



中海壳牌石油化工有限公司  
CNOOC and Shell Petrochemicals Company Limited



# 15<sup>th</sup> Monitoring Report on the Environmental and Social Management Plan *- Environmental and Social Performance 2007*



PA-HSEQ-Operations-002

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## **Section 1 Introduction**

### **1.1 Purpose**

The Environmental and Social Management Plan (ESMP), in conjunction with the Monitoring Reports, is the mechanism by which CSPC (CNOOC and Shell Petrochemicals Company Limited) manages the environmental and social impacts associated with the CSPC Nanhai Petrochemicals Project. The goal of the management effort is to avoid or minimize adverse impacts and maximise beneficial impacts upon the local communities and environment. The goals of each monitoring report are:

- a. To track and report on the effectiveness of the measures and responsibilities identified in the ESMP.
- b. Inform on the augmentation or adjustment of mitigation measures.
- c. Identify any potential new areas of exposure, and
- d. Ensure findings are integrated into HSE and other appropriate management systems for the operational phase.

### **1.2 Structure**

The report structure addresses the environmental, social and health effects as well as the effects of accidents and emergencies. Each section will in turn deal with potential effects that were identified in the ESMP and will evolve to include future effects as and when they are identified. For each potential effect one or more indicators of performance have been identified for ongoing monitoring.

As the project has now entered the operational phase a number of specific construction effects identified in the ESMP are no longer appropriate and will not be included. In addition, CSPC will expend efforts to encourage involvement with other local industries and governmental agencies in collaborative monitoring of potential environmental and social effects as a result of industrial activities in the area. It should be recognized that collaborative monitoring of potential environmental and social effects is a positive step and has as its main purpose collective responsibility for all stakeholders, in the environmental and social conditions in Dayawan.

Wherever possible data reported is derived from independent or externally verifiable sources.

## **Section 2 Sustainable Development – Executive Summary**

CSPC has successfully managed social impacts during the Construction Phase of the Complex, as indicated by the follow-up monitoring of approximately 60 social economic and health parameters. The Complex has now successfully moved into the operational phase. It is CSPC intent to carry on meeting the commitments made in the Environment and Social Management Plan. These commitments will need to be reviewed over-time to ensure that the prevailing influence for responsibility is properly assigned, for example, greater involvement of the Local Authorities in collaborative monitoring and action.

In addition to the social and environmental monitoring, CSPC continues to exert efforts to promote the development of the local communities while paying special attention to vulnerable groups.

In 2007, 144 visits, to meet and consult with 58 stakeholders in the local communities were made. Maintaining dialogue and open communication is a critical element that CSPC are committed to establish.

In total, 2000 students and teachers from local schools attended the CSPC Open Day Program held in 2007. This event was educational, raising the awareness and creating a better understanding of what part CSPC plays in the Local Community and the benefits that CSPC products bring to the continuing growth and development of China.

Social empowerment initiatives have seen 113 resettled villagers attend the free craft training courses organized. 104 local primary and middle school students and 16 college students from the resettled villages received scholarship and grant aid to help them bridge their financial difficulties.

Contracts have been awarded to the resettled village companies that include laundry services for Fire Retardant Clothes and the collection of domestic waste from the CSPC Complex. These as with other contracts awarded have the purpose to provide CSPC with value for money services and the resettled villagers with sustained employment and income opportunities while help build their capacity through interactions with and coaching from CSPC.

In addition, About 30 resettled villagers currently work for CSPC's office service contractor and 60 resettled villagers work as either forklift truck operators or general workers for CSPC's logistic contractor.

## Section 3 Social Impact Monitoring

The Project has now entered the Operations phase. Adjustments have been made and will continue to be made in the parameters being monitored, measured and reported as a result of the potential impacts and effects of the Operation on the community. The parameters included below are presented as impacts that can result in either adverse or positive effect. A number of impacts that have been included below are recommended not to be included in future reports with reasons given.

