

## EXECUTIVE SUMMARY

### Introduction

This is the twenty-second monthly Environmental Monitoring and Audit (EM&A) Report prepared by Cinotech Consultants Limited for the “Low Level Radioactive Waste Storage Facility at Siu A Chau” (the Project). This report documents the findings of Environmental Monitoring and Audit (EM&A) Works conducted in between 1<sup>st</sup> and 30<sup>th</sup> June 2005 inclusively.

The major site activities undertaken in the reporting month were:

- Removal of temporary working platform;
- Finishing works;
- E&M works; and
- Testing and commissioning.

### Environmental Monitoring and Audit Works

Environmental monitoring for the Project was performed regularly as stipulated in the EM&A Manual and the results were checked and reviewed. The implementation of the environmental mitigation measures, Event Action Plans and environmental complaint handling procedures were also checked.

The marine works for the jetty were completed on 10<sup>th</sup> June 2005 and no further marine works would be expected to be carried out. Therefore, the water quality impact monitoring was conducted up to 10<sup>th</sup> June 2005.

Summary of the non-compliance of the reporting month is tabulated in Table I.

### *Water Quality Monitoring*

Water quality monitoring was conducted as scheduled in the reporting month.

#### Routine Water Quality Monitoring

No exceedance of Action/Limit Level for dissolved oxygen, turbidity and suspended solids was recorded in this reporting month.

#### 12-hr Continuous Water Quality Monitoring

No exceedance of both Action and Limit Levels was recorded in this reporting month.

Table I summarizes the number of exceedances recorded in the reporting month.

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

Parameter	No. of Events Exceeding		No. of Exceedances due to the Project	Action Taken
	Action Level	Limit Level		
<b>Station W1-W3</b>				
DO (mg/L)	0	0	0	N/A
Turbidity (NTU)	0	0	0	
SS (mg/L)	0	0	0	
<b>Station WS</b>				
DO (mg/L)	0	0	0	N/A
Turbidity (NTU)	0	0	0	

**Environmental Licensing and Permitting**

License/Permits granted to the Project include the Environmental Permit (EP), the Further Environmental Permit (FEP), the Water Discharge License (WDL) and Construction Noise Permit (CNP) for the Project.

**Complaints and Prosecutions**

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

**Status of Waste Management**

The Waste Management Plan (WMP) was accepted with conditions by EPD on 30<sup>th</sup> September 2003 and the Contractor resubmitted WMP (Rev. B) on 9<sup>th</sup> October 2003.

A total of 2960 m<sup>3</sup> inert materials were disposed of at public fill and no C&D waste was disposed of at landfill in the reporting month. The waste management should follow the procedures in the approved WMP.

**Key Information in the Reporting Month**

The summary of key information in this reporting month is tabulated in Table II.

**Table II Summary Table for Key Information in the Reporting Month**

Event	Event Details		Action Taken	Status	Remark
	Number	Nature			
Complaint received	0	---	N/A	N/A	---
Changes to the assumptions and key construction / operation activities recorded	0	---	N/A	N/A	---
Status of submissions under EP	0	---	N/A	N/A	---
Notifications of any summons & prosecutions received	0	---	N/A	N/A	---

**Future Key Issues:**

No major environmental impacts are anticipated as the major construction activities have been completed.

