IMPACT OF COAL MINING ON NOISE: A CASE STUDY OF SINGRAULI COAL MINES AREA

[1]Vishwadeepak Tiwari, [2]Prof. R.K. Bhatia

[1]M.E. Student, [2]Associate Professor
Department of Civil Engineering
Jabalpur Engineering College, Jabalpur, Madhya Pradesh, India

***Abstract*: Coal is a major source of energy in India and the world for many past decades but it has also proved as one of the largest source of carbon dioxide, sulphur dioxide with metal concentration especially Fe, Cu, Mn and Ni releases. Coal mining is basically associated with the extraction of coal mineral and resulting in degradation of natural resources like air, water, land and the destruction of habitat with extensive noise pollution of heavy machineries, blasting and excavations .Thus, poses a threat to surrounded biodiversity. The noise pollution caused hearing loss and affected the mental and physical health in many ways. The noise in mining generally occurred by Operation of heavy duty earth moving machines, Blasting, Crushing, Screening and various Loading operations which exceeded the permissible noise limits. Thus this study is aimed to assess the impact of coal mining on the noise pollution due to mining activities and processing carried out in the Singrauli Coal Field Region in the district of Singrauli, Madhya Pradesh (India).**

***Keywords*: Jayant, Nigahi, khadia, kakri, Amlori, Jhingurda, Noise pollution, opencast mine (OCM).**

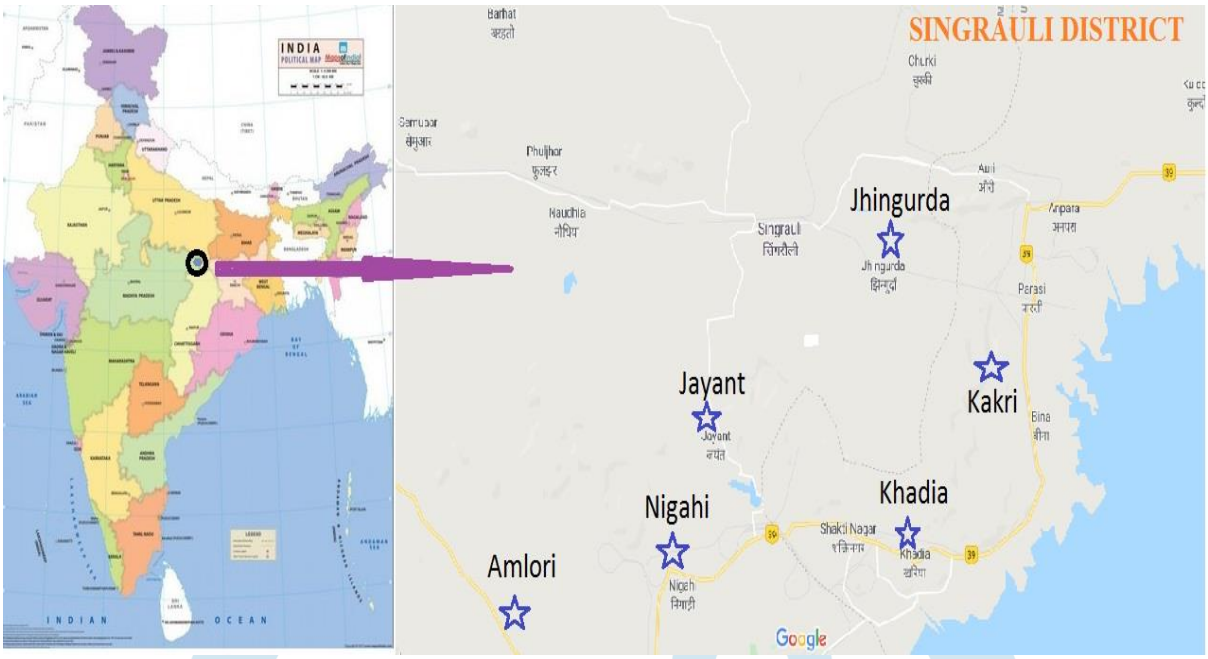
1. INTRODUCTION:

