall
- Rock filling at seawall

**Summary of EM&A Requirements**

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

- All monitoring parameters;



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

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

1.15 This report presents the monitoring results, observations, locations, equipment, period, methodology and QA/QC procedures of the required monitoring parameters, namely noise levels, water quality and audit works for the Project in this reporting month.

## 2. NOISE

### Monitoring Requirements

- 2.1 Noise monitoring was conducted in accordance with the EM&A Manual. Appendix A shows the established Action and Limit Levels for the environmental monitoring works.

### Monitoring Locations

- 2.2 Noise monitoring was conducted at four designated monitoring stations, namely N1, N9, N11 and N17, as summarized in Table 2.1. Figure 2.1 shows the locations of these stations.

**Table 2.1 Noise Monitoring Stations**

Monitoring Station	Location
N1	Ground level of No. 26B Shek Tsai Po
N9	Roof top of Tai O Primary School
N11	Roof top of Lung Tin Court, Wing Tin House
N17	Roof top of one village house at Nam Chung Tsuen

### Monitoring Equipment

- 2.3 Table 2.2 summarizes the noise monitoring equipment model being used. Copies of calibration certificates are attached in Appendix B.

**Table 2.2 Noise Monitoring Equipment**

Equipment	Model and Make	Qty.
Integrating Sound Level Meter	B&K Model 2238	5
Calibrator	B&K 4231	2
Wind Speed Anemometer	Vane Anemometer, Model 451104	1

### Monitoring Parameters, Frequency and Duration

- 2.4 Table 2.3 summarizes the monitoring parameters, frequency and total duration of monitoring. The noise monitoring schedule is shown in Appendix C.

**Table 2.3 Noise Monitoring Parameters, Frequency and Duration**

Monitoring Stations	Parameter*	Period	Frequency	Measurement
N1	$L_{eq}(30 \text{ min.}) / 3 \times Leq(5 \text{ min}) \text{ dB(A)}$	1. 0700-1900 hrs. on weekdays 2. 1900-2300 hours 3. 0700-1900 hours on holidays	Once a week in each period	Free field
N9				Facade
N11				Facade
N17				Facade

- $L_{eq}(30\text{-min})$  will be taken at all four stations for the time period between 0700-1900 hours on normal weekdays.
- Three consecutive  $Leq(5\text{-min}) \text{ dB(A)}$  will be taken at Stations N1, N11 and N17 for the time period between 1900-2300 hours and 0700-1900 on holidays, if construction works are carried out in these periods.

### **Monitoring Methodology and QA/QC Procedures**

- The Sound Level Meter was set on a tripod at a height of 1.2 m above the ground.
- The battery condition was checked to ensure the correct functioning of the meter.
- Parameters such as frequency weighting, the time weighting and the measurement time were set as follows:
  - frequency weighting : A
  - time weighting : Fast
  - time measurement :  $L_{eq}$  (30 min) for daytime noise monitoring /  
3 consecutive  $L_{eq}$  (5 min) for restricted hour noise monitoring
- Prior to and after each noise measurement, the meter was calibrated using a Calibrator for 94.0 dB at 1000 Hz. If the difference in the calibration level before and after measurement was more than 1.0 dB, the measurement would be considered invalid and repeat of noise measurement would be required after re-calibration or repair of the equipment.
- The wind speed was frequently checked with the portable wind meter.
- At the end of the monitoring period, the  $L_{eq}$ ,  $L_{90}$  and  $L_{10}$  were recorded. In addition, site conditions and noise sources were recorded on a standard record sheet.
- Noise measurement was paused during periods of high intrusive noise if possible and observation was recorded when intrusive noise was not avoided.
- Noise monitoring was cancelled in the presence of fog, rain, and wind with a steady speed exceeding 5 m/s, or wind with gusts exceeding 10 m/s.

### **Maintenance and Calibration**

- 2.5 The microphone head of the sound level meter and calibrator was cleaned with soft cloth regularly.
- 2.6 The meters were sent to the supplier to check and calibrate on yearly intervals.

