

Chapter-XI

SUMMARY AND CONCLUSION

11.1 Introduction

Purpose of the report

The Tirap and Tikak opencast mines are at present the only coal producing opencast mines in NEC. The projectised balance mineable reserves at Tirap OC mine would last for another 3-4 years at the current rate of production. Thus the Tirap OC mine is nearing its closure.

Tikak OC mine would be the only OC mine producing coal at the rate of 1.20-1.25 lakh tonne per annum for another 12-15 years.

By closing one OC mine producing coal at the rate of 3.40-3.50 lakh tonne per annum would bring down NEC further into red. The demand of coal as well as overall economics of the northeastern coalfields has therefore necessitated for looking at alternatives. Thus, the alternative lies in increasing opencast production in current economic situation.

The proposed project will be able to compensate partly for the loss of production due to closure of Tirap opencast mine.

Identification of project & project proponent

Tikak Opencast project is one of the new coal project of the Makum Coalfields in the Tinsukia District of Assam of North Eastern Coalfields (NEC). NEC is proponent of the mine and it is under administrative control of Coal India Limited. Coal India Limited is a Public sector Undertaking of central government India and functioning under the Ministry of Coal, Govt. of India.

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Location, Nature and size of the project

The proposed Tikak Extension OCP is located in the north-central region of Makum coalfield, Dist : Tinsukia, Assam.

Geographical Location

- **Latitude** 27°15' to 27°25'
- **Longitude** 95°40' to 95°5'
- **Survey of India Topo sheet number** 83M/11,83M/15 and 92A/3
- **Elevation above Mean Sea Level** 150m -155 m
- **Total mining lease area (in ha.)** 192 ha

11.2 Project Description

Technology and process description

Highly inclined seams in the proposed mining area attain a depth of nearly 70 m within a length of 200 m and surface level varies from 225 m to 425 m within a distance of 1.50 km. Presence of faults and underground workings make the mining conditions more difficult. The area experiences very high rainfall during rainy season, during which the mining operations have to be stopped.

Coal of these seams is soft and powdery in nature and overburden contains weathered rock as well as hard sandstone, shale etc. which require blasting. 0.20 Mt. Of coal will be produced per annum from three coal seams and quantity of OBR is 2.44 Mcum per annum from numerous benches. Limited strike length of benches and narrow working space have been considered in

the proposed mining system. Technology options are guided by these factors mainly.

Limited extent of the deposit, variable thickness of coal and floor structure makes shovel-dumper combination more suitable under the prevailing geo-mining conditions. Shovel-dumper application has been considered for coal, interburden and lower horizons of OB which largely comprise of sandstone and shale.

3.7-4.0 cum diesel hydraulic shovels along with 35T RD and 2.7-2.8 cum diesel backhoes along with 35T RD have been considered for OB removal and Coal production.

11.3 Description of the Environment

The Environmental scenario of a place is determined by the quality of Ambient air, Water, Soil and Noise level in the neighbourhood. Air quality can be assessed by monitoring the level of gaseous and particulate pollution. Water quality assessment is done by measuring the concentration levels of various parameters like pH, oxygen demand etc. soil quality is determined by physico-chemical characters of the soil and the acoustic quality is determined by the level of noise.

To prepare this report, sampling for air, water, soil and noise level was undertaken. Sampling and analysis was carried out during the period of January 2007 to March 2007. Separate assessments have been made for air quality, water quality, soil quality and noise level in the study area.

Ambient Air Quality

Ambient Air Quality was monitored with Respirable Dust Sampler for analysis of Respirable Particulate Matter (RPM), Suspended Particulate Matter (SPM), Sulphur Dioxide (SO₂) and Nitrogen Oxides (NO_x) at six different locations, selected by Shri Ashok Roy, Agent, Tikak Colliery and Shri S.P. Chaki, Superintending Engineer (Civil) of North Eastern Coalfields.

Concentration of Respirable Particulate Matter (RPM) in $\mu\text{g}/\text{m}^3$ were in the range of 27–48 and 24-62 respectively at AT₁ and AT₂ in Core zone and 19-42, 12-38, 16-42, and 20-49 respectively at AT₃, AT₄, AT₅ and AT₆ location for Buffer zone. These were found to be below the permissible limit of 200 and 100 stipulated for coal mining and residential area.

