Noise Quality Assessment Near Marble Mine Area in Tehsil-Kotputali District-Jaipur, Rajasthan (India)

***Prem Singh Bugasara**
****Rajesh Kumar Yadav**
*****Neha Saxena**

Abstract:

Unwanted noise needs to be minimised in order to create a comfortable working environment. In this chapter, the impacts of various sources are investigated together with a mathematical analysis of noise. A combined noise level that is 3 dB higher than the individual values of two noises at the exact same volume can occur. The total noise level is lower the more distinct the two noise sources are from one another. The same type of noise might cause distinct reactions in different persons. Noise levels up to 90 dB have no discernible impact. Unprotected ears should not be exposed to noise levels beyond 115 dB due to the possibility of hearing loss. Extraction of minerals and metals from the earth's crust is known as mining. It is important to locate any possible noise impact areas as well as the current noise levels on and around the property. It might be necessary to monitor pre-mining noise if the potential effects call for it. Vibration training should be similar. Although the formation of industry and mining is necessary for human progress and economic advancement, these activities must be environmentally responsible. In order to plan forward for environmentally responsible mining in the area, it is crucial to evaluate the effects of mining on several environmental parameters. This work includes a case study from mining activities and a Noise Quality Assessment near Marble Mine Area in Tehsil-Kotputali, District-Jaipur, Rajasthan. It also includes information on the sources and levels of noise in and around mines, the effects of noise, and finally suggestions to lessen these effects (India)

Keyword: EIA, mining, mineral, possible impact, eco-friendly, mining activities

Introduction:

All opencast mining activities produce noise from various stationary, mobile, and impulsive sources, making it a necessary component of the mining environment. It is described as unwelcome sound or sound lacking a pleasing melodic character. Because of the loud earthmoving equipment in opencast mines, noise is a typical environmental concern [1]. The health of the mine workers is seriously threatened by noise pollution. The eardrum starts to vibrate when noise impinges on it in the form of waves, triggering other delicate tissues and organs in the ear. If the level of noise surpasses the tolerance limits, it will show as pain that will eventually turn into annoyance and, in the worst situations, hearing loss. The age of the person and the overall period of exposure to the noise are

other factors in the negative impacts of noise pollution, in addition to sound pressure level and frequency. As hearing loss among mine workers continues to be the most common disease and illness in the industry, the noise generated by extraction activities such as drilling, blasting, excavation, loading, and transporting is crucial when evaluating labour health and job performance. [2] Monitoring the noise sources and determining the expected effects on the workplace exposure environment are the main goals of the noise survey in the research region. Noise pollution contaminates the environment, which is unwelcome and impairs one's physical and mental well-being (see also reference 3). The noise levels in open-pit mining are only exceeded by those near jet engines at airports when compared to exposure levels in other industries (airport, forest machinery, cement industry, foundry, textile industry, printing, metal plate workshop, ship engine room, and riveting workshop) [4]. It is crucial to ensure efficient, considerate operational and administrative standards in the planning and execution of a mining operation[5] since noise should be taken into account from the beginning of the mining process onward. Any hazardous noise that *can* be removed or attenuated *should* be removed or attenuated.

