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"ANALYSIS OF IMPACT OF MINING PROJECTS ON ENVIRONMENT:A CASE STUDY ON MANA INCLINE AND NANDGAON UNDERGROUND MINES"

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ABSTRACT

Environmental protection in last decade became an important issue in all Industrial, hydro-technical, Mining, Power plants project. Every industrial activity and procedure influences the environment and climate change, each to a lesser or greater extent. Industrial activities are pursued in India without focussing on environmental issues, due to this natural resourses are in pressure and also creating harmful effects on human health and well being, this environmental pressure is due to unplanned and unsustainable development. Environmental impact assessment involves identifying, measuring and assessing impacts. This complex process deals with considerable amount of information and requires processing and analysis of quantitative data, qualitative information as well as expert human judgement.

Under this project various processes of EIA, methodology, principles, various impacts considered in EIA, various actors involved in EIA and their role in the EIA process. Generic structure of environmental impact assessment document are studied and all this study is compared with actual field study of two mining projects Mana Incline and

Nandagaon under-ground mine. The study aims to examine all aspects and activities of selected project in terms of its impact on the environmental component and to know the environmental pollution control measures adopted. In order to identify environmental impacts of selected project several interviews with the relevant authorities are conducted and present status of environment in Chandrapur area is known. In addition to it public opinion survey of project affected people is conducted and conclusion from field survey is drawn.

KEYWORDS: *EIA, Air Pollution, Water Pollution, Noise Pollution, Land Degradation, Field Survey*

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INTRODUCTION

Environmental impact assessment involves identifying, measuring and assessing impacts. This complex process deals with considerable amount of information and requires processing and analysis of quantitative data, qualitative information as well as expert human judgement.

Central Pollution Control Board (CPCB) has identifed 43 out of 88 major industrial clusters in the country as " critically polluted". (Source:- CEPI Report, CPCB 2009-10). To study and examine the impacts of the industrial projects on Chandrapur, we conducted a case study on the EIA of two mining projects Mana incline and Nandgaon underground

mines. Mana and Nandgaon Underground Project is located in Chandrapur district of Maharashtra State and administered by Chandrapur Area of Western Coalfields Limited. The project does not involve Resettlement & Rehabitation. There area no national parks, wildlife Santurary, Biosphere Reserve found in 15 km buffer zone. The project does not involve modification of drainage. Mining will bev underground by Bord &Piller method involving hydraulic sand stowing. The extension project does not envolve change in land requirement,mining technology, displacement, Manpower, and no fresh source of the water. Mineral transportation of 2333TPD of coal is by trolly from mine face to surfaceto CHP located near the Incline mouth and thereafter by road (973TPD) and by rail (1360TPD) fro the railway siding located at a distance of 2 km. Ultimate working depth of the mine is 265m below ground level(bgl).Mining bhas intersected water table, which is in the range of 3.2-14.10 m bgl. During premansoon and 1-4.5 m during post mansoon. Balance life of the mining is at the prposed rated capacityis 17 years.The capital investment for the expansion project is 15.1835 crores.

OBJECTIVES

The Main Objectives of the Project Are:

- To study the impacts due to coal mines and power plants on the environment.
- To study the principles, processes, methodology, components and actors involved in the EIA and generic structure of EIA.
- To study the Environmental Impact Assessment of coal mines (Mana Incline and Nandgaon underground mine).
- To study the mitigation measures used to control and reduce adverse impacts on environment.
- To study the public opinion of affected people due to mining and conclude their views.

LITERATURE REVIEW

[A] Galina Ivanova(2007): The coal mining industry makes a key contribution to the Queensland economy, and is the underlying driver of employment and economic conditions in many local and regional communities. This article aims to focus on how the social and economic impacts of mining should be assessed and negotiated with local and regional communities. The following assessment tools were trialed to ascertain the impacts on communities of changes in the mining industry: extended stakeholder analysis of key community representatives; economic modeling of changes in the level of mining activity; a random survey of householders involving choice experiments to assess tradeoffs; and experimental workshops to assess how residents were prepared to prioritise different community development options. The results showed that impact assessment should be addressed using different economic and social science tools to ensure regulatory approval as well as community acceptance. This article suggests alternative social and economic impact assessment mechanisms that can be applied to any industry and any situation (e.g. growth, decline, new development, simultaneous changes)[1].