### 3.1 Income levels of households of resettled villagers

**Monitoring result:** According to third party independent consultant Robert Barclay, “Mean monthly household income is presently about RMB 1200 higher than it was pre-resettlement. This increase is somewhat higher than was necessary to offset the increased household expenditure resulting from the rural to urban shift.” “Overall, the external monitoring panel assesses that conditions favourable to sustaining increases in resettler household income have been established.”

**Data source:** *Resettlement External Monitoring Report October 2007*

**Recommendation:** The income levels of resettled villagers will not be monitored since it has been verified by third-party independent consultant that CSPC has attained its goal of helping villagers restore or improve the livelihood of resettled villagers.

### 3.2 Status of vulnerable groups in resettled villages Those sectors of the population that may not benefit from the economic growth of the area.

**Monitoring result:** According to the statistics of the Dayawan Civil Affairs Bureau, as of December 2007, the number of the vulnerable of the resettled villages is 106, an increase of 14% compared with that in 2006. The internal monitoring found that this increase is attributed to age, disability and poor health.

**Data source:** The Dayawan Civil Affairs Bureau

### 3.3 Level of community knowledge and concern about project

**Monitoring result:** CSPC have been very active with Community Liaison activities and appointed a Community Liaison Officer to deal with any concerns raised by the Local Community with the project. All concerns raised during the construction period have been addressed to the satisfaction of the local stakeholder community.

Active engagement with the Local Communities and stakeholders is ongoing. The Community Liaison Officer has received enquiries about the steams from the Liquid Waste Incinerator and the Cooling Towers. Their concerns have been satisfactorily addressed.

**3.4 Implementation of RAP** The RAP (Resettlement Action Plan) has specified mitigations concerning the direct impacts on resettled people and villages. This included loss of houses, outbuildings, agricultural land, other losses assigned to individuals, loss of community land and loss of village infrastructure.

**Monitoring results:** The RAP resulted in these categories of mitigation: Payment of compensation, provision of housing, payment of allowances and provision of land entitlements to village collectives.

By now all terms have been complete in accordance with the RAP.

The third party external monitor assessed that “conditions favourable to sustaining increases in resettler household income have been established”, “Consultations with project affected communities ... clearly demonstrate that CSPC has earned the respect of its host and has been granted a true ‘license to operate’”.

**Data source:** *Resettlement External Monitoring Report October 2007*

**Recommendation:** The parameter will not be monitored since the RAP has been satisfactorily implemented.

**3.5 Fishery and Aquaculture Production (annual)** Marine transportation related to CSPC operation and its potential impact on the aquaculture and customary fishing industry.

**Monitoring result:** The fishery production in tonnage increased 2.6% in 2006 compared to 2005, while the total value of the fishery production increased by 0.07%.

In addition, fishermen have reported that their production has been decreasing over the past few years. Whilst fishery production figures can reflect both changes in human activity (less fishermen) and the availability of marine resources, that which can be outside the direct impact caused by marine transportation to and from the Complex.

**Data source:** The Dayawan Oceanic and Fishery Bureau

**3.6 Status of those dependent on fishery and aquaculture (annual)** Marine transportation related to CSPC operation could impact aquaculture and customary fishing industry.

**Monitoring:** The level and degree of economic health of fishing individuals / communities.

**Monitoring results:** This information will be updated once official information is available.

**3.7 General Health Indicators** As the project has moved from the construction and into the operation phase, the health impacts to migrant construction workers are no longer an issue.

**Monitoring results:** A number of health indicators that include any growth or improvement in health infrastructure and capacity are measured to determine the degree of positive health impacts. This monitoring and reporting is undertaken by the Local Governmental Agencies and includes:

- a) Health Status – Life expectancy at birth (10 years).
- b) Health Status – Life expectancy at 65 years (10 years).
- c) Health Status – Infant mortality rate (10 years).

A census was carried out in Dayawan in 2000 and includes data for all the above three indicators. This census will be carried out every 10 years.

- d) Community Health Care resources – Number of practicing physicians and nurses (annual).