### **Results and Observations**

- 2.7 Noise monitoring was performed at the four designated locations during the daytime period (0700 to 1900) as scheduled in this reporting month.
- 2.8 As the Contractor was granted the Construction Noise permit on restricted hours including 1900 – 2300 on weekdays and General Holidays including Sundays (CNP no. GW-UW0285-03), noise monitoring works during restricted hours were also conducted at Stations N1, N11 and N17.
- 2.9 The details of the monitoring results and graphical presentations are shown in Appendix D.
- 2.10 The weather during the monitoring sessions was mainly sunny. Weather conditions information is provided in Appendix D.
- 2.11 No noise limit level exceedance was recorded in the reporting period. The major noise sources identified at these designated stations were road and marine traffic noises.

### 3. WATER QUALITY

#### Monitoring Requirements

- 3.1 Water quality monitoring was conducted in accordance with the EM&A Manual. Appendix A shows the established Action Limit Levels for the environmental monitoring parameters.

#### Monitoring Equipment

- 3.2 The water sampler used for water quality monitoring was Kahlsico Water-Bottle Model 135DW150, except at Stations A1 and A2. The sampler with associated equipment complied with the specifications stipulated in the EM&A Manual.
- 3.3 Due the shallow water depth at Stations A1 and A2 (Refer to Table 3.3), the above-mentioned water sampler could not be used for water sampling at these stations. Water samples at these two stations were directly taken into polyethylene bottles.
- 3.4 Table 3.1 summarizes the equipment used in the water quality monitoring program. All the monitoring equipment complied with the specifications stipulated in the EM&A Manual. Copies of the calibration certificates of are attached in Appendix B

**Table 3.1 Water Quality Monitoring Equipment**

Equipment	Model and Make	Qty.
Water Sampler*	Kahlsico Water-Bottle Model 135DW 150	1
Multi-parameter Water Quality System	YSI 6820	2
Monitoring Position Equipment	“Magellan” Handheld GPS Model GPS-320	1

Notes:

\* For Stations W1 to W5 only.

#### Monitoring Parameters, Frequency and Duration

- 3.5 Table 3.2 summarizes the monitoring parameters, monitoring period and frequencies of water quality monitoring.

#### Monitoring Locations

- 3.6 In accordance with the EM&A Manual, five water quality monitoring locations (Stations W1 to W5) were specified for baseline water quality monitoring. Two more locations (Stations A1 and A2) were added for water quality monitoring upon requested by the Independent Environmental Checker (IEC) and agreed by the Engineer. Table 3.3 describes the locations of the monitoring stations. The monitoring locations are also shown on Figure 3.1.

**Table 3.2 Frequency and Parameters of Water Quality Monitoring**

Station	Parameters	Frequency	No. of depth	No. of samples
W1	DO, SS, turbidity, salinity, pH & temperature	3 times per week	3	2 per monitoring day (1 for mid-ebb and 1 for mid-flood)
W2			3	
W3			3	
W4			3	
W5			1*	
A1			1*	
A2			1*	

Notes:

\* The recorded water depths at Stations A1 and A2 were less than 3 m during the monitoring; only 1 sample at mid-depth was taken each time.

**Table 3.3 Water Quality Monitoring Locations**

ID	Locations	Co-ordinates	
		Easting	Northing
W1*	Outer Bay	802250	813200
W2*	Outer Bay	801900	812710
W3*	Outer Bay	801850	812060
W4*	Outer Bay	802050	811530
W5*	Mouth of Tai O Creek	803844	812839
A1**	Salt Pan	803799	812606
A2**	Salt Pan	803899	812198

Notes:

\* In accordance with the EM&amp;A Manual.

\*\* Requested by IEC and agreed by the Engineer.

**Monitoring Methodology, Calibration Details and QA/QC Procedures*****Instrumentation***

- 3.7 A multi-parameter meter (Model YSI 6820 CE-C-M-Y) was used to measure DO, turbidity, salinity, pH and temperature.

***Operating/Analytical Procedures***

- 3.8 At each measurement, two consecutive measurements of salinity, turbidity, pH and temperature were taken. The probes were retrieved out of the water after the first measurement and then re-deployed for the second measurement. Where the difference in the value between the first and second readings of each set was more than 25% of the value of the first reading, the reading was discarded and further readings were taken.
- 3.9 For SS measurement, grab samples were collected. Water samples of about 500 ml were collected and stored in polyethylene bottles. The sample bottles were packed into an ice-box and delivered to a HOKLAS Laboratory, WELLAB Ltd., for the analysis of suspended solids contents within 24 hours.