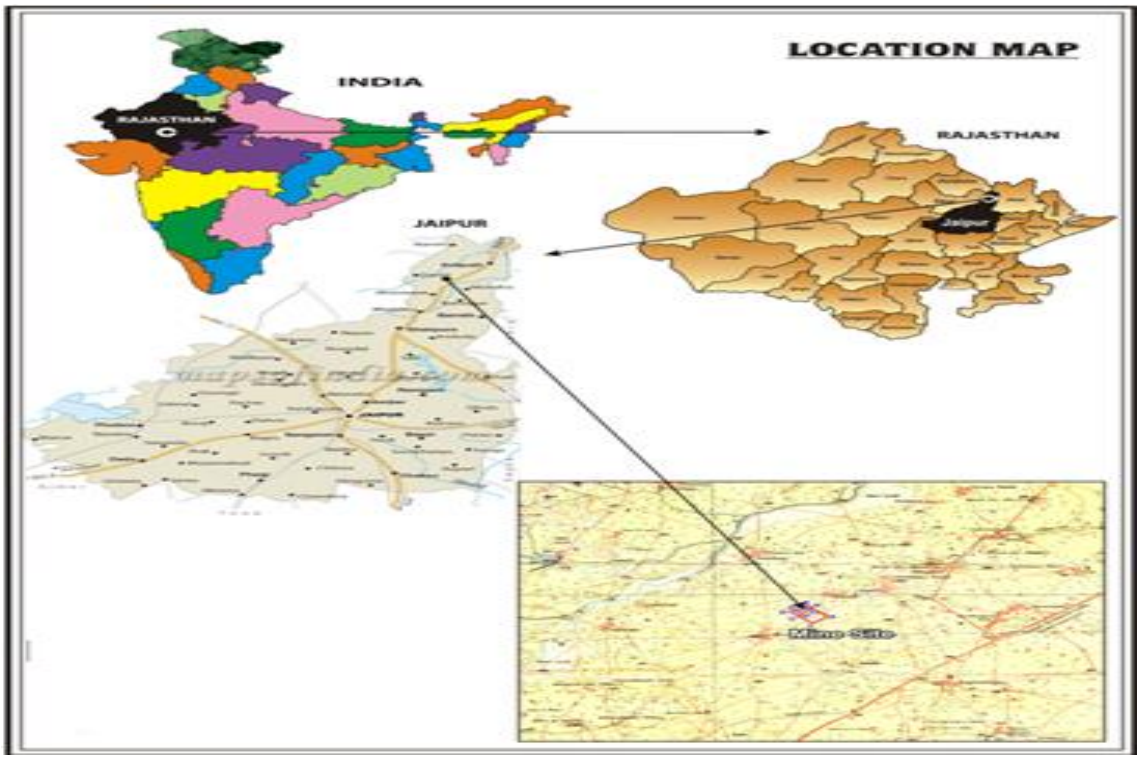

Fig-1.2 Showing the Location of the Study Area

Study Area:

The study was made on one of the states of India viz Rajasthan. Rajasthan is situated on the north-western part of India. It covers 3, 42,239 square kilometers (132,139 square miles).

The study area is located about 10.5 km in NE direction is Kotputli town and is accessible from National Highway-8 which is approx 3.0 km in the SE direction of mine site. State Highway 37-B is at a distance of 7.0 Km in NNE Direction of mine site. The lease area is about 88 km away from Jaipur (i.e District Headquarter).

Methodology:

For evaluations of the noise level, noise samples are gathered in and around the mining region. Using a weighted sound pressure level meter, the noise levels in the research area are measured. Model number SL-4012, The noise measurement was done during working hours at various locations that were close to the mining region and heavily used by the mining equipment. On a very large scale and with the aid of a questionnaire, a neighbouring villager was questioned in order to explain the noise and its significance for the health of mine workers. From 2013 to 2014, the noise intensity in the research region was analyzed.

Result and Discussion:

To know the baseline noise levels, in surrounding the mine area, noise levels were measured at site and villages in the study area. Noise level measured & recorded in two sets 6.00 AM to 10.00 PM & 10.00 PM to 6.00 A.M at all locations in the studied area. (as per CPCB Guidelines).

Ambient noise levels were recorded and measured at different 8 locations around the mine site Noise levels ranged in day time 68.49 ± 4.49 to 77.78 ± 2.96 in summer season 2013 where as in Summer Season 2014 the range varies from 59.46 ± 4.14 to 70.43 ± 1.77. Minimum noise level observed in Village- Bhaislana in both the monitoring season in day time whereas maximum observed in Village- Gordhanpura in 2013 & Village- Dantil in 2014 in the Day time .The Values are found above the permissible limits by CPCB in near mine site & Town Paota where as in the night time in the Summer Season 2013 the range varies from 54.25 ± 3.53 to 57.92 ± 4.32 the minimum noise recorded in Town- Paota and maximum in Village- Dantil and in the Summer Season 2014 the range varies from 49.74 ± 3.42 to 61.14±3.56. The minimum noise level observed in Village- Bhaislana and the maximum recorded in mine site. In the night time noise level was found in the limit as there is no impact in the night time in the study area.

Tables showing the locations of noise stations and monitored noise levels are given in below Table.

Table 1. Ambient Noise level Monitoring Data in Day Time in Summer Season 2013

Station	Location	Analysis Results	Control dB(A)
S1	Mine Site	72.78 ±_4.68	75
S2	Near Mine Site	77.78 ±_2.96	75
S3	Village Dantil	74.62 ± 2.30	75
S4	Village Dhandha	71.83 ±_3.24	75
S5	Village Gordhanpura	74.92 ± 3.09	75
S6	Village Bhaislana	68.49 ± 4.49	75
S7	Town Paota	77.07 ± 2.72	75
S8	Village Parshotampura	73.91 ±_3.98	75