## 1. INTRODUCTION

### Background

- 1.1 Various industrial, educational and medical facilities in Hong Kong have, for a number of years, used radioactive materials and generated radioactive waste. Most of the existing waste arisings are stored in disused air raid tunnels close to Queen's Road East in Wan Chai. Other arisings are stored temporarily (although in some cases for several years) at the point of use in educational institutions or hospitals.
- 1.2 The condition of the Queen's Road East tunnels has been found to be unsatisfactory and various parts of the tunnel system suffer from leakage and ingress of water. The condition of some of the waste packages has subsequently deteriorated and they are generally unsatisfactory for the safe long-term containment and storage of radioactive materials.
- 1.3 The existing facilities are unsatisfactory and in addition are located closed to a high density of population, which make access to, and management of, the waste more problematic. As well as existing waste, there is also a continuing need to use radioactive materials in Hong Kong and a continuing predictable amount of future waste arisings. Therefore, the Government has decided that storage of low-level radioactive waste in Hong Kong requires a dedicated, purpose-designed facility. After a thorough consultancy study in the "Environmental Impact and Safety Assessment Report, June 1995 (Stage 1 EISA)" and evaluation, the preferred site located on the island of Siu A Chau in the Soko Islands, adjacent to the small bay of Sum Wan on the eastern side of the island was selected.
- 1.4 Environmental Protection Department (EPD) commissioned the construction and operation of the Low-Level Radioactive Waste Storage Facility (LRWF) at Siu A Chau (hereinafter referred as the "Project") under Contract No. EP/SP/40/02 to ATAL-Belgoprocess Joint Venture Limited (hereinafter called "the Contractor") in July 2003. The Project site layout is shown in Figure 1.1 and the location of the environmental sensitive receiver is depicted in Figure 1.2.
- 1.5 An Environmental Permit (EP) (No. EP-131/2002) for the Project was issued on 11 April 2002 to the Special Waste Facilities Group, Environmental Protection Department as Permit Holder. Under the Tender Specification Clause 1.6.3.1, the Contractor is required to obtain a Further Environmental Permit (FEP) before he assumes the responsibility for relevant construction and operation. The FEP (No. FEP-01/131/2003) was successfully obtained from EPD on 30<sup>th</sup> July 2003 by the Contractor.
- 1.6 Cinotech Consultants Limited (hereinafter called the "ET") was commissioned by the contractor to undertake the Environmental Monitoring and Audit (EM&A) works for the Project. Mr. Jesse Yuen of Cinotech Consultants Limited was appointed as the ET Leader under Condition 2.1 of the FEP. Mr. Sam Tsoi of Ove Arup & Partners Hong Kong Limited was appointed as the IEC under Condition 2.2 of the EP and the FEP.

- 1.7 This is the twenty-second monthly EM&A report summarizing the EM&A works for the Project in June 2005.

### Project Organizations

- 1.8 Different parties with different levels of involvement in the project organization include:
- Employer's Representative (ER) – Environmental Protection Department
  - Contractor – ATAL-Belgoprocess Joint Venture Limited
  - Environmental Team (ET) – Cinotech Consultants Limited
  - Independent Environmental Checker (IEC) – Ove Arup & Partners Hong Kong Limited
- 1.9 The responsibilities of respective parties are detailed in Sections 1.16 to 1.19 of the EM&A Manual of the Project.
- 1.10 The key contacts of the Project are shown in Table 1-1.

**Table 1-1 Key Project Contacts**

Party	Role	Name	Position	Phone No.	Fax No.
EPD	Employer's Representative	Mr. Alex Ng	PEPO	2872 1800	2591 6662
		Mr. Davie Kan	SEPO	2872 1682	2591 0636
		Mr. Richard Fok	EPO	2872 1686	2591 0636
ATAL-Belgoprocess Joint Venture	Contractor	Mr. Barry Lee	Project Manager	2565 3150	2811 3321
		Mr. Christopher Lee	Construction Manager	2565 3477	2811 3321
Cinotech	Environmental Team	Mr. Jesse Yuen	ET Leader	2151 2091	3107 1388
		Mr. Henry Leung	Audit Team Leader	2151 2083	3107 1388
Ove Arup	Independent Environmental Checker	Mr. Sam Tsoi	IEC	2268 3211	2268 3950

### Construction Programme

- 1.11 The site activities undertaken in the reporting period were:
- Removal of temporary working platform;
  - Finishing works; and
  - E&M works.
- 1.12 The updated master work programme for civil works is attached in Appendix A. The marine activities were completed on 10<sup>th</sup> June 2005.