Coal is commonly called the black gold which is a combustible black or brownish-black sedimentary rock. Coal is the most abundant available fossil fuel around the globe which meets a major part of the conventional energy source needed for human consumption. it contributes a major part to production of energy for commercial and domestic need and hence it is widely used in the industries to generate electricity. it usually occurs in rock strata in layers or veins which are called as coal beds or coal seams. Coal mining is particularly surface mining which requires large areas of land to be disturbed and excavated using various mechanical means. This raises a number of environmental challenges, including soil erosion, air, noise, water pollution and impacts on local biodiversity. However, as compared to other fossil fuels, coal generates more pollution holding less energy production efficiency. The activities which are responsible for pollution around coalmining areas are drilling of mineral, blasting using explosives, loading and unloading of coal and overburden, dust from hauling roads and transport roads, exposed overburden dumps in open areas, coal handling plants, exposed faces of pits, presence of fire in coal mineral, exhausts and dust from movement of heavy machineries, crushing of coal , mine water discharge, open pits and collapse of abandoned mines. Environmental effects of coal mining are potentially very broad which creates air, soil, noise, water pollution and loss of biota. Hence, the environmental impacts of coal mining sites must be assessed periodically with in fixed time interval for air, water and noise quality assessment.

2. Materials and Methods

Geography of Study area

Singrauli area consists of north east part of Singrauli district of Madhya Pradesh & southern part of Sonebhadra district of Uttar Pradesh. It is the 50th district of Madhya Pradesh which is disintegrated from Sidhi district on 24th May 2008. It is an emerging power hub of India due to availability of coal & water. N.C.L has ten working open cast coal mines which produced 70.021 million tonnes of coal during 2012-2013. N.C.L. has planned to reach 80 million tonnes by the year 2016-2017. Water Rihand dam has reservoir capacity of 129 million cubic meter & catchment are 5148km^2.Dam & spill way. Dam height is 91meter & length 934meter. Because of these two factor that is availability of coal and water. Electricity is generated in the minimum cost.



Power Generating capacity of India is 211766.22 MW that is 100%, out of which 141713.6 MW that is 66.91% from thermal, 121610.88MW that 57.42% from coal based thermal power plant, 13732 MW from singrauli approximately 12 % of coal based thermal power plant. Near about 10000 MW under construction. Due to this much of power Generation in singrauli Lot of Air pollution occurs in the singrauli the main pollution content are SO_2, NOx, PM_{10}(RPM) & $PM_{2.5}$ which are in very high Quantity and their chances to exceed beyond allowable limit .

For noise quality monitoring, SIX number of monitoring colliery sites were selected. These collieries are Nigahi OC mine, Jayant OC mine, Amlori OC mine, Kakri OC mine, Khadia OC mine, Jhingurda OC mine were selected in different directions and distances in coal mining area of Singrauli coal mining area.

Table 1.1- Monitoring sites for Noise Level Analysis:

S.No.	Colliery	Code	Class	Site Name
1.	Nighai O/C Mine	1.	B	Nigahi filter plant
		2.	A	B1 incline
		3.	B	Nigahi colony
2.	Jayant O/CMine	4.	A	Jayant incline
		5.	A	Heera incline
		6.	B	Jayant staff colony
3.	Amlori O/CMine	7.	A	Amlori incline
4.	Kakri O/CMine	8.	A	Sub station
		9.	A	Excavation office
		10.	B	Kakri village
5.	Khadia O/C Mine	11.	A	Khadia Incline
6.	Jhingurda O/CMine	12.	A	Shri incline
		13.	B	Jhingurda colony

Class: A- Industrial, B-Residential

2.2. Methods of Monitoring:

Sampling and field work:

NOISE monitoring was conducted with the help of noise level meter at various points of noise pollution like The movement of coaling machines and transport units-conveyor, tubs and transfer points and at time of mine blast at various distance of 30m and 70 m .Various methods used for monitoring is described below:

S. NO	PARAMETER	METHOD OF TESTING
1.	Noise Level	CPCB protocol for ambient level noise monitoring

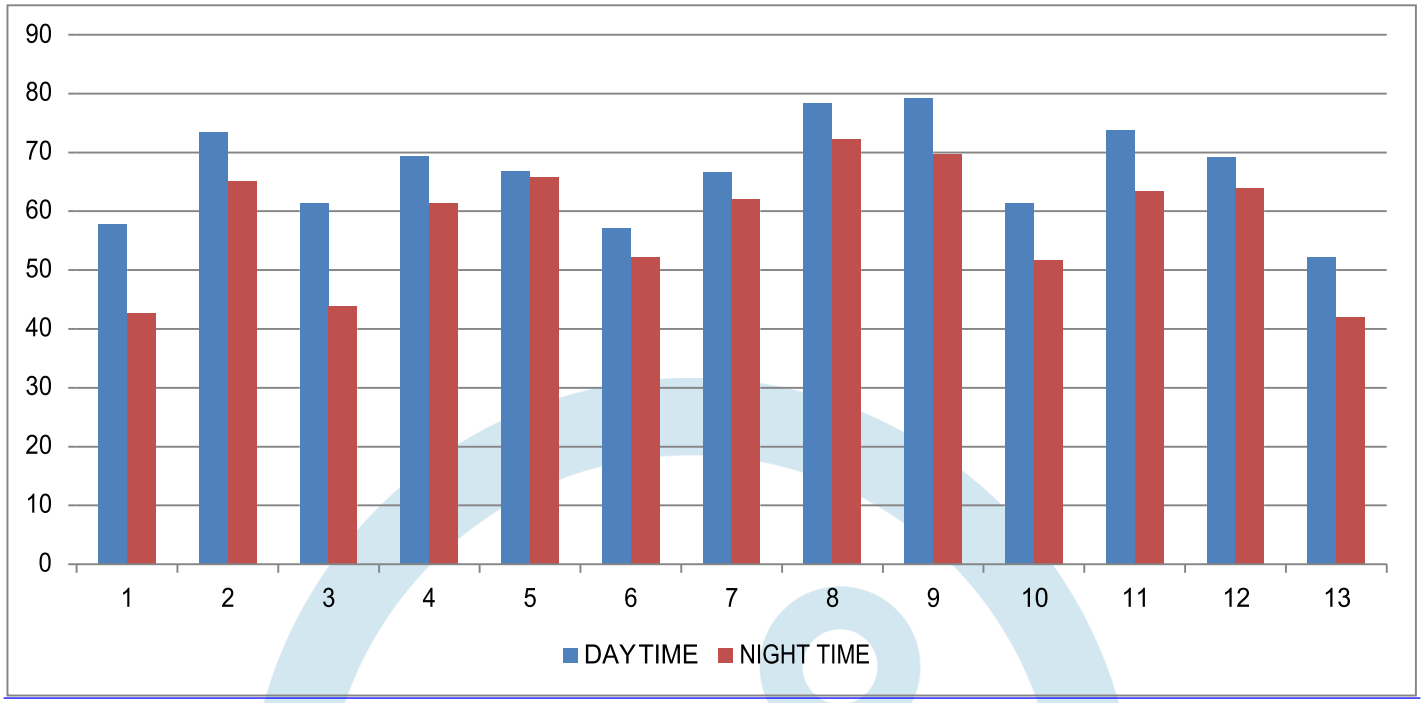
3. Results and Discussions:

Noise Pollution

The most noise generating equipment underground are the haulage, ventilators-main, auxiliary and forcing fans, conveyor transfer points, cutting and drilling machines. The ambient noise level due to different operations in underground mines varies within 50-80 dBA. whereas In a opencast mine of Amadand Collieries, the noise level near blasting pits, fan house, conveyor system, shearer and road headers was reported to be within 75-80 dBA which is quite higher than permissible limits of 75 dBA in day time as well as in nights also. The higher noise level was recorded in nearby residential areas from 40-75 dBA where permissible limits are upto 55 dBA.