Concentration of Suspended Particulate Matter (SPM) in $\mu\text{g}/\text{m}^3$ were in the range of 64-96 and 59-110 respectively at AT₁ and AT₂ in Core zone and 41-94, 39-86, 50-92 and 47-91 respectively at AT₃, AT₄, AT₅ and AT₆ locations for Buffer zone. These were found to be below the permissible limit of 500 and 200 stipulated for coal mining and residential area.

Sulphur Dioxide (SO₂) and Nitrogen Oxides (NO_x) in $\mu\text{g}/\text{m}^3$ were found to be in the range of 11-28 & 12-31 and 10-26 & 14-36 respectively at AT₁ and AT₂ in Core zone. Sulphur Dioxide and Nitrogen Oxides were in the ranges of 09-21 & 10-29, 06-25 & 12-34, 10-26 & 15-30 and 08-27 & 11-29 respectively at AT₃, AT₄, AT₅ and AT₆ in buffer zone. These values too, were less than the permissible limits of 120 and 80 stipulated for coal mining and residential area.

Micro-meteorological Data

Micro-meteorological data collected from RMC Guwahati for IMD Dibrugarh, and data generated locally for Tikak Extension OCP was found to be normal.

Water Quality

Quality of Water samples drawn from all the Five (1 from existing Tikak Opencast mine, 3 from Surface run-off and 1 drinking sample from residential area of Tikak Opencast area) sampling sources were found to be satisfactory and generally free from organic and inorganic pollutants.

Noise Level

Noise levels recorded at all the six ambient sampling points were found to be satisfactory and well within permissible limit.

Soil Quality

Soil samples were collected from 3 different locations, 1 from Core Zone area and 2 from Buffer Zone areas around Tikak opencast. Samples collected were from depth of 0 – 30 cm, 30cm. – 60cm. and 60cm. – 90cm. Analysis was carried out for chemical and grain size distribution of above samples.

All Industrial activities may affect the environment adversely, unless proper pollution control and mitigation measure are undertaken. To know the effects of pollutions, if any, a proper understanding of the Flora & Fauna details of the study area is essential. The Socio-economic scenario of the study area also needs to be studied to know the effects the proposed industrial activity might have on the societal structure of the area.

This report is prepared on the basis of available literatures and field studies carried out during the period of January 2007 and March 2007.

Flora and Fauna Survey

The baseline data on terrestrial ecology, covering both flora and fauna are derived from existing literature of Botanical Survey of India, Zoological Survey of India and on past studies conducted in the area by other organizations and corroborated through field studies during January 2007 to March 2007. The overall floral and faunal composition in the study area is good and is comparable to the neighbouring areas. The general growth of most of the plants in the study area is found to be normal. The fauna is listed on the basis of species sighted during field investigation. The data on the aquatic life of the water bodies in the study area is derived from existing literature and through

collection of samples and their analysis conducted during January 2007 and March 2007.

Socio-economic Scenario

The study area is mostly semi-urban and rural in nature with a substantial SC, ST and OBC population. The principal language spoken by the people is Assamese. The literacy rate is moderate. Apart from mine workers, the main occupation of the people in the study area is agriculture. The principal crop, grown for the popular staple food of the state, is paddy. The primary source of drinking water is dug-wells, tube-wells and water supplied by the CIL authority. Relevant data has been obtained from the census records and these has been supplemented and corroborated by conducting a socio-economic survey in the study area during January 2007 and March 2007.

11.4 Detail of Anticipated Environmental impacts & Mitigation Measures

Sources of air pollution

The main sources of air pollution are identified as-

- 1) Mining activities inside the OCP viz. Drilling, Blasting, OB removal, transport and dumping, both externally and internally and finally extraction and loading of coal.
- 2) Transport of coal from mine to coal stock yard.
- 3) Coal handling activities at coal stock yard.
- 4) Coal transportation from coal stock yard to Railway Siding.
- 5) Storage and Wagon loading of coal at the Railway Siding.

