

**Terms of reference**  
for consultant  
for Assessment of Contamination and Design of Remediation Plan for five  
contaminated areas in the state of West Bengal

**Capacity Building for Industrial Pollution Management Project (CBIPMP)**

## **1. INTRODUCTION**

The Government of India, through its Ministry of Environment & Forests, will be implementing a World Bank funded project titled “Capacity Building for Industrial Pollution Management” with the objective of strengthening the environmental management capacity of central and state level regulatory authorities with emphasis on rehabilitation of polluted sites and for undertaking area-based demonstration projects on remediation of contaminated sites. The project also aims at developing a “National Program for the Rehabilitation of Polluted Sites” to reduce or eliminate the environmental and health risks associated with legacy pollution.

## **2. PROJECT DESCRIPTION**

Specific laws for management of hazardous wastes were first promulgated in India in 1989 and this was followed by a decade of inadequate implementation. Only recently, industrial units have started proper storage and disposal of hazardous wastes, mostly through common hazardous waste treatment and disposal facilities. Till the time such disposal facilities were developed most hazardous wastes were illegally and indiscriminately dumped on land, ditches, rivers, etc. which resulted in an abundance of contaminated sites throughout the country most with high risk potential. A large volume of industrial waste was also dumped alongwith municipal waste thus contaminating most of the municipal landfills in the country.

Most states in India have identified some illegal dumpsites or legacy sites in compliance of the Hon’ble Supreme Court Directive of 2003 but there are still a significant number of sites that are yet to be identified. A few of these sites have been assessed to determine the level of contamination but many more remain to be assessed. The project aims to tackle the issue of contaminated sites and develop the capacity of the regulatory institutions through a “learning by doing” approach.

Two states, Andhra Pradesh and West Bengal, have been identified for undertaking remediation of some identified contaminated sites as demonstration projects suitable for scale up. The State Pollution Control Boards of the two states will be responsible for implementation of the project at the state level.

The project will have the following three distinct components for implementation in West Bengal :-

- i. Strengthening of Environmental Institutions - this component is aimed at building the capacity of the environmental institutions for addressing pollution remediation issues through targeted technical assistance in hazardous waste inventurisation and contaminated site assessment studies, trainings related to hazardous waste management, laboratory infrastructure enhancement for analyzing hazardous waste samples and establishment and support of Environment Compliance Assistance Centres (ECAC)
- ii. Investments in Priority Investments and Environmental Improvements - Remediation of a group of seven legacy polluted sites in Hooghly district and closure/ containment of the old Dhapa dumpsite in Kolkata will be conducted in West Bengal as part of this component
- iii. Project Management - for effective and transparent implementation of the project.

### **3. OBJECTIVE**

The objective of this consultancy shall be to

- i. Carry out detailed assessment of five identified contaminated regions in the State as described in "Site Description"
- ii. Determine whether remediation is necessary
- iii. Suggest possible remedial actions
- iv. Select best available remedial measure and prepare remediation plans

### **4. SITE DESCRIPTION**

The consultant shall conduct a detailed assessment of the following five identified contaminated sites :-

- o Durgapur (area surrounding M/s Durgapur Chemicals Ltd.) and Khardah (area around M/s Hindustan Heavy Chemicals Ltd.) for mercury contamination
  
- o Belda (around M/s Belda Chemical Industries), Dankuni (area around M/s Calcutta Chemical Products) and Durgapur (area surrounding M/s Durgapur naphthalene) for naphthalene contamination

Though mercury and naphthalene are expected to be the principal contaminants, other contaminants are also expected to be present. The units mentioned are the suspected major source of the contaminants. Hence, the source of the principal contaminants may not be limited to these units alone. In absence of appropriate regulation and a regulatory mechanism, hazardous wastes from these industries had probably been dumped in the immediate neighbourhood leading to surface water, groundwater, soil and sediment contamination.

The Durgapur and Khardah regions are highly industrialized areas and the two chlor-alkali units namely M/s Durgapur Chemicals Ltd. in Durgapur and M/s Hindustan Heavy Chemicals Ltd. in Khardah have been in operation since 1963 and 1946 respectively. Initially when there were no regulations to prevent discharge of pollutants to water and land, almost all the mercury laden wastewater was discharged to the river / canal flowing alongside the units. Later, when regulatory restrictions were imposed, the units started burial of mercury bearing sludge within their premises initially with no protective barrier to prevent groundwater contamination. It is expected that the mercury has contaminated the underlying aquifer, the river beds and the neighbouring land.

The three naphthalene processing units identified as sources of naphthalene contamination are extremely small units having minimal knowledge of the hazards associated with naphthalene disposal. One of the units located in Belda (now closed) had contaminated the groundwater wells which were drinking water sources for the neighbouring population. The stored wastes were removed and the unit was closed but the extent of contamination had not been estimated. The contamination due to the other two units in Durgapur and Dankuni, have never been analysed thus leaving high chance of groundwater contamination.