The number of practicing physicians and nurses has increased by 8.4% from 190 in 2005 to 206 in 2006.

- e) Community Health Care resources – Number of hospitals and clinics (annual).

The number of hospitals and clinics is 3 in 2006 and has remained stable from 2001 to 2006.

- f) Community Health Care resources – Number of hospital beds (annual).

The number of hospital beds has increased by 6.9% from 145 in 2005 to 155 in 2006

**Data source:** The Dayawan Statistical Yearbook

- g) Health care utilization (annual) – Ongoing and historic data for the following indicators are provided by Huizhou CDC:

- i. Number of consultations with Doctors.
- ii. Childhood immunizations.
- iii. Number of inpatient admissions.
- iv. Numbers of acute care admissions.

**Note:** These parameters had been monitored during the construction phase of the Project primarily to assess the impact of construction workers. Since this impact does not exist since the 25,000 workers had left the area.

- h) Community health expenditure (annual) – Average health expenditure per urban individual includes the expenditure on pharmaceutical, healthcare insurance and anything related to healthcare.
  - v. Total expenditure on health.
  - vi. Total expenditure on health as compared to Huizhou GDP.

**Note:** This information will be updated once official information is available.

- i) Non-medical determinants (annual).
- j)
  - vii. Tobacco, alcohol and tea consumption – alcohol and tobacco use are not directly related to the project, but rather indicators of the state of health of a population.

**Note:** This information will be updated once official information is available.

- viii. Average household food expenditure (annual) – improved economic circumstances of residents may provide them with a better diet. However, due to the absence of BMI data, the annual household expenditure on food will be considered as a long-term measure to reflect improved nutrition.

**Note:** This information will be updated once official information is available.

- k) Demographic and economic context (annual).
  - ix. Total population
  - x. Gross Domestic Product

**Note:** This information will be updated once official information is available.

**3.8 Emergency** – monitoring and reporting will only occur following an accident or emergency and will include the following:

- a) Fire / explosion.
- b) Surface water contamination – hazardous material handling, storage or transport could result in surface fresh water contamination and associated adverse effect on habitat quality.
- c) Seawater contamination – hazardous material handling, storage or transport could result in seawater contamination and associated adverse effect on marine habitat quality.
- d) Soil contamination – hazardous material handling, storage or transport could result in soil contamination.

- e) Groundwater contamination - hazardous material handling, storage or transport could result in groundwater contamination.
- f) Injuries related to work – this will be given as a profile and will detail the incidence, type and severity.

The accident and emergency reporting against all the above indicators will be carried out annually and included in this report.

## **Section 4 CSPC Environmental Monitoring Results: Operational period 2007**

### **4.1 Scope**

This document details the environmental monitoring plans and results for the CNOOC and Shell Petrochemicals Company for the year 2007.

### **4.2 Purpose**

This document identifies the standards used to define and implement the monitoring requirements of the CSPC Complex. This includes the release points and the substances monitored for emissions to air, water and land. It also defines the community monitoring requirements. Furthermore, this document serves the purpose of reporting actual performance for the operating period defined in the report.

### **4.3 Acronyms / Definitions**

BOD5	Biological Oxygen Demand
COD	Chemical Oxygen Demand
Complex	CSPC Petrochemicals Complex
CPDP	Chinese Preliminary Design Package
CNOOC	China National Offshore Oil Company
CSPC	CNOOC and Shell Petrochemicals Company Limited
DO	Dissolved Oxygen
EISA	Environmental Impact Statement (2002) Amendment
ESIA	Environmental and Social Impact Assessment (2002)
ETP	Effluent Treatment Plant
HSE	Health, Safety and Environment
PRC	Peoples Republic of China
GEPA	Guangdong Environmental Protection Agency
NEPA	National Environmental Protection Agency
TSP	Total Solids Particulates
TSS	Total Suspended Solids
TOD	Total Oxygen Demand

### **4.4 Legislation**

The monitoring plans are based on the following requirements as a minimum:

- PRC National Regulations and Guangdong Provincial Regulations;
- CSPC requirements;

- Agreements between CSPC and PRC Authorities;
- Proposals in the EIS (1997 amendment) and the recommendations by NEPA and GEPA on the approval of the EIS (1997 Amendment);
- Recommendations of the ESIA (2002) and Marine EIA (2002);
- CPDP (2002); and
- Requirements for correct operation of the Effluent Treatment Plant (ETP), Evaporative Concentration Unit (ECU), Liquid Concentrate Incinerator (LCI), Wet Air Oxidation Unit (WAO) and Sludge and Waste Disposal Incinerators.

PRC Standards include:

- Ambient Air Quality Standard (GB3095-1996);
- Emission Standard for Odour Pollutants (GB14554-1993);
- Industry boundary limit noise standard(GB12348—90);
- Integrated Wastewater Discharge Standard (GB8978-1996);
- Emission Standard of Air Pollutants for Industrial Kiln and Furnace (GB9078-1996);
- Emission Standard of Air Pollutants for Thermal Power Plants(GB13223-2003);
- Pollution control standard for hazardous wastes incineration(GB18484-2001) ;
- Emission Standard of Air Pollutants(DB4427-2001) ;
- PRC National Integrated Emission Standard for Air Pollutants(GB 16297-1996) ;
- PRC Guangdong Provincial Standard for Effluent Discharge(DB4426-2001) ;
- PRC National Standard for Discharge of Effluent to Marine Waters(GB 18486—2001) ;
- PRC Identification Standard for Hazardous Wastes – Identification for Corrosive (GB5085.1-1996);
- PRC Identification Standard for Hazardous Wastes – Screening Test for Acute Toxicity (GB5085.2-1996);
- PRC Identification Standard for Hazardous Wastes – Identification for Extraction Procedure Toxicity (GB5085.3-1996); and
- PRC Classification of Hazardous Waste.

#### **4.5 Monitoring Programmes**

CSPC have designed and implemented monitoring plans for collecting data on ambient air and water quality and for the releases of concern from major point sources. In addition, CSPC monitor emissions and their environmental impacts on the receiving environment and consider this as an important element of the environmental protection plan for the Complex.

CSPC Complex is now in the Operational phase and as such has implemented a number of Operational monitoring programmes that include:

Monitoring within the Complex:

- Point source monitoring of stacks and vents;
- Monitoring of effluent discharge via subsea pipeline;
- Monitoring of effluent discharge via shore trench;
- Solid and hazardous waste;
- Groundwater quality;

Monitoring outside the Complex (in conjunction with GEPA and Huizhou Municipality as requested and as part of the collaborative arrangements of operators on the Daya Bay Industrial Park):

- Water quality in Daya Bay (adjacent to shore discharge, and at the outside edge of the subsea pipeline discharge mixing zone);
- Sediment quality in Daya Bay;
- Flora / fauna surveys (offshore).

#### **4.6 Operational Gaseous Emission Monitoring Results**

CSPC have in place point source release monitoring that provide feedback to pollution and prevention control systems and guide any necessary corrective action. This data is collated and monitored internally and forms part of the "Aspects Register" for the site operations. The results of this monitoring are sent to Daya Bay Environmental Protection Bureau monthly.

The parameters in the monitoring programme include:

- Flow rate;
- Temperature;
- Particulates;
- Sulphur Oxides;
- Nitrogen Oxides;
- VOC;
- Carbon Monoxide;
- Halogens (only for Environmental acceptance and when requested by the Authorities);
- Fugitive emissions;

- Other toxic materials (including metals).

CSPC monitoring programme has taken into account the recommendations made by PRC NEPA and include:

- In line monitoring systems at main waste water and gas discharge outlets; and
- Fuel oil has been chosen and purchased that enables CSPC to meet the emission limits set, particularly for SO<sub>x</sub> and NO<sub>x</sub>.