### Summary of EM&A Requirements

- 1.13 The EM&A programme requires baseline monitoring for water quality and ecology; and construction phase monitoring for water quality and environmental site audit. The requirements for each parameter as stipulated in EM&A Manual 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 Stage 1 EISA Report for the Project;
  - 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 3 of this report.
- 1.15 This report presents the monitoring results, observations, locations, equipment, period, methodology and QA/QC procedures for the required monitoring parameters [namely dissolved oxygen (DO), turbidity, temperature and suspended solids (SS)] and site audit works for the Project in the reporting month.

**2. WATER QUALITY**

**Monitoring Requirements**

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

**Monitoring Locations**

2.2 In accordance with the EM&A Manual, four water quality monitoring locations (Stations W1 to W3 and WS) were specified for baseline water quality monitoring. The water quality monitoring locations are shown in Figure 2.1 and their coordinates are provided in Table 2-1.

**Table 2-1 Locations of Water Quality Monitoring Stations**

Station	Co-ordinates	
	Northing	Easting
W1	804471.4	809611.2
W2	804330.9	809558.6
W3	804393.9	809725.0
WS	804555.2	809535.9

**Monitoring Parameters, Frequency and Duration**

2.3 Table 2-2 summarizes the monitoring parameters, monitoring period and frequencies of impact water quality monitoring. The water quality monitoring schedule is shown in Appendix C. Note that only 2 weeks of monitoring works were scheduled as the major marine construction activities were completed on 10<sup>th</sup> June 2005.

**Table 2-2 Frequency and Parameter of Water Quality Monitoring**

Monitoring Stations	Parameters, unit	Depth	Frequency <sup>1</sup>
W1, W2, W3	<ul style="list-style-type: none"> <li>• DO Saturation, %</li> <li>• DO, mg/L</li> <li>• Temperature, °C</li> <li>• Turbidity, NTU</li> <li>• SS, mg/L</li> </ul>	Three depths (1m below surface, mid-depth and 1m above seabed) at mid-flood and mid-ebb tides	3 times per week during construction of unloading facility
12-Hour Monitoring Station: WS	<ul style="list-style-type: none"> <li>• Conductivity</li> <li>• Water depth, m</li> <li>• DO Saturation, %</li> <li>• DO, mg/L</li> <li>• Temperature, °C</li> <li>• Turbidity, NTU</li> </ul>	Mid-depth, with data logging at every 5 minutes for 12 hours between 0700 and 1900	

Note: <sup>1</sup> 2 consecutive readings of in-situ parameters will be taken in order to agree accuracy within 25%

**Monitoring Equipment**

- 2.4 Table 2-3 summarizes the details of the monitoring equipment to be deployed, the model number, manufacturer and the calibration date.
- 2.5 All the monitoring equipment complied with the specifications stipulated in the EM&A Manual. Copies of the calibration certificates are attached in Appendix D.

**Table 2-3 Water Quality Monitoring Equipment**

<b>Parameters/ Functions</b>	<b>The Equipment to be Deployed</b>	<b>Model and Make</b>	<b>Calibration Date</b>
Positioning	Digital Global Positioning System (GPS)	"Standard Horizon" Handheld GPS Magnum NAV-40	N/A
Water Depth	Echo Sounder	"Humminbird" In-Dash Digital Depthsounder HDR 600	N/A
Water Sampling	Kahlsico Water Sampler	135 WB150	N/A
<b>Routine Water Quality Monitoring</b>			
Dissolved Oxygen, pH and Temperature	YSI Model 6820 CE-C-M-Y	YSI 6820	14 <sup>th</sup> May 2005
Turbidity	YSI Model 6820 CE-C-M-Y	YSI 6820	14 <sup>th</sup> May 2005
<b>12-hour Continuous Water Quality Monitoring</b>			
Dissolved Oxygen and Temperature	YSI Model 6920 M	YSI 6920	14 <sup>th</sup> May 2005
Turbidity	YSI Model 6920 M	YSI 6920	14 <sup>th</sup> May 2005

**Monitoring Methodology and QA/QC Procedures**

***Routine Water Quality Monitoring***

*Instrumentation*

- 2.6 A multi-parameter meter (Model YSI 6820 CE-C-M-Y) was used to measure dissolved oxygen (DO), DO saturation, temperature and turbidity.