***Maintenance and Calibration***

- 3.10 Before each round of monitoring, a zero check in distilled water was performed with the turbidity probe of YSI 6820. The probe was kept in wet condition and then calibrated with a solution of known NTU.
- 3.11 Quality Control Reports for SS analysis by the HOKLAS-accredited laboratory, WELLAB Ltd. are attached in Appendix E.

**Results and Observations**

- 3.12 The monitoring data and graphical presentations of the monitoring results are shown in Appendix F. Note that in Appendix F, the “sea condition” is given as indicative information and does not necessarily adhere to any standard sea state descriptions. In general, “calm” means small or no waves were observed; “rough” includes white-capped sea or rougher; and “moderate” means all conditions in between “calm” and “rough”.
- 3.13 Water quality monitoring was conducted as scheduled in this reporting month.
- 3.14 The weather during the monitoring session was mainly sunny.
- 3.15 Dissolved oxygen levels (for all depths and tides) were fluctuating. A total of 44 Action Level exceedances and 136 Limit Level exceedances for DO levels were reported at monitoring stations W1, W2, W3 and W4 on 4<sup>th</sup>, 6<sup>th</sup>, 8<sup>th</sup>, 10<sup>th</sup>, 13<sup>th</sup>, 15<sup>th</sup>, 16<sup>th</sup>, 20<sup>th</sup>, 22<sup>nd</sup>, 24<sup>th</sup>, 27<sup>th</sup>, 29<sup>th</sup> and 30<sup>th</sup> October 2003.
- 3.16 A total of 3 Action Level exceedances and 26 exceedances of Limit Level of the Control Station for turbidity were recorded. For SS, 1 Action Level exceedance and 29 Limit Level exceedances were recorded. The exceedances were recorded at monitoring stations W1, W2, W3 and W4 on 2<sup>nd</sup>, 4<sup>th</sup>, 8<sup>th</sup>, 13<sup>th</sup>, 15<sup>th</sup>, 16<sup>th</sup>, 20<sup>th</sup>, 22<sup>nd</sup>, 24<sup>th</sup>, 29<sup>th</sup> and 30<sup>th</sup> October 2003.
- 3.17 Table 3.4 summarizes the number of exceedances of DO, turbidity and SS levels for ebb and flood tides in the reporting month. The details of exceedances and the associated action taken are summarized in Appendix G.
- 3.18 Comparison of total number of exceedances of this reporting month with the last two reporting months is summarized in Table 3.5.
- 3.19 The DO level exceedances were considered not directly related to the Project due to the followings reasons:
- DO levels recorded at Stations A1, A2 and W5, which are closer to the dredging site, were usually higher than those recorded at Stations W1 to W4.
  - DO levels may be affected by many other factors, e.g., salinity and water temperature. Graphical presentations of the variations of salinity and water temperature are shown in Appendix F. In addition, the average water temperature at all monitoring stations during baseline monitoring period was 20.7°C<sup>1</sup>, that in October 2003 was 27.0°C<sup>2</sup>

- Therefore, one possible reason for the increase of DO exceedance when compared with previous months may be due to the seasonal effects. Weather was warmer in October 2003 ( $27.1^{\circ}\text{C}^3$ ) as compared with previous months and the baseline monitoring period (Mean Air Temperature is  $21.1^{\circ}\text{C}^3$ ). Therefore, the increase in water temperature may lead to the decrease in oxygen solubility in water and hence the DO levels.

3.20 The turbidity and SS level exceedances were considered not directly related to the Project due to the followings reasons:

- All the exceedances of SS and Turbidity levels were recorded at W1 to W4, but not at A1, A2 and W5 which are closer to the project site. This can be explained by the fact that the SS and turbidity were brought about from the Pearl River Delta region rather than the project itself.
- The monitoring location at W4 (Control Point) is sheltered from the hinterland and hence the low levels of turbidity and SS at W4 cannot reflect the influence of tidal effect on turbidity and SS to the impact stations W1 – W3 at mid-flood tide.
- Limit level exceedances for turbidity and SS were recorded at impact monitoring stations whereas low levels of turbidity and SS were recorded at the control station (W1 at mid-ebb tide and W4 at mid-flood tide) at the corresponding tide.
- The SS and turbidity levels recorded were well below the baseline levels.