#### **4.6.1 Waste Incineration Facilities**

The waste incineration facilities on site have continuous monitoring of:

- NO<sub>x</sub>;
- SO<sub>x</sub>;
- CO
- Total dust;
- Organic carbon;
- Temperature of the combustion chamber, oxygen content, pressure and water vapour.

In addition emission sampling of the Incineration facilities is carried out at an agreed frequency, of as a minimum once per year, of the following pollutants:

- Particulates;
- Metals that include mercury, cadmium, thallium, antimony, arsenic, lead, chromium, copper, manganese, nickel and vanadium.

As a requirement of the Environmental emission performance acceptance testing of the site, the Incineration facilities have been tested for the following components to demonstrate negligible emissions:

HCl; and  
Dioxins.

#### **4.6.2 Air quality monitoring at site boundary and neighbourhood**

The following substances are measured at the site boundary:

- Total non-methane hydrocarbons (as C);
- Oxides of Sulphur (SO<sub>x</sub>);
- Oxides of Nitrogen (NO<sub>x</sub>); and
- Particulate matter.

These substances are measured in accordance with the principles described in the PRC Standards.

#### **4.6.3 Process Vents**

In cases when process vents cannot be recovered, CSPC ensure complete combustion of the substance by routing the substance to flare before release to atmosphere.

In cases when process vents cannot be routed to flare CSPC have in place abatement equipment designed specifically to ensure the pollutant discharge complies with permitted requirements.

#### **4.6.4 Fugitive Emissions**

Fugitive emissions include releases from:

- Compressors, pumps, valves, seals etc;
- Secondary emissions from open drains, sewers, oil/water separators, waste handling facilities, sewer systems, cooling water systems etc; and
- Losses from storage tanks.

In 2007 fugitive emissions have been calculated on mass balance loss. As part of a monitoring and improvement plan for environmental protection the use of a Leak Detection and Repair Programme (LDAR) to reduce fugitive emissions of VOC will be introduced and implemented across site from end 2008.

#### **4.6.5 Sampling and Analysis methods**

PRC sampling and analysis methods are followed.

#### **4.6.6 Releases of concern from major point sources**

Air emission standards have been set and are the maximum amounts of a pollutant that may be emitted by the CSPC Complex. These pollutants have been expressed as concentrations and as a total mass release, which reflects more directly the overall objective of reducing the total load on the environment. The emission standards set for the CSPC Complex have been established in

terms of what can be achieved with available technology and in terms of the impact of the emission on the ambient environment.

Table 4.6.6 represents the major air emission standards for compliance and results for 2007:

**Table 4.6.6**

Aspect Source	Pollutant	Averaged Bubble Concentration of whole site	Limit Total mass	Result 2007 Concentration	Result 2007 Total Mass (tons)
Boilers, Combustion Furnaces, Incineration Facilities and Process Vents	SOx	500mg/Nm <sup>3</sup>	5500 t/a	On spec	within limit
Boilers, Combustion Furnaces, Incineration Facilities and Process Vents	NOx	240mg/Nm <sup>3</sup>	4407 t/a	On spec	within limit
Boilers (1), Combustion Furnaces (2), Incineration Facilities (3) and Process Vents (4).	Particulate Matter	(1) 30 TSP (2) 200 TSP liquid fuel furnace, 20 TSP gaseous fuel furnaces (3) 20 TSP (4) 20 TSP	1837 t/a	On spec	within limit

#### 4.7 Operational Aqueous Effluent Monitoring

In compliance with the requirements of PRC National Integrated Wastewater Discharge Standard (GB8978-1996), CSPC have in place sampling equipment and a monitoring programme for each discharge outlet that gives priority to water quality management and knowledge that the discharge load from the Complex does not compromise the sustainability of the aquatic system and receiving environment.