Air Quality Management

The drilling equipment will be equipped with dust arresting devices so that fugitive dust generation is minimal. Blasting will be done in controlled way to minimize the generation of fugitive dust. The blasting will be done once in a

day to give sufficient time for settling of dust and for settling of the coarser particles. The haul road will be regularly sprayed with water sprinkler to prevent dust from getting air borne. The coal transportation to siding will be done through covered tipping trucks. All dust generating points will be equipped with nozzle sprinkler to minimise the fugitive dust emission. Green belt will be developed around mine infrastructure.

Observations

As per Air Quality prediction done by using FDM model, the future values of SPM, SO₂, and NO_x are likely to remain within the limits prescribed by MOEF for North Eastern Coalfields. There is also negligible increase in the levels of the above pollutants in the buffer zone. The proposed mining activity is not likely to have any adverse effect on the existing environment in Core and Buffer Zone. Still all control measures suggested in this report will be strictly adhered to.

Water Quality Management :

Water quality may be affected due to the following activities:

Mine water discharge into surface water source.

Workshop effluent discharge due to washing of dumper, dozer, grader and floor washing.

The mine water quality varies seasonally due to contamination during seepage in mine floor resulting in a higher value of total suspended solids (TSS). The effluent from the mine may contain high TSS concentration. Similarly, the workshop effluent may contain high TSS and oil & grease due to washing of HEMMs and floor. The effluent from the mine and workshop will be treated in treatment plant consisting of oil & grease trap and settling tank before being discharged into nallah.

Noise Level Management:

Noise is considered as an occupational hazard. Blasting is an occasional and impulsive event, which needs to be carried out in an isolated manner. No workforce shall be allowed during blasting time so that the workers are not exposed to impulsive noise level. The noise generating points will be enclosed to minimize the propagation of high noise intensity. The workforce working at the coalface, where high noise level is expected, will be provided with protective device for occupational safety. Apart from above, the formation of internal spoil dump and green belt development will also muffle the noise to a great extent.

Flora &-Fauna Conservation :

Plantation will be done as per the norms and guidelines of forest department. This will help in enriching the flora and fauna of project area.

Socio-Economic Condition:

The project is likely to give a boost to the economy of the area and providing secondary and tertiary employment to local people. The infra-structural facilities provided by the project will benefit local villagers also.

Land Resource Management

The total land requirement is 192 Ha. This land will undergo degradation due to mining activity, infrastructure development, overburden dumping etc. The pre-mining, during mining and post-mining land use is given below which illustrates the salient features of land resource management.

Pre-mining vs post-mining land use

Land Use During Mining		Post –mining Land Use (Coceptual)	
Particulars	Area (ha)	Particulars	Area (ha)
1. Area to be excavated	72.00	Reclaimed and afforested internal OB dump	58.5
		Water body	8.5
2. Mine periphery including haul roads, power supply arrangements etc	35.00	Community use/handed to State Govt	31.0
		Plantation along the road side	4.0
3. External dumps	85.00	Plantation in External OB Reclaimed	85.0
6. Green Belt & Safety zone		Green Belt	5.0
TOTAL	192.00	TOTAL	192.00

The progressive mine closure activity is likely to significantly reduce the impact of mining activity on the land apart from increasing the green cover and surface water availability.

11.5 Analysis of Alternatives

The Tirap and Tikak opencast mines are at present the only coal producing opencast mines in NEC. The projectised balance mineable reserves at Tirap OC mine would last for another 3-4 years at the current rate of production. Thus the Tirap OC mine is nearing its closure.

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By closing one OC mine producing coal at the rate of 3.40-3.50 lakh tonne per annum would bring down NEC further into red. The demand of coal as well as overall economics of the northeastern coalfields has therefore necessitated for looking at alternatives. Thus, the alternative lies in increasing opencast production in current economic situation.

The proposed project will be able to compensate partly for the loss of production due to closure of Tirap opencast mine.

It is proposed to exploit the coal reserves in the proposed project by opencast method. The conventional shovel-dumper system of mining is proposed to be followed for O.B removal and coal extraction.