## **5. SCOPE OF SERVICES**

The consultant shall conduct the assessment studies to provide the following information :-

1. A description of the site's hydrogeology
2. Identification of the types of contaminants and their concentrations
3. A description of the horizontal and vertical extent of contamination; an estimate of the volume of soil that has been contaminated
4. Source of contamination
5. Extent of groundwater contamination in terms of volume
6. Expected contaminant migration route and rate
7. Existing and future potential of health and environmental hazards

## **6. METHODOLOGY**

The work will be carried out through the following broad steps:-

### **Step 1 - Preliminary site assessment**

Preliminary site assessment is to be carried out for each of the sites through

- Visual inspection of the area surrounding the source industries
- study of topographical, geological, soil and flood plain maps, published reports on land use, rainfall rates, groundwater and soil conditions, vegetation, etc.,
- study of previous site investigation reports
- study of scientific literature
- discussion with local people and other informed people, district administrative, municipal and regulatory authorities, NGOs, etc.
- other methods as may be appropriate

The West Bengal Pollution Control Board (WBPCB) will provide all relevant documents, investigation reports, laboratory results, etc. available with the Board. The Board will also write to relevant agencies to provide required information and documents whenever required by the consultant but the consultant will remain responsible for collecting the said documents.

A description of the sites shall be developed after the preliminary assessment is completed detailing physical site characteristics, contaminant characteristics and possible extent of contamination.

## **Step 2 : Development of Sampling protocol and Quality Assurance/ Quality Control (QA/QC) Program and Field Investigation**

A field investigation is to be conducted to identify the contaminants and establish the extent and location of contamination. This should be conducted in two steps - geophysical site screening to identify areas of greatest contamination (hot spots) and comprehensive sub-surface investigation. The work will consist of the following:-

- conduct a screening sampling and analysis to identify areas of greatest contamination and establish a sampling program
- determine soil type and porosity
- determine contaminant concentration at surface level, in test pits, bore holes, monitoring wells, nearby water bodies, etc. through soil, groundwater and surface water sampling

All samples collected shall be ~~sent for analysis to the Central~~ analyzed in a Laboratory ~~of the~~ approved by WBPCB or other laboratories recognized by the Ministry of Environment & Forests, Govt. of India, ~~in consultation with WBPCB.~~

## **Step 3 : Risk Assessment**

Based on the findings of the field investigation, the consultant should conduct a Site specific Risk Assessment (SSRA) to determine whether or not remediation is necessary and also the scope of remediation. The following work will be done before performing the risk assessment exercise :-

- Identify types of contaminants and their concentrations

- identify source of contamination,
- establish the horizontal and vertical extent of contamination and estimate the volume of soil , surface water and groundwater that has been contaminated
- predict expected contaminant migration route, rate of migration, fate of the contaminants, possible degradation processes and transport mechanisms
- highlight existing and future potential of health and environmental hazards considering the ultimate land use, potential receptors and extent of expected exposure

The hazard potential of the sites will be ascertained as part of the SSRA and the sites will be ranked accordingly to help in prioritising remedial action.

**Step 4 : Development of Remediation Plan for each site**

The consultant shall

- list and evaluate best available practices for remediation of the contaminated sites (soil, surface water, groundwater, etc.) based on cost, complexity, effectiveness, execution problems, previous performance of the practices, safety, locally available skills, etc.
- identify the best remedial option and prepare a remediation plan keeping in view the future land use and target contaminant concentrations

**7. REPORT AND DELIVERY SCHEDULE**

The delivery schedule shall be as follows :- - the number and the time line doesnot match. Please check?

Sl. No	Task	Time (months)					
1	Preliminary site assessment_	4					
2	Development of Sampling protocol and Quality Assurance/ Quality Control (QA/QC) Program and Field Investigation_	6					
3	Risk Assessment			6			
4	Development of Remediation Plan				6		

The consultant shall submit :- Pleased check the time lines here and the above schedule does not match. Also the time seems to high. 60 weeks is too high. It doesn't require more than 12-15 months

- First Interim Report after preliminary site assessment (three colour hard copies in each case) within 20 weeks of work order issue
- Second Interim Report after completing field investigation (three colour hard copies in each case) within 32 weeks of work order issue
- Draft final report with proposed remedial plan (three colour hard copies) within 54 weeks of work order issue
- Final report (10 hard copies and 3 electronic copies, all in colour) after incorporating changes suggested by the Board within 60 weeks of work order issue

The consultant shall also make presentations before the Project Steering Committee and the Project Implementation Unit on their activities after field investigation and after submission of draft final report. Presentations before the Technical Evaluation Panel of the MoEF shall be made as and when required.

8. **CONSULTANT/ FIRM QUALIFICATIONS - please indicate the core team required and its experience and qualification**

The consultant/ firm will be an international or domestic firm with past experience of

- a. Working on contaminated site assessment,
- b. Working with various contaminant types, and
- c. Contaminated site remediation work

The consultant/firm will be familiar with Indian industrial and environmental policies, enforcement mechanisms, compliance issues, industrial setup, land use planning, etc.

The Team Leader or Principal Investigator will have at least 10 years experience in the field of hazardous waste management including assessment of contaminated sites, undertaking risk assessment studies, preparing remedial plans, etc.

The consultant/firm must have an adequate number of qualified technical and scientific staff to assist the Team Leader or Principal Investigator.