There are two main aqueous effluent discharge points from the Complex. The main discharge to Daya Bay is from the Effluent Pumping Station via an undersea pipeline that has as its purpose to ensure minimal impact of the discharge on the receiving environment. The second discharge point from the site is concerned with non-contaminated water drain off. The quality of this discharge is also monitored and controlled to ensure requirements are met, and as a minimum is monitored to ensure that Total Petroleum Hydrocarbon content is <0.5 mg/l before drain off.

CSPC have in place point source release monitoring that provide feedback to pollution and prevention control systems and guide any necessary corrective action. This data is collated and monitored internally and forms part of the "Aspects Register" for the site operations. The results of this monitoring are sent to Daya Bay Environmental Protection Bureau monthly.

The parameters in the monitoring programme for the Effluent Pumping Station include:

- Volumetric flow (continuous in line monitoring);
- Total Oxygen Demand (TOD) (continuous in line monitoring);
- PH (24 hour composite sample);
- COD (24 hour composite sample);
- BOD5 (24 hour composite sample);
- Suspended Solids (24 hour composite sample);
- Dissolved Oxygen (24 hour composite sample);
- Sulphide (24 hour composite sample);
- Phenol (24 hour composite sample);
- Nitrate (24 hour composite sample);
- Ammonic Nitrogen (24 hour composite sample);
- Phosphate (24 hour composite sample);
- Cyanide (24 hour composite sample);
- Oil and Grease (24 hour grab sample);
- Total Petroleum Hydrocarbon (24 hour grab sample);
- Mercury (monthly);
- Cadmium (monthly);
- Chromium (hexavalent) (monthly);
- Arsenic (monthly);
- Lead (monthly);
- Nickel (monthly);
- Total Coliforms (monthly);
- Pesticides;
- Surfactants;

For controlled discharge into Daya Bay for non-contaminated water drain off:

- PH;
- Oil and grease;
- COD;
- Total Suspended Solids;
- Total Petroleum Hydrocarbon.

#### 4.7.1 Sampling and Analysis Techniques

The measurement techniques stipulated by the PRC Integrated Waste Water Discharge Standard are used. For analysis of streams that there is no PRC method available World Bank standards will be used.

#### 4.7.2 Releases of concern from major point sources

Water emission standards have been set and are the maximum amounts of a pollutant that may be emitted by the CSPC Complex. The emission standards set for the CSPC Complex have been established in terms of what can be achieved with available technology and in terms of the impact of the emission on the receiving environment.

**Table 7.2.1**

Aspect Source	Pollutant	Limit	Result 2007
<b>Effluent Pumping Station</b>	COD	100 mg/l	within limit
	pH	6-9	
	Total Suspended Solids (TSS)	70 mg/l	
	NH4-N	10 mg/l	
	Oil and Grease	10 mg/l	
<b>Non Contaminated Water Discharged to Shore</b>	Total Petroleum Hydrocarbon	50 mg/l	within limit
	Oil and Grease	10 mg/l	
	pH	6-9	
	COD	100 mg/l	
	Total Petroleum Hydrocarbon	0.5 mg/l	
	Total Suspended Solids (TSS)	70 mg/l	

#### 4.8 Solid and Hazardous Waste Monitoring

CSPC monitor all solid waste resulting from site operations to determine the most acceptable treatment, storage, transport and disposal methods to be used. Any wastes that may leach toxic

materials, such as heavy metals, are analysed for their leachability. Each shipment going for disposal is certified for composition and toxic properties to ensure safe transportation and disposal.

CSPC have implemented a philosophy on waste that, put simply is expressed:

“Waste should be managed and not merely disposed of”. To enable this philosophy the following strategies are part of the waste management at the CSPC Complex:

- Reduction – minimizing the amount of waste generated at source and/or minimizing the hazardous components of waste;
- Re-Use – putting used items back into use;
- Recovery – capturing used materials and reprocessing them in some way. This includes recycle of materials and recovering energy from materials, e.g. power generation;
- Disposal – although the least favoured option, this includes disposal to landfill or incineration using the site incinerators.