Mean ±_SE (Standard Error), n=6

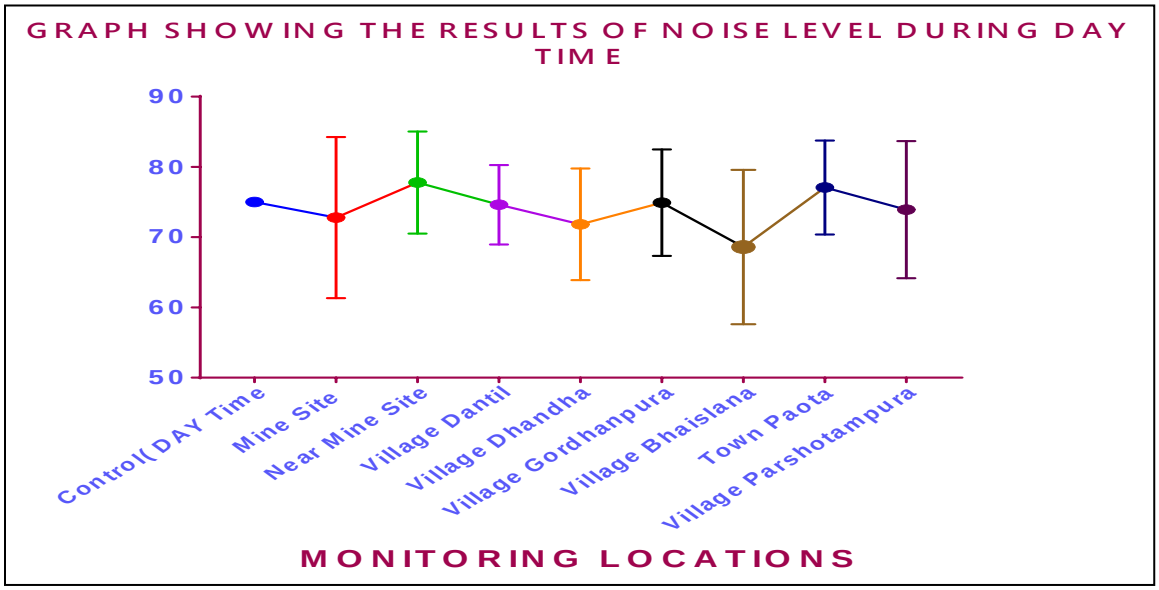

Figure 1(A): Graph Showing the Noise Levels of Different Locations at Day Time in Summer Season 2013

Table 2: Ambient Noise level Monitoring Data in Day Time in Summer Season 2014

Station	Location	Analysis Results	Control dB(A)
S1	Mine Site	69.05 ±_2.25	75
S2	Near Mine Site	68.00 ±_3.30	75
S3	Village Dantil	70.43 ± 1.77	75
S4	Village Dhandha	67.52 ±_1.17	75
S5	Village Gordhanpura	63.81 ± 2.15	75
S6	Village Bhaislana	59.46 ± 4.14	75
S7	Town Paota	66.60 ± 1.74	75
S8	Village Parshotampura	62.91 ±_3.40	75

Mean + SE (Standard Error), n=6

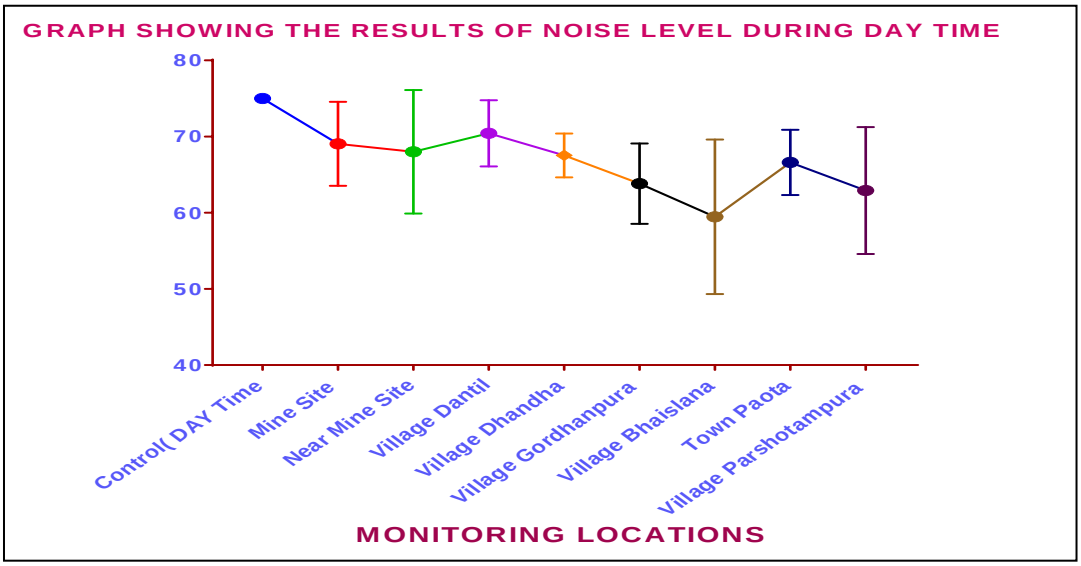

Figure 1 (B): Graph Showing the Noise Levels of Different Locations at Day Time in Summer Season 2014

Table 3 : Ambient Noise Level Monitoring Data in the Night Time in Summer Season 2013

Station	Location	Analysis Results	Control dB(A)
S1	Mine Site	55.07 ±_5.13	70
S2	Near Mine Site	55.77 ±_4.90	70
S3	Village Dantil	57.92 ± 4.32	70
S4	Village Dhandha	55.98 ±_3.48	70
S5	Village Gordhanpura	57.47 ± 4.09	70
S6	Village Bhaislana	54.47 ± 1.91	70
S7	Town Paota	54.25 ± 3.53	70
S8	Village Parshotampura	54.91 ±_3.12	70

Mean + SE (Standard Error), n=6

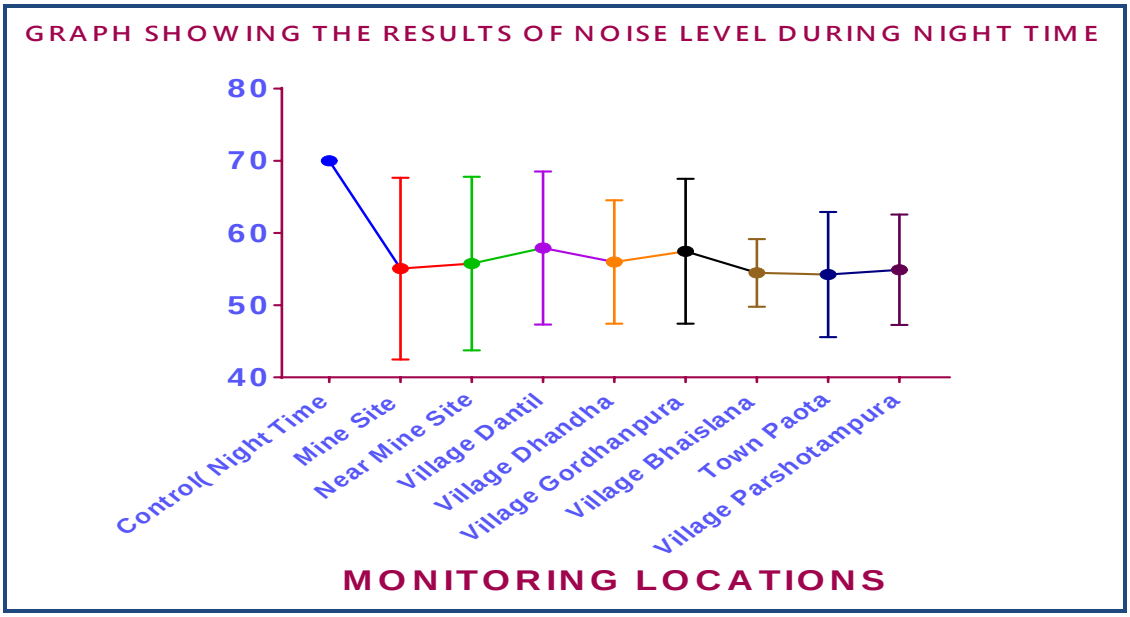

Figure 1.2 (A): Graph showing the Noise Levels of Different Locations at Night Time in Summer Season 2013

Table 4.: Ambient Noise Level Monitoring Data in the Night Time in Summer Season 2014

Station	Location	Analysis Results	Control dB(A)
S1	Mine Site	61.14 ±_3.56	70
S2	Near Mine Site	60.62 ±_4.01	70
S3	Village Dantil	56.13 ± 2.45	70
S4	Village Dhandha	56.18 ±_4.63	70
S5	Village Gordhanpura	55.48 ± 3.78	70
S6	Village Bhaislana	49.74 ± 3.42	70
S7	Town Paota	53.90 ± 3.94	70
S8	Village Parshotampura	50.06 ±_2.95	70

Mean + SE (Standard Error), n=6