Various results of noise levels are as under:

PARAMETER `	**NOISE POLLUTION**				
Sampling Time				**Day**	**Night**
LIMIT in dB(A)	**INDUSTRIAL**		**-A**	**75**	**70**
	RESIDENTIAL		**-B**	**55**	**45**
Colliery	**Class**	**S.no.**	**Site Name**	**Day**	**Night**
Nighai O/C Mine	B	1.	Nigahi filter plant	57.5	42.60
	A	2.	B1 incline	73.2	65.01
	B	3.	Nigahi colony	61.4	43.80
Jayant O/C Mine	A	4.	Jayant incline	69.3	61.40
	A	5.	Heera incline	66.7	65.78
	B	6.	Jayant staff colony	57.2	52.20
Amlori O/C Mine	A	7.	Amlori incline	66.5	62.12
Kakri O/C Mine	A	8.	Sub station	78.8	72.12
	A	9.	Excavation office	79.4	69.70
	B	10.	Kakri village	61.4	51.60
Khadia O/C Mine	A	11.	Khadia Incline	73.8	63.36
Jhingurda O/C Mine	A	12.	Shri incline	69.1	63.88
	B	13.	Jhingurda colony	52.4	41.90



4. Conclusion:

The noise pollution caused hearing loss and affected the mental and physical health in many ways. It has also physiological effect such as increase in blood circulation rate, heart beat rate, elevated blood cholesterol and gastric secretion. The noise interfered sleep and forced the use of sleeping pills. Hence, proper care should be taken for cure and control of these unwanted pollution. Noise can be controlled through the careful selection of equipment and insulation and sound enclosures around machinery.

References:

[1] FAUSTI, S., WILMINGTON, D., HELT, W., KONRADMARTIN, D. Hearing Health and Care: The Need for Improvised Hearing Loss Prevention and Hearing Conservation Practices. Journal of Rehabilitation Research & Development, 42(4), 45, 2005.
[2] CINAR, I. Noise Monitoring, Modelling and Mapping in Mining, PhD Thesis, Graduate School of Pure and Applied Sciences, Selcuk University, Konya, pp. 141, 2005
[3] Marcus, Jerrold J. (1997). Mining Environmental Handbook: Effects of Mining on the Environment and American Environmental Controls on Mining. London: Imperial College Press.
[4] Andy, W. Adrian, S, and Jack, C. (1984) Surface erosion and sediment control at opencast mines in southern Africa. Challenges in African Hydrology and Water Resources (Proceedingsof the Harare Symposium, July 1984). IAHS Publ. no. 144.
[5] Adimado A. A.; Amegbey N., A. (2003). Incidents of cyanide spillage in Ghana, Mineral Processing and Extractive Metallurgy. (Trans. IMMC) 112, 2.
[6] Akabzaa, T. M., Banoeng - Yakubo, B. K. And Seyire, J. S. (2005): Impact of Mining Activities on Water in the Vicinity of the Obuasi Mine.
[7] James I. Sams III and Kevin M. Beer, "Effects of Coal-Mine Drainage on Stream Water Quality in the Allegheny and Monongahela River Basins—Sulfate Transport and Trends"U.S. Department of the Interior Water-Resources Investigations Report 99-**4208, 2000.**
[8] "Heavy Metals Naturally Present in Coal & Coal Sludge" Sludge Safety Project, accessed November 2009.
[9] American Public Health Association (APHA),1985, Standards Methods for Examination of Water and Wastewater, 16th
[10] Singh R N, Atkins A K and Pathan A G, 2010, "Determination of ground water quality associated with lignite mining in arid climate", International Journal of Mining & Environmental Issues, Vol. 1,pp: 65-78.
[11] Carlos V M, Pompeo M L M, Lobo F L, 2011, "Impact of coal mining on water quality of three artificial lakes in Morozini River Basin", Actd Limnologica Bratsiliensid, Vol. 23, pp: 271-281.
[12] Singh R N, Dharmappa H B, Sivakumar M, 1998, "Study of waste water quality management in Illawara coal mines", Coal Conference, University of Wollongong, pp: 456-473.