CSPC follows a code of practice in the management of solid and hazardous waste that is summarized in the following four steps:

- All waste is clearly identified by analysis and categorized with detail of any hazards it may present. This is described on the transfer note from the producer to the receiver.
- Waste is stored in a proper manner, so that it is not spilled, will not leak or be blown about. The waste stored on the Complex is done so with safety and security and different types of waste are handled and stored separately.
- A Registered Carrier who holds a current license to carry that waste does all collection of waste on site. As the waste producer, CSPC furthermore audit and inspect the registered waste carrier to ensure compliance with requirements.
- CSPC audit and inspect the final disposal place to ensure that disposal methods being used by the Landfill Site is following acceptable health, safety and environmental standards.

All waste arising from CSPC site is analysed and monitored whether transported and disposed of at the site incineration facilities or transported off-site for disposal.

The wastes are categorized accordingly:

#### **4.8.1 Operational Hazardous Waste exported from Complex**

Each shipment is categorized and monitored for Metals including:

- Mercury;
- Arsenic;

- Lead;
- Chromium;
- Cadmium;
- Vanadium;
- Nickel;
- Copper.

#### **4.8.2 Operational Non-Hazardous Waste exported from Complex**

Each shipment is categorized and monitored for Metals including:

- Mercury;
- Arsenic;
- Lead;
- Chromium;
- Cadmium;
- Vanadium;
- Nickel;
- Copper.

#### **4.8.3 Operational Waste exported from Complex for Metal recovery / reuse**

Each shipment is categorized and monitored for Metals including:

- Mercury;
- Arsenic;
- Lead;
- Chromium;
- Cadmium;
- Vanadium;
- Nickel;
- Copper.

#### **4.8.4 Operational Waste sent to Complex Incineration facilities**

To be based on the nature of the waste and may include:

- Oil;
- Sulphur;
- Heavy metals (Cd, Cr, Hg, As)

#### **4.8.5 Internal Key Performance Indicators and Targets**

Waste management performance is monitored and reviewed. The total hazardous waste transported from the CSPC Complex for disposal as a percentage of the total waste generated from site operations is for 2007, is less than 5% hazardous waste of the total waste generated.

#### **4.9 Noise Monitoring Programme**

The noise monitoring proposed in the EIS (1997 Amendment) has been carried out in 2006 at distinctive times between day (06:00 – 22:00) and night (22:00 – 06:00) and comply with the specified standards and conditions. CSPC discontinue noise monitoring at the outside of complex from 2007 because the noise level generation has change considerably due to the industrial expansion and also the noise generation by CSPC is very stable during normal operational phase.

#### **4.10 Groundwater Quality Monitoring**

CSPC have founded water-monitoring wells for ground water monitoring to ensure that the ambient quality of the groundwater is not impaired due to production. The wells have been sited upstream (x2) and downstream (x2) on the Complex to ensure that shallow groundwater is not contaminated. The wells provide CSPC complex with background data about quality, the flow regimes of both shallow and deep aquifers and whether any contamination has occurred due to spills on site. Table 10.0 below indicates the minimum substance testing.

**Table 10.0**

<b>Location</b>	<b>Description</b>	<b>Substance</b>	<b>Results 2007</b>
<b>On-Site</b>	Up gradient (x2) Down gradient (x2)	pH COD Oil (TPH) Benzene TSS Inorganic Nitrogen	within limit

#### **4.11 Marine EIA 2002**

CSPC emission into the Marine environment has been monitored in 2007 and the Complex past Marine Environmental Acceptance in 2008.

Petroleum hydrocarbon is the main pollutant concern with heavy metals such as Cr, Pb, and Hg. The objective is to monitor toxin accumulation, such as total petroleum hydrocarbon, inside the body of the marine habitats. In addition the long-term variation of water quality and sediment at specific locations can be studied and analysed. Daya Bay authorities will continue to monitor the condition of offshore sensitive habitats and receptors. Where habitats are at risk from cumulative impacts caused by industrial activities, CSPC will advocate collaborative monitoring and the implementation of corrective action where necessary.