*Operating/Analytical Procedures*

- 2.7 All in-situ measurements were taken at 3 water depths, namely 1m below water surface, mid-depth, and 1m from seabed, except where the water depth was less than 6m, the mid-depth measurement was omitted. If the water depth was less than 3m, only the mid-depth position was monitored.
- 2.8 At each measurement, two consecutive measurements of DO, DO saturation, turbidity 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.

Laboratory Analytical Methods

- 2.9 For SS measurement, grab samples of mid-depth water 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.
- 2.10 The following table shows the standard test methods of the proposed determinants for laboratory analysis.

**Table 2-4 Methods for Laboratory Analysis for Water Samples**

<b>Parameters (Unit)</b>	<b>Analytical Method</b>
SS (mg/L)	APHA 2540 D

Notes: APHA = American Public Health Association: Standard Methods for the Examination of Water and Wastewater Ed. 19.

Maintenance and Calibration

- 2.11 Before each round of monitoring, a zero check in distilled water was performed with the turbidity probe of YSI 6820. The probe was then calibrated with a solution of known NTU.
- 2.12 Quality Control Reports for SS analysis by the HOKLAS Accredited Laboratory, WELLAB Limited, are attached in Appendix E.

***12-Hour Continuous Water Quality Monitoring***

- 2.13 The continuous water quality monitoring station was installed at Station WS. Water quality parameters of DO, DO saturation, turbidity and temperature were measured at intervals of 5 minutes for 12 hours (0700 to 1900).

**Results and Observations**

- 2.14 Water quality monitoring was conducted as scheduled until 10<sup>th</sup> June 2005. The weather conditions during the monitoring sessions were mainly sunny, fine or cloudy.
- 2.15 The monitoring data and graphical presentations of the monitoring results are shown in Appendix F, whereas the summary of exceedances is attached in Appendix G.

Routine Water Quality Monitoring

- 2.16 No exceedance of Action/ Limit Level for dissolved oxygen, turbidity and suspended solid was recorded in this reporting month.

12-hr Continuous Water Quality Monitoring

- 2.17 No exceedance of both Action and Limit Levels was recorded in the reporting month.

**3. ENVIRONMENTAL AUDIT**

**Site Audits**

- 3.1 Site audits were carried out on a monthly basis to monitor the timely implementation of proper environmental management practices and mitigation measures in the Project site.
- 3.2 A monthly site audit for this reporting month was conducted on 30<sup>th</sup> June 2005. The summary of site audit is attached in Appendix H.

**Status of Environmental Licensing and Permitting**

- 3.3 All permits/licenses obtained are summarized in Table 3-1.

**Table 3-1 Summary of Environmental Licensing and Permit Status**

Permit No.	Valid Period		Section	Status
	From	To		
<b>Environmental Permit</b>				
EP-131/2002	11/04/02	N/A	Design, construct and operate a waste disposal facility for industrial or special waste. The site is of 0.6 ha constructed with a single storey building of approximately 44m x 24 m in size. Scope of the construction includes: (i) civil engineering works, (ii) building works including building services, and (iii) operation of the facility	The EP has not been surrendered.
FEP-01/131/2003 (a copy was attached in the first monthly report)	30/07/03	N/A		Valid
<b>Construction Noise Permit</b>				
GW-UW0313-04 (a copy is attached in the monthly report for January 2005)	06/01/05	01/07/05	The use of powered mechanical equipment for carrying out construction work at Sum Wan, Siu A Chau on general holiday (including Sunday) between 0700 and 0700 hours on next day and on any day not being a general holiday between 1900 and 0700 hours on next day.	Valid
<b>Water Discharge License</b>				
EP760/934/0085411 (a copy was attached in the monthly report for December 2003)	22/12/03	31/12/08	Discharge of Industrial Trade Effluent arising from the construction activities (settlement facility) at the construction site for Low-Level Radioactive Waste Storage Facility at Sun Wan, Siu A Chau, Hong Kong.	Valid

**Review of Environmental Monitoring Procedures**

- 3.4 The water quality monitoring works conducted by the monitoring team were inspected regularly. The following observations have been recorded for the water quality monitoring works:
- 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 Waste Management**

- 3.5 The Waste Management Plan (WMP) was accepted with conditions by EPD on 30<sup>th</sup> September 2003 and the Contractor resubmitted WMP (Rev. B) on 9<sup>th</sup> October 2003.
- 3.6 A total of 2960 m<sup>3</sup> inert materials were disposed of at public fill and no C&D waste was disposed of at landfill in the reporting month. The waste management should follow the procedures in the approved WMP.
- 3.7 The monthly C&D Report in the reporting month is shown in Appendix I.