[B]M.Monjezi(July 2009): Mining is widely regarded as having adverse effects on environment of both magnitude and diversity. Some of these effects include erosion, formation of sink-hole, biodiversity loss and contamination of groundwaterby chemicals from the mining process in general and open-pit mining in particular. As such, a repeatable process to evaluate these effects primarily aims to diminish them. This paper applies Folchi method to evaluate the impact of open-pit mining in four Iranian mines that lacked previous geo-environmental assessment. Having key geologic resources, these mines are: Mouteh gold mine, Gol-e-Gohar and Chogart iron mines, and Sarcheshmeh copper mine.

The environmental components can be defined as public health and safety, social relationships, air and water quality, flora and fauna hence, various impacting factors from the mining activities were estimated for each environmental component. For this purpose, each impacting factor was first given a magnitude, based solely on the range of possible scenarios. Thereafter, a matrix of weighted factors was derived to systematically quantify and normalize the effects of each impacting factor. The overall impact upon each individual environmental component was then calculated by summing the weighted rates. Here, Folchi method was applied to evaluate those environmental conditions. Based on the acquired results, the present paper finally concludes that amongst four case histories in Iran, Sarcheshmeh copper mine significantly affects the environment, with critical level of air pollution there[2].

[C]Mai Fangdai(May 2011): The environmental impact post assessment is a further extension and improvement on the basis of environmental impact assessment. There is an important role to improve the effectiveness of environmental impact assessment and guidance to carry out environmental protection. In our country, coal mining environmental impact assessment study is still in the exploratory stage. This paper systematically discusses the impact of coal mining on the environment, focusing on coal mining environmental impact assessment contents[3].

[D]Environmental Impact Assessment: Insights from mining communities in Ghana(December 2014): The object of this paper is to ascertain the level of Environmental Impact Assessment (EIA) compliance of mining companies in selected mining communities in Ghana. Over the past three decades, Ghana has demonstrated considerable commitment to the conservation and management of bio-physical and socio-cultural environment. Laws and regulations have been enacted to monitor and ensure compliance for sound environmental management by mining companies. Contextually, this paper examines how communities affected by large-scale mining perceive EIA compliance and their expected role in the design and implementation of the process. The paper opines that despite the excellent environmental regulations in place, the level of enforcement and compliance has not been satisfactory. This is partly due to the neglect of priority issues affecting local communities during the processes of EIA. A higher commitment to the involvement of all stakeholders, particularly the Environmental Protection Agency (EPA) in environmental decision making in mining communities is highly recommended[4].

METHODOLOGY

- At first stage we collected all the data and the research paper on the EIA of mining projects and studied them.
- Then we gave visit to Maharashtra Pollution Control Board (MPCB) and WCL mines for the data required for the case study.
- The field survey has been carried to collect the opinion of expert of the project and the people of the affected area.
- The concluding remark based on the study was made.
- In the next stage we did a case study on mining projects in the Chandrapur region and Western Coal Limited (WCL) Mines.
- Case study includes study of environmental study report and public opinion survey on respective project.
- In the final stage, we concluded the impacts of the projects on the environment and gave suitable mitigation measures to reduce them.

ANALYSIS AND RESULTS

General Description of Project

- **Name of Project:** Expansion of Ballarpur U.G. Coal mines consisting Mana Incline & Nandgaon U/G Mine WCL, Chandrapur Area.
- **Location of Project:** Mana & Nandgaon Underground Mining project is located in Chandrapur district of Maharashtra State and is administered by Chandrapur Area of Wesern Coalfield Limited.
- **Climate:** The climate of the area is dry to moist tropical with well-defined summer from April to June, rainy season from July to September and winter from December to January. In summer, the temperature generally goes to a maximum of 48ºC whereas in winter, it falls to a minimum of 10ºC. The average annual rainfall is about 1200mm.
- **Industry:** beside other coalmines, Maharashtra Electrosment and twin Super Thermal Power stations operated by MESB falls in the vicinity of project area.
- **Pollution Due to Other Sources:** The above-mentioned industries are also likely to contribute in increasing the pollution of area.