<sup>1</sup> Extracted from the Baseline Monitoring Report

<sup>2</sup> Determined from the monitoring results

<sup>3</sup> Obtained from the website of Hong Kong Observatory

**Table 3.4 Total Number of Exceedances in October 2003**

Station	Exceedance Level	DO		Turbidity		SS	
No. of monitoring days		14		14		14	
Tide		Mid-Ebb	Mid-Flood	Mid-Ebb	Mid-Flood	Mid-Ebb	Mid-Flood
A1	Action	2	2	0	0	0	0
	Limit	0	0	0	0	0	0
	Total	2	2	0	0	0	0
	Total/Monitoring Day	0.14	0.14	0.00	0.00	0.00	0.00
A2	Action	4	1	0	0	0	0
	Limit	0	0	0	0	0	0
	Total	4	1	0	0	0	0
	Total/Monitoring Day	0.29	0.07	0.00	0.00	0.00	0.00
W1	Action	3	4	0	0	0	0
	Limit	14	16	0	5	0	4
	Total	17	20	0	5	0	4
	Total/Monitoring Day	1.21	1.43	0.00	0.36	0.00	0.29
W2	Action	5	3	1	0	0	1
	Limit	17	17	0	6	3	6
	Total	22	23	1	6	3	7
	Total/Monitoring Day	1.57	1.64	0.07	0.43	0.21	0.50
W3	Action	4	2	1	1	0	0
	Limit	19	17	3	4	4	6
	Total	23	19	4	5	4	6
	Total/Monitoring Day	1.64	1.36	0.29	0.36	0.29	0.43
W4	Action	4	4	0	0	0	0
	Limit	20	15	8	0	6	0
	Total	24	19	8	0	6	0
	Total/Monitoring Day	1.71	1.36	0.57	0.00	0.43	0.00
W5	Action	3	3	0	0	0	0
	Limit	1	0	0	0	0	0
	Total	4	3	0	0	0	0
	Total/Monitoring Day	0.29	0.21	0.00	0.00	0.00	0.00
Sum	Action	25	19	2	1	0	1
	Limit	71	65	11	15	13	16
	Total	96	84	13	16	13	17
	Total/Monitoring Day	6.86	6.00	0.93	1.14	0.93	1.21
Total	Action	44		3		1	
	Limit	136		26		29	
	Total	180		29		30	
	Total/Monitoring Day	12.86		2.07		2.14	



**Table 3.5 Total Number of Water Quality Exceedances in October 2003 and the Previous Months**

Parameter	Exceedance Level	August 03	September 03	October 03
No. of monitoring days		13	12	14
DO	Action	9	13	44
	Limit	153	166	136
	Total	162	179	180
	Cumulative	541	720	900
	Total / Monitoring Day	12.46	13.77	12.86
Turbidity	Action	2	7	3
	Limit	26	33	26
	Total	28	40	29
	Cumulative	82	122	151
	Total / Monitoring Day	2.15	3.08	2.07
SS	Action	4	4	1
	Limit	24	35	29
	Total	28	39	30
	Cumulative	79	118	148
	Total / Monitoring Day	2.15	3.00	2.14
Total	Action	15	24	48
	Limit	203	234	191
	Total	218	258	239
	Cumulative	702	960	1199
	Total / Monitoring Day	16.77	19.85	17.07
Cumulative	Action	67	91	139
	Limit	635	869	1060
	Total	702	960	1199

#### **4. ENVIRONMENTAL AUDIT**

##### **Site Audits**

- 4.1 Site audits were carried out on weekly basis to monitor the timely implementation of proper environmental management practices and mitigation measures in the Project site.
- 4.2 Site audits were conducted on 3<sup>rd</sup>, 10<sup>th</sup>, 17<sup>th</sup> and 23<sup>rd</sup> October 2003. The summaries of site audits are attached in Appendix H.

##### **Review of Environmental Monitoring Procedures**

- 4.3 The monitoring works conducted by the monitoring team were inspected regularly. The following observations have been recorded for the monitoring works:

###### *Noise Monitoring*

- The monitoring team recorded all observations around the monitoring stations, which might affect the monitoring result.
- Major noise sources were identified and recorded. Other intrusive noise attributing to the result was trimmed off by pausing the monitoring temporarily.

###### *Water Quality Monitoring*

- The monitoring team recorded all observations around the monitoring stations, which might affect the monitoring result.
- The monitoring team recorded the weather and sea conditions on the monitoring day.

##### **Status of Environmental Licensing and Permitting**

- 4.4 All valid permits/licenses are summarized in Table 4.1.

