# Chapter-VI

## Environmental Monitoring Programme

### 6.1 Introduction

For effective implementation, a time bound action plan for environmental management including all aspects is to be prepared by the project.

Samples for study of air quality, water quality and noise level are to be collected and tested quarterly at strategic places representing all the categories of location. The Implementing Authority will be guided and advised by feed back data obtained from these tests.

### 6.2 Parameters to be monitored

**Ambient Air Quality, Water Quality and Ground Water Level & Noise Level**

Ambient air quality, water quality (mine discharge and drinking water samples), ground water level and noise level will be monitored for standard parameters.

**Plantation**

Plant growth, its maintenance and survival rate will be monitored. This is already being implemented through Forest Department in other running projects.

**Land Reclamation and Plantation**

Overburden to be excavated, backfilled, the plantation schedules etc. will be monitored in the light of EMP.

**Health**

Health of the employees will be examined for identifying occupational diseases etc. to initiate remedial measures in time. This is already being implemented by NEC in other running projects by way of peridic Medical Examination as per DGMS guidelines.

### 6. 3 Monitoring Frequency

**Air, Water & Noise :** Following number of stations have been fixed for monitoring of environment for the present and proposed expansion project.
i. Ambient Air:-3 Stations ii. Water:- 3 Stations iii. Noise:- 3 Stations

**Monitoring frequency for air quality:** Air quality monitoring at three locations including industrial and residential areas will be done at a frequency of two days in a quarter

**Monitoring frequency for water quality:** One mine discharge water sample from the proposed workings, two potable water samples to residential areas will be monitored at a frequency of once every quarter for all the parameters as per MoEF guidelines / Indian Standard. The drinking water samples will be compared with IS: 10500 standard and mine discharge water samples will be compared with MoEF Schedule-VI standard.

**Monitoring frequency for ground water quality:** Ground water level and ground water quality monitoring will be undertaken 4 times in a year in the months of January, May, August and November in each year on a long term basis. The ground water samples will be compared with IS: 10500 standard once every year.

**Monitoring frequency for noise level:** The noise level observations will be made as per Environment Protection Act GSR 1063(E) Schedule III at all the ambient air quality stations. The noise level will be monitored once every quarter during day time (6 AM to 9 PM) and night time (9 PM to 6 AM)

**Plantation :**Monitoring will be continuous up to 3 years so that desired growth of plants and trees is attained.

**Land Reclamation and Plantation:** Monitoring will be carried on till fulfillment of action plan of EMP and that of set-out technical guidelines, directives of different Government Departments like Department of Agriculture, State Forest Department and Forest Research Institute and statutory guidelines from Regional Office of Ministry of Environment and Forest, Govt. of India.

**Health :** Monitoring of health of the workers and staff for identifying occupational diseases etc. in time and initiating remedial measures is being done regularly.

**Compensation to land losers:** This will be monitored as per time frame in accordance with EMP.

## 6. 4 Measurement Methodologies

**Air Quality:** The Suspended Particulate Matter. (SPM), Respirable, Particulate Matter (RPM), Sulphur dioxide ($SO_2$) and Oxides of Nitrogen ($NO_X$) concentration in downwind direction considering predominant wind direction, at a distance of 500 metres from the following dust generating sources shall be measured in the manner indicated below:

| Sl. No. | Parameter | Technique | Technical Protocol | Minimum Detectable Limit µg/m$^3$ |
|---|---|---|---|---|
| 1 | Suspended Particulate Matter | High Volume Sampler (Gravimetric Method) | IS:5182 (Part-IV) | 1.0 |
| 2 | Respirable Particulate Matter | Respirable Dust Sampler (Gravimetric Method) | IS:5182 (Part-IV) | 1.0 |
| 3 | Sulphur Dioxide | Modified West & Gaeke | IS:5182 (Part-II) | 4.0 |
| 4 | Oxides of Nitrogen | Jacob & Hochheiser | IS:5182 (Part-VI) | 4.0 |

In addition to the general laboratory and analytical facilities, the following sampling and analytical equipment shall be used.

| Sl. No | Name of the Equipment |
|---|---|
| 1 | High Volume air samplers. |
| 2 | Multi gas air samplers. |
| 3 | Wind recorder |
| 4 | Aneroid Barometer. |
| 5 | Wet & Dry Bulb Thermometer |
| 6 | Hygrometer |
| 7 | Rain Gauge |
| 8 | Dust Fall Jar & Stand with bird Guard. |
| 9 | Spectrophotometer. |

**Water Quality**: Three litres of representative water samples will be collected in plastic container and transported to laboratory for physico-chemical analysis. For determination of BOD and bacteriological analysis, 250 ml pre-sterilized bottles will be used and care will be taken to maintain cool temperature by keeping the bottles in ice boxes during transportation to the laboratory for analysis. Physico-chemical and bacteriological parameters for drinking water samples will be compared with IS: 10500 standard and mine discharge water samples will be compared with MoEF Schedule-VI standard. The methodology of analysis for drinking water and mine water samples are given below.