Sampling Locations

Table 1: Ambient Air Quality Monitoring Locations

Sr. No.	Location Details	Location Code
1.	Manager's Office	CM_NUA-1
2.	Sub-station of Mana	CM_NUA-2
3.	Colony (Nandgaon&Mana)	CM_NUA-3
4.	Mana village	CM_NUA-4

Table 2: Water Quality Monitoring location

Sr.No.	Location Details	Location Code
1.	Mine water discharge	CM_NUW-1

Table 3: Noise Level Monitoring Location

Sr.No.	Location Details	Location Code
1.	Fan House	CM_NUN-1
2.	Colony (HLOC)	CM_NUN-2

Status of Land Acquisition

Table 4: The Land Aquired by the Nandgaon and Mana Mining Project is Given as Belows

Type of Land	Required as Per EMP (in Hectares)	Actual Area Acquired (in Hectares)
Forest Land	123.71	123.71
Wastage Land(Govt. land)	272.93	272.93
Agricultural Land	1223.92	1223.92
Total	**1619.66**	**1619.66**

Rehabilitation and Resettlement-

The actual position is on 01-04-2017 is as follows:

- Compensation for land acquired : N.A.
- Compensation for house acquired : N.A.

Frequency of Monitoring :

Air: Frequency of monitoring s as per the Env. (Protection) Amendment Rules Published wide Gazette date. 25.9.2000

Water: Water Quality is monitored on fortnightly basis.

Noise: Noise level is monitored on fortnightly basis.

Methodology of Sampling and Analysis

Water: Mine water discharge is collected on fortunity basis in plastic zaricane and is transported to the labortory for analysis. As per the Env. (protection) Amendment Rules Published vide Gazette dt.25.9.2000,water samples are analysed fortinightly for the parameters- pH, TSS,Oil & Greaseand COD and once in a year for all parameters as per schedule VI, Env. Protection rule.

Noise: Day time and night time noise level data are recorded fortnightly.

Air: 24 hourly air samples are collected Respirable dust Sampler at selected locations to monitor ambient air quality w.r.t. Suspended Perticulate matter (SPM), Respirable Perticulate matter (PM-10), Sulpher di-oxide (SO_2) and Oxides of nitrogen (NO_x) etc.

Table 5: Analysis of Water Sample from Different Locations in Project Area

Sr. No.	Place	Sample	Schedule	Analysis Result			
				pH IS-3025/ 11:1983	COD (mg/l) APHA-Closed reflux	TSS (mg/l) IS - 3025/17:1984	O&G (mg/l) IS - 3025/39:1991
1	HLP OC	Mine water	13/12/2017	8.85	28	22	<2
			26/12/2017	6.69	28	26	<2
2	ETP(Workshop)	Treated water	13/12/2017	6.07	24	18	<2
			26/12/2017	7.11	32	26	<2
3	HLP 1 UG	Mine water	12-12-2017	7.76	40	32	<2
			25/12/2017	8.4	36	20	<2
4	HLP 3 UG	Mine water	12-12-2017	7.72	36	32	<2
			25/12/2017	7.62	24	20	<2
5	Nandgaon UG	Mine water	12-12-2017	6.83	32	28	<2
			26/12/2017	7.26	36	28	<2
	Below Detection Limit			0.2	4	10	2
	Permissible Limit			5.5-9.0	250	100	10

Table 6: Analysis of Noise- from Different Locations in Project Area

Sr. No.	Place	Schedule	Noise Level in dB(A)	
			Day Time	Night Time
1	Near fan house-CNUN 1	13/12/2017	66.2	60.5
		26/12/2017	63.4	60.1
2	Near fan house-HLP 1 UG CHUN 1	13/12/2017	66.7	64.2
		26/12/2017	65.7	60.2
3	CHP :CHON 1	13/12/2017	60.9	57.6
		26/12/2017	61.6	50.5
	Permissible Limit		75	70