11.6 Environmental Monitoring Program

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

Samples for study of air quality, water quality and noise level shall 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.

Parameters to be monitored

Ambient Air Quality, Water Quality , 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 and 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 Periodic Medical Examination as per DGMS guidelines.

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

11.7 Additional Studies

Public Consultation & Public Hearing

The following detail will be incorporated after public hearing:-

Date of Advertisement.

Newspapers in which the advertisement appeared.

Date of public hearing (DD/MM/YYYY).

Public Hearing Panel chaired by & members present

No. of people attended the public hearing meeting
and number of people from the lease area.

Summary/details of public hearing in tabular form.

Risk assessment

A comprehensive blue print for risk assessment and management has been drawn for the project incorporating the following:

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

Special care will be taken for following aspects related to safe mining practices as stipulated by DGMS:-

Slope Failure in Mine Pit

Barbed Wire Fencing

Blasting

Explosive Handling

Safety Rules

Mine Inundation

Fire

Road Accidents

Illumination and Communication

Training

Medical Aid

11.8 Project Benefits

The opening of the Tikak Extension OCP will enhance the socio-economic activities in the adjoining areas. This will result in following benefits

- Improvements in Physical Infrastructure
- Improvements in Social Infrastructure
- Increase in Employment Potential
- Contribution to the Exchequer
- Prevention of Illegal Mining
- Post-mining Enhancement of Green Cover

11.9 Environmental Cost Benefit Analysis

Capital Investment envisaged under the head Environment related cost of Rs. 240.00 lakhs. Break up of this amount with year wise phasing is given below:

Amount in Lakhs

Sl. No.	Item	Total Cost	Phasing						
			1 st yr.	2 nd yr	3 rd Yr	4 th Yr	5 th Yr	6 th Yr	7 th Yr & onward
1	Pollution abatement cost	10.00	-	-	-	2.00	3.00	5.00	-
2	Effluent treatment plant	20.00	-	-	-	10.00	10.00	-	-
3	Green belt development	20.00	-	-	-	5.00	5.00	5.00	5.00
4	Pollution Monitoring & Control facilities	15.00	-	-	-	3.00	7.00	5.00	-
5	Compensatory Afforestation	125.00	-	-	-	25.00	25.00	25.00	50.00
6	Biological reclamation	50.00	-	-	-	-	-	10.00	40.00
	Total	240.00	-	-	-	45.00	50.00	50.00	95.00

B) EMP preparation cost: 20.00 Lakhs

c) Biological reclamation cost and pollution control measures cost shall be revenue expenses and have shown under the head Misc. Expenses. The revenue expenses is taken as 15.00 lakh/annum approx.

11.10 Environmental Management Plan

The success of environmental management in an organization not only depends on deep involvement of its personnel at all levels but also on the creation of an effective implementing organizational structure. The objectives are:

- To implement environmental control and protection measures.

- Subsequent environmental monitoring of the efficacy of various control measures.
- Plantation/green belt development.
- Land restoration.

North Eastern Coalfields, the owner of this project has already set-up an Environmental Cell headed by a Chief General Manager at its HQs. The cell provides necessary support that is required for Environmental Management of various projects and mines under the jurisdiction of the company.

The responsibility for implementing Environmental Management Plan rests with the Chief General Manager of the Project, who gets proper assistance by a team of qualified and trained personnel. The Environmental Cell at the Project and Corporate level looks after the following functions for implementation and monitoring of pollution control measures and for overall environmental management. The responsibility for implementing environmental management plan would rest with the project officer of the project, who would be properly assisted by team of qualified and trained personnel. Organisation for environmental management in Margherita, NEC will carry out the task and responsibility connected therewith.

- Generation of environmental data bank.
- Evolving micro environmental management plan for the project in collaboration with other agencies and consultants.
- Monitoring project implementation along with environmental control measures.
- Co-ordinate with other project activities to ensure timely implementation of the project.
- Co-ordination with Ministry of Environment & Forest, Central /State Pollution Control Board for prevention and control of pollution.