##### **Status of Waste Management**

- 4.5 The amounts of wastes generated by the activities of the project in October 2003 are shown in Appendix M (to be confirmed).
- 4.6 The solid waste generated from the Project was mainly uncontaminated dredged sediment. No violation was observed during site inspections.

**Table 4.1 Summary of Environmental Licensing and Permit Status**

Permit No.	Date of Approval	Valid Period		Section	Status
		From	To		
<b>Environmental Permit</b>					
EP-144/2002 * a copy was attached in the monthly report of April 2003	11/09/02	12/07/02	End of the Project	Construction of 4 ha. sheltered boat anchorage for small boats/fishing vessels including a breakwater of about 350 m long and associated marine access channels, construction of 0.23 ha. promenade including landing steps, formation of about 0.22 ha. of land for future bus terminus, site formation and associated engineering works for a mangrove planting area in the disused Tai O salt pans and restoration of the existing historic seawall of about 630 m.	Valid
<b>Construction Noise Permit</b>					
GW-UW0285-03 * a copy was attached in the monthly report of September 2003	09/09/03	09/09/03	03/03/03	Use of powered mechanical equipment for carrying out construction work at Typhoon Shelter, Tai O, Lantau Island, HK at 0700-2300 on general holidays and at 1900-2300 on any day not being a general holiday	Valid
<b>Marine Dumping Permit</b>					
EP/MD/04-059 * a copy was attached in the monthly report of September 2003	24/09/03	04/10/03	03/04/04	Disposal of dredged sediment at East Sha Chau Contaminated Mud Disposal Site – Pit IVb	Valid
EP/MD/04-073 * a copy is attached in Appendix N	14/10/03	16/10/03	15/11/03	Disposal of dredged sediment at East Sha Chau Contaminated Mud Disposal Site – Pit IVc	Valid
<b>Waste Disposal (Chemical Waste)</b>					
WPN: 5111-944-C2397-08 * a copy was attached in the monthly report of April 2003	25/04/03	25/04/03	End of the Project	Disposal of chemical waste such as waste lubricating oil and diesel oil arising from construction work.	Valid

**Implementation Status of Environmental Mitigation Measures**

- 4.7 During the subsequent site inspections in this reporting month, the following observations and recommendations were made.

*Chemical and Waste Management*

- 4.8 Following up the previous audit on 25<sup>th</sup> September 2003, it was observed that drip tray was provided to prevent oily water from discharging into the sea during the audit on 2<sup>nd</sup> October.

- 4.9 On 15<sup>th</sup> October 2003, oily layer was observed near the drilling machine. The situation was improved during the audit on 23<sup>rd</sup> October 2003.

#### *Water Quality*

- 4.10 Following up the previous audit on 25<sup>th</sup> September 2003, oil drums had been removed on the derrick barge.

#### *Air Quality, Noise and Permit / Licenses*

- 4.11 No violation was observed during subsequent site inspections.

#### *Environmental Mitigation Implementation Schedule (EMIS)*

- 4.12 According to the Environmental Permit and the EM&A Manual, the mitigation measures detailed in the documents are required to be implemented. An updated summary of the EMIS is presented in Appendix J.

#### **Implementation Status of Event Action Plans**

- 4.13 The Event Action Plans for noise and water quality are presented in Appendix I.
- 4.14 Noise monitoring works were conducted on both daytime and restricted hours as the Contractor was granted a CNP for construction works on restricted hours (CNP no. GW-UW0285-03).
- 4.15 No noise limit level exceedance was recorded in the reporting month.
- 4.16 A total of 44 Action Level exceedances and 136 Limit Level exceedances for DO levels were reported on 4<sup>th</sup>, 6<sup>th</sup>, 8<sup>th</sup>, 10<sup>th</sup>, 13<sup>th</sup>, 15<sup>th</sup>, 16<sup>th</sup>, 20<sup>th</sup>, 22<sup>nd</sup>, 24<sup>th</sup>, 27<sup>th</sup>, 29<sup>th</sup> and 30<sup>th</sup> October 2003. However, the exceedances were due to the seasonal effect and no direct evidence showed that the exceedances were due to the Project works. The exceedances were all considered to be invalid.
- 4.17 A total of 3 Action Level exceedances and 26 Limit Level exceedances of the Control Station for turbidity were recorded. For SS, 1 Action Level exceedance and 29 Limit Level exceedances were recorded. The exceedances were recorded at monitoring stations W1, W2, W3 and W4 on 2<sup>nd</sup>, 4<sup>th</sup>, 8<sup>th</sup>, 13<sup>th</sup>, 15<sup>th</sup>, 16<sup>th</sup>, 20<sup>th</sup>, 22<sup>nd</sup>, 24<sup>th</sup>, 29<sup>th</sup> and 30<sup>th</sup> October 2003. However, the exceedances were due to the influence from Pearl River and no direct evidence showed that the exceedances were due to the Project works. The exceedances were all considered to be invalid.