Table 6: Contd.,				
4	Colony - CHUN 2	13/12/2017	46.2	40.1
		26/12/2017	52.6	42.8
5	Colony - CHON -2	13/12/2017	47.8	41.5
		26/12/2017	39.3	33.2
6	Near Fan House-: CHUN -2	13/12/2017	48.2	40.7
		26/12/2017	48.3	39.6
	Permissible Limit		55	45

Table 7: Analysis of Air Sample from Different Locations in Project Area

Sr No	Places	Material	Schedule	Parameters				
				SPM*	PM-10	Nox	SOX	PM-2.5
1	Substation-HLC 1UG	Air	13/12/2017	242	151	6	22	
			26/12/2017	132	46	6	15	
2	Pit Office-HLC-1-INCLINE	Air	13/12/2017	103	71	6	17	
			26/12/2017	87	28	6	14	
	Permissible Limit			600	300	120	120	60
3	HLC-3 colony	Air	12-05-2017	106	36	6	15	
			20/12/2017	300	193	7	21	
4	Rajiv Gandhi Engg. College	Air	12-05-2017	62	30	5	21	
			20/12/2017	213	120	6	17	
	Permissible Limit			200	100	80	80	60
5	HLOC-VTC	Air	12-05-2017	143	118	6	15	32
			20/12/2017	305	193	6	17	52
6	Between ph 1&2 seasonal mine	Air	12-05-2017	242	170	7	20	20
			20/12/2017	195	116	7	14	56
	Permissible Limit			600	300	120	120	60
7	Colony(Nandgaon)	AIR	13/12/2017	35	14	7	23	
			27/12/2017	125	93	6	24	
8	Mana Village	Air	14/12/2017	167	57	6	13	
			27/12/2017	92	67	6	14	
	Permissible Limit			200	100	80	80	60
9	Manager office mana	Air	13/12/2017	137	82	6	21	
			14/12/2017	47	12	6	15	
			26/12/2017	238	122	6	21	
10	Substation-mana incline	Air	14/12/2017	85	28	5	22	
			26/12/2017	148	110	6	16	
	Permissible Limit			600	300	120	120	60

Impacts of Mining Project on Environment

Effect on Water

Mining can have adverse effects on surrounding surface and groundwater if protective measures are not taken. The result can be unnaturally high concentrations of some chemicals, such as arsenic, sulphuric acid and mercury over a significant area of surface or subsurface. Large amounts of water produced from mine drainage, mine cooling, aqueous extraction and other mining processes increases the potential for these chemicals to contaminate ground and surface water.

Effect on Air

The ambient air of Chandrapur region has SPM (suspended particulate matter) and RSPM (respirable suspended particulate matter) more than acceptable limits during most of the time. The National Ambient Air Quality Standards' (NAAQS)-24 hours time weighted average standards for RSPM and SPM concentrations are 100 µg/m3 and 200 µg/m3

respectively for residential and rural areas ambient air quality. The same for industrial area are 150 µg/m3 and 500 µg/ m3 respectively.Ambient air had a lot of dust, including ash, soil dust from roads, and coal dust. The coal dust comes from the stock yards, the heavy and continuous transport of coal in the area and from fugitive emissions from coal handling.

Effect on Humans

Humans are also affected by mining. There are many diseases that can come from the pollutants that are released into the air and water during the mining process. Most of the miners suffer from various respiratory and skin diseases. Miners working in different types of mines suffer from asbestosis, silicosis, or black lung diseases.

Effect on Land

Mining can cause physical destruction to the surrounding land by creating landscape blots such as open pits and piles of waste rock. Such disruptions contribute to the deterioration of the area's flora and fauna. The surface features that were present before mining activities cannot be replaced after the process has ended. Landscape declination caused by ground movements on the surface of the earth as a result of collapsing overlaying sheets cause damage to roads and buildings.