**Methodology of analysis for drinking water and industrial effluent**

| Parameters | Method of analysis | Detection Limit |
|---|---|---|
| Colour | Photometric | 1 |
| Odour | Physically | - |
| pH | Electro-metric | 0.01 |
| Taste | Physically | - |
| Turbidity | Photometric | 0.1 |
| Total Residual free chlorine | Volumetric (Titration) | 0.04 |
| Total Hardness | Volumetric (Titration) | 0.5 |
| Chlorides | Volumetric (Titration) | 0.25 |
| Dissolved solids | Gravimetric | 0.1 |
| Calcium | Volumetric (Titration) | 0.02 |
| Sulphate | Nephlometric | 1 |
| Arsenic | As-Kit | 0.01 |
| Mercury | AAS | 0.001 |

| | | |
|---|---|---|
| Lead | AAS | 0.05 |
| Cadmium | AAS | 0.01 |
| Hexavalent Chromium | Photometric | 0.01 |
| Copper | AAS | 0.02 |
| Zinc | AAS | 0.02 |
| Selenium | Photometric | 0.01 |
| Fluoride | Photometric | 0.01 |
| Phenolic Compounds | Extraction/Photometric | 0.001 |
| Manganese | AAS | 0.05 |
| Iron | AAS | 0.05 |
| Nitrate | Photometric | 0.01 |
| Alkalinity | Titration | 0.5 |
| Boron | Photometric | 0.01 |
| Most Probable Numbers (MPN) | Multiple tube fermentation technique | 1 |
| Dissolved Phosphate | Photometric | 0.01 |
| Free Ammonia | Photometric | 0.02 |
| Nickel | AAS | 0.1 |
| Sulphide | Photometric | 0.01 |
| Total Chromium | AAS | 0.1 |
| Total Kjeldahn Nitrogen (TKN) | Photometric | 0.02 |

In addition to the general laboratory and analytical facilities, the following sampling and analytical equipment shall be used.

**Noise Level**: Guidelines prescribed by the Director General, Mines & safety (DGMS) shall be complied with.

The noise level meter capable of measuring equivalent sound pressure level shall be used for noise level measurement.

## 6. 5 Emergency Procedures

The term ‘major accident’ means an unexpected and sudden occurrence of event from abnormal developments in course of one’s industrial activity leading to a serious danger to public or environment, whether immediate or delayed, inside or outside the installation involving one or more hazardous substances.

Keeping in view the three basic principles i.e. prevention, preparedness( both pro-active and reactive) and mitigation of effect through rescue, recovery, relief and rehabilitation, a comprehensive blue print of disaster management plan(DMP)is to be prepared for Tikak Extension OCP incorporating the following:

-Identification and assessment of risks

-Recommendation of measures to prevent damage to life and property against such risks.

The emergency procedures have been discussed in Chapter VII

## 6. 6 Manpower for Managing the Environmental System

Environmental cell at the area and Corporate level will take all necessary care to implement and monitor pollution control measures and for overall environmental management. It will look after the following aspects of environmental management-

- Generation of environmental data bank

- Monitoring of project implementation along with environmental control measures.

- Co-ordination for timely implementation of compliance-conditions of Environmental clearance of the project.

- Liaison with MOEF and Assam Pollution Control Board.

**Corporate Level**

Environmental Cell headed by CGM, NEC, CIL will provide necessary support required for environmental management of project.

**Area Level**

The GM/CGM of the area will co-ordinate the rehabilitation scheme, land reclamation, biological reclamation/plantation and other environmental control measures including environmental quality monitoring in consultation with CIL HQs, State Govt., Environmental cells [Area/ NEC], State Forest Department and Area Staff Officer (Environment Management and Control). The Area Staff Officer (Environment Management and Control) gets the necessary staffs and other infra-structural facilities for effective implementation of various measures from the office of GM/CGM of the Area.

**Project Level**

The environmental management activities of the project will be carried out under the overall control of the CGM/GM of the Area through the Staff Officer (Environment Management and Control) as the project Officer. The Agent will not be able to co-ordinate and devote the required time in view of production and other operational pressing needs. The following persons will be required :

**Land Reclamation**

Superintending Engineer (Environment Management and Control)
R & R /Land Officer
Water Tanker Operators
Dozer Operators
Scraper Operators
Grader Operators
Truck Operators
Tractor Operators
General Mazdoor

**R & R Activities**

This activity will be carried out by the R & R Officer who will be under the control of the Staff Officer (Environment Management and Control).

Following persons will be responsible for the works mentioned hereunder:

Chief General Manager, NEC Area
Project Officer, Tikak Extension OCP
Land Survey and Revenue Deptt. NEC (HQ)
Representative from State Govt

**Pollution Control Measures**

Chief General Manager, NEC Area

Project Officer/Environmental Cell, NEC Area

Environmental Cell, NEC HQ

**Plantation/Green Belt Development**

Chief General Manager, NEC Area

Project Officer/Environmental Cell, NEC Area

Environmental Cell, NEC (HQ)

**Land Restoration**

Chief General Manager/General Manager, NEC Area

Project Officer/Environmental Cell, NEC Area

Environmental Cell, NEC (HQ)

## 6.7 Environmental Budget

The following budgetary provision has been made for environmental control measures**.**

- Capital : Rs. 240.00 Lakh
- EMP preparation cost : Rs. 20.00 Lakhs
- Mine closure Fund (proposed) : Rs. 1.00/tonne

## 6.8 Procurement Schedule

The environmental monitoring programme will be implemented by an external agency having suitable manpower and well equiped laboratory and other infrastructure the job in a competent manner. The cost of the same will be met from revenue account as per the prevalent practise being followed in other projects of NEC.