**Implementation Status of Environmental Mitigation Measures**

- 3.8 During site inspection in the reporting period, no non-conformance was identified. The observations and recommendations are summarized in Table 3-2.

**Table 3-2 Observations and Recommendations of Site Audit**

Date	Parameters	Observations	Remedial Actions/ Reminders
30 <sup>th</sup> June 2005	<i>Water Quality</i>	The drainage system was not well maintained e.g. filled with silt and soil.	The Contractor was reminded to improve the drainage channel properly for preventing surface runoff during the rainy day.
	<i>Air Quality</i>	No environmental deficiency was identified during the environmental site inspection.	<ul style="list-style-type: none"> <li>• The Contractor was reminded to implement dust mitigation measures more properly.</li> <li>• Water spraying should be provided to avoid dust generation.</li> </ul>
	<i>Noise</i>	No environmental deficiency was identified during the environmental site inspection.	N/A
	<i>Waste/ Chemical Management</i>	No environmental deficiency was identified during the environmental site inspection.	The contractor was reminded to clear the construction waste at collection depot more frequent to avoid accumulation.
	<i>Permit/ Licenses</i>	No environmental deficiency was identified during the environmental site inspection.	N/A
	<i>Others</i>	The environmental deficiency items identified in the previous site audit was rectified by the Contractor.	N/A

**Implementation Status of Event Action Plan**

3.9 The Event Action Plan for water quality is presented in Appendix J.

Routine Water Quality Monitoring

3.10 No exceedance of Action/ Limit Level for dissolved oxygen, turbidity and suspended solids was recorded in this reporting month.

12-hr Continuous Water Quality Monitoring

3.11 No exceedance of both Action and Limit Levels was recorded in the reporting month.

**Summary of Complaints and Prosecutions**

3.12 No environmental complaint and prosecution was received in the reported month.

3.13 The summary of Complaint Log is shown in Appendix K.

#### **4. FUTURE KEY ISSUES**

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

- 4.1 No environmental impact is anticipated as the dredging works have been completed.

## 5. CONCLUSIONS AND RECOMMENDATIONS

### Conclusions

- 5.1 The major marine construction works were completed on 10<sup>th</sup> June 2005. Environmental monitoring works were performed between 1<sup>st</sup> and 10<sup>th</sup> June 2005 in this reporting month and all monitoring results were checked and reviewed.
- 5.2 No exceedance of Action/Limit Level for dissolved oxygen, turbidity and suspended solids was recorded in this reporting month.
- 5.3 For 12-hr continuous water quality monitoring, no exceedance of both Action and Limit Levels was recorded in this reporting month.
- 5.4 Monthly site audit was performed in the reporting month on 30<sup>th</sup> June 2005. No non-conformance was identified during the site audit.
- 5.5 No environmental complaint and prosecution was received during the reporting month.
- 5.6 According to the environmental audit performed in the reporting month, the following recommendations were made:

#### Dust Impact

- To prohibit open burning on site.
- To regularly maintain the machinery and vehicles on site
- To implement dust suppression measures on dust-generating activities (e.g. site clearance)

#### Water Impact

- To implement proper mitigation measures to avoid surface runoff into the sea.
- To identify any wastewater discharge from site.
- To regularly maintain the sediment control measures.

#### Waste/Chemical Management

- To check for any accumulation of waste materials or rubbish on site.
- To avoid any discharge or accidental spillage of chemical waste or oil directly from the site.
- To avoid improper handling or storage of oil drum on site.

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