Depletion of Ground and Surface Water Resources:

One of the most serious impacts on water resources observed by the team was the drying up of ground water sources like wells and tube wells in the vicinity of coal mines. The digging to very low levels for extraction of coal (about 100-200 feet for opencast mines and about 300-400 feet for underground mines) disrupts groundwater aquifers and groundwater flows, and as a result, wells and tube wells in an area of 4-5 km radius have either totally dried up or dry up soon after the monsoon. Even surface water sources like nallahs and tanks / ponds face similar problem. Villages are now facing difficulty in even meeting daily water needs while agriculture is also severely impacted. Another problem in this regard that was mentioned by the local villagers was that even wild animals get affected by this and when they don't find water they come to the mines where they themselves often get killed and also become a risk for the local populations.

Environmental Pollution Control Measures

Land Management

Underground mining method of coal extraction injection with hydraulic has been adopted in this mine, it is anticipated that no serious damage escape and land use pattern will occur in this region. Detail control measures to be adopted for controlling the subsidence as far as its possible to perform has been discussed here. The control measures to be adopted are as follows :-

- Grounding the depillaring area correlated on the surface, protective bunds and the garland drains shall be laid so that no water from surface enters the subsistence area and throw the crack to the working area.
- The surface crack shall be sealed by using shale, clay or other suitable material.
- Depressed portions shall be levelled up using soil, clay or other suitable material.
- There is also a statutory requirement to monitor subsidence regularly. For this purpose, grid pillars shall be located 30m apart at the surface, over the working panels and at intervals of 50m beyond. Level section shall be taken every month and plotted. This will provide information regarding progress of subsidence in stability of

equilibrium conditions are reached.

- Any cracks or potholes formed consequent to underground coal extraction would be filled up from time to time. However, the entire operation will be carried strictly in accordance with the permission of DGMS and related guidelines. Regular monitoring will be carried out and records will be maintained as per statue.

Air Pollution

- Overloading of truck is avoided during coal transportation, preventing the spillage. Covering of coal transportation has been implemented.
- Dust suppression by water spraying is being done in CHP.
- Dry sweeping of coal transportation road is also done regularly.
- Adequate number of trees shall be planted so far around infrastructure colony, along road, etc. In future plantation programme continued.
- Regular monitoring of ambient air quality in and around the project will continue to be done during the balance life.

Water Pollution

Domestic Effluents: To deal with the domestic effluents, adequate disposal scheme has been made by providing Septic tank and soak pit residential unit.

Industrial Effluents: So far as this UG mine is concerned, the quality of industrial effluent is negligible.

Mine Water: The quality of pumped out water from mine is quite satisfactory is being monitored regularly as per Environment (Protection) Amendment Rule such that possibility of any adverse effect on natural watercourses is ruled out.

Noise Pollution

Preventive maintenance of vehicles, plants and machineries.As far as practicable provision of silencers, mufflers equipment has been made. Personal protective gears to expose to high noise level have been provided. Provision of noise absorbing pads at the foundation of the equipment Provision of green belts around the areas where excessive noise to be produced will be helpful in minimizing- propagation of noise. Regular monitoring of noise level of the project area.

CONCLUSIONS

- Negative impacts of this projects are for long period over 30-50 years after commencement of project because of complete change in land pattern and its physical properties.
- Temperature in the surrounding area rises due to emission of huge amount of fly ash and toxic gases in atmosphere from the power plant.
- Presence of dust content in air due to transportation of coal from mines contaminates it causing various fatal diseases.
- Huge land being used in mines and power plant and also particulate matter reduce land fertility making it improper certain regular crop.

- Gases released, make fog thick, reducing visibility and causes road accidents.
- An underground mine reduces the ground water level of the nearby area.
- Up to 6 km distance from point of discharge of treated effluents, the water is unfit for any domestic use.
- Project affected people and project benefited people have different views regarding the project; hence public opinion survey should be conducted for both category of people.

Even though Mining and Thermal Power project contributes major portion to overall development but it causes extensive damage to environment.

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