#### **Summary of Complaints and Prosecutions**

- 4.18 No environmental complaint or prosecution related to the Project works was received since the commencement of the Project.

## **5. FUTURE KEY ISSUES**

### **Key Issues for the Coming Month**

5.1 Key issues to be considered in the coming month include:

- Transport of dredged materials by hopper barges.
- Noise from operation of the equipment and machinery on-site.
- Wastewater discharge from site.
- Storage of chemicals/fuel and chemical waste/waste oil on site.

### **Monitoring Schedule for the Next Month**

5.2 The tentative environmental monitoring schedule for the next month is shown in Appendix D.

### **Construction Program for the Next Month**

5.3 The tentative construction program for the coming three months is provided in Appendix K.

## 6. CONCLUSIONS AND RECOMMENDATIONS

### Conclusions

- 6.1 Environmental monitoring works were performed in this reporting month and all monitoring results were checked and reviewed.
- 6.2 Noise monitoring works were conducted on both daytime and restricted hours as the Contractor was granted a CNP for construction works on restricted hours (CNP no. GW-UW0285-03).
- 6.3 No noise limit level exceedance was recorded in the reporting month.
- 6.4 Water quality monitoring was conducted as scheduled in this reporting month.
- 6.5 A total of 44 Action Level exceedances and 136 Limit Level exceedances for DO levels were reported on 4<sup>th</sup>, 6<sup>th</sup>, 8<sup>th</sup>, 10<sup>th</sup>, 13<sup>th</sup>, 15<sup>th</sup>, 16<sup>th</sup>, 20<sup>th</sup>, 22<sup>nd</sup>, 24<sup>th</sup>, 27<sup>th</sup>, 29<sup>th</sup> and 30<sup>th</sup> October 2003. However, the exceedances were due to the seasonal effect and no direct evidence showed that the exceedances were due to the Project works. The exceedances were all considered to be invalid.
- 6.6 A total of 3 Action Level exceedances and 26 Limit Level exceedances of the Control Station for turbidity were recorded. For SS, 1 Action Level exceedance and 29 Limit Level exceedances were recorded. The exceedances were recorded at monitoring stations W1, W2, W3 and W4 on 2<sup>nd</sup>, 4<sup>th</sup>, 8<sup>th</sup>, 13<sup>th</sup>, 15<sup>th</sup>, 16<sup>th</sup>, 20<sup>th</sup>, 22<sup>nd</sup>, 24<sup>th</sup>, 29<sup>th</sup> and 30<sup>th</sup> October 2003. However, the exceedances were due to the influence from Pearl River and no direct evidence showed that the exceedances were due to the Project works. The exceedances were all considered to be invalid.
- 6.7 No environmental complaint and prosecution was received since the commencement of the Project.

### Recommendations

- 6.8 According to the environmental audit performed in this reporting month, the following recommendations were made:

#### *Dust Impact*

- To prohibit any open burning on site.
- To regularly maintain the machinery and vehicles on site.
- To implement dust suppression measures (e.g., water spraying, covering with impervious sheets and vehicle speed control) on all haul roads, stockpiles and dry surfaces.

*Noise Impact*

- To inspect the noise sources from inside and outside of the site.
- To follow up any exceedance caused by the construction activities.
- To space out noisy equipment and position as far as possible from sensitive receivers.
- To provide temporary noise barrier as minimize the noise nuisance from the construction site.

*Water Impact*

- To monitor loading of hopper barges.
- To identify any wastewater discharges from site.
- To minimise loss of sediment from grab \ suction pipes during dredging.
- To follow up any exceedance caused by the construction works.

*Waste/Chemical Management*

- To check for any accumulation of waste materials or rubbish on site.
- To avoid any oil leakage from the equipments within the construction site.
- To remove ponding water regularly in drip trips on site.