#### **4.12 Collaborative Regional Monitoring**

CSPC will continue to pay attention to those natural resources over which the “near field” impacts of the Complex are likely to extend. CSPC will fulfil this obligation by active participation in collaborative programmes with PRC authorities and/or other bodies as operated or planned by organizations such as WWF.

#### **4.13 Environmental Incidents**

CSPC manage the impact of operation on the environment. Management controls, programmes, monitoring, collection of data, internal and external review and reporting of performance, are all part of the CSPC Environmental Management System.

Reporting of environmental incidents to PRC Authorities is a requirement of CSPC License to Operate. In addition CSPC have in place a developed process of internal incident and near miss reporting to enable timely corrective action and prevention. Key performance indicators are set with targets that enable environmental performance meet, as a minimum, PRC regulatory limit.

During the operation of the Complex in 2007 there was no reportable incidents occurred requiring reporting to the PRC authorities.

There were no spills occurred in unbounded areas of the Complex or offsite facilities during 2007.

## **Section 5 Injuries or illnesses related to work**

### **5.1 Classification of Injuries and illnesses**

A number of definitions are used that distinguish the extent and severity of the injury and include:

- a. First Aid Case (FAC) – this is any single treatment and subsequent observation of minor scratches, cuts, burns, bruises, splinters etc. that do not normally require medical care by a physician.
- b. Medical Treatment Case (MTC) – Any work related injury that involves neither lost workdays or restricted workdays, but which requires treatment by a physician or other medical specialist and include; treatment of infection, application of antiseptics during second or subsequent visit to medical personnel, treatment of second or third degree burns, application of sutures, removal of foreign bodies from the eye, etc.
- c. Restricted Work Case (RWC) – Any work related injury, which renders the injured person temporarily unable to perform all, but some, of their normal work on any day after the day on which the injury occurred.
- d. Lost Time Injury (LTI) – Any work related injury that renders the injured person temporarily unable to perform their normal work or restricted work on any day after the day on which the injury occurred.
- e. Occupational Illness – Any work related abnormal condition or disorder, other than one resulting from an injury that is caused by or mainly caused by exposure at work (50% or more probability that the illness was caused by exposures at work).
- f. Permanent partial disability – injury or illness that affects work performance in the longer term, such as prolonged absence from work. Irreversible health damage without loss of life, e.g. noise induced hearing loss, chronic back injuries, sensitization, hand / arm vibration syndrome, repetitive strain injury, etc.
- g. Permanent total disability – from an injury or occupational illness. Includes irreversible health damage with serious disability, such as corrosive burns, heat stroke, cancer, etc.
- h. Fatality – a death resulting from a work related injury or occupational illness.

### **5.2 Injury or illness incidence**

A number of definitions are used to indicate the incidence of injuries or illnesses and include:

- a Total Reportable Case Frequency (TRCF) – the sum of all reportable cases (MTC, RWC, LTI) per million exposure hours.
- b Total Reportable Occupational Illness Frequency (TROIF) – the sum of all reportable cases (TROI, LTOI) per million exposure hours.
- c Lost Time Injury Frequency (LTIF) – The number of lost time injuries per million exposure hours.

- d Lost Time Occupational Illness Frequency (LTOIF) – the sum of lost time occupational illnesses per million exposure hours.
- e Work related activities – those activities for which management controls are or should have been in place. Injuries or illnesses occurring in the course of work related activities are work related.

### 5.3 Injury and Illness Performance Summary for 2007

Exposure Hours	LTI	RWC	MTC	Occupational Illness	FAC	TRCF	LTIF	TROIF	LTOIF
7,584,037	0	0	10	1	25	1.32	0	0.13	0

### 5.4 Summary:

A total of **11** reportable injuries including **10** medical treatment cases and **1** occupational illness as a result of heat stress occurred during site operation in 2007. **Zero** injury resulted in lost time; **Zero** injury resulted in restricted work. In addition, there were a total of **25** first aid cases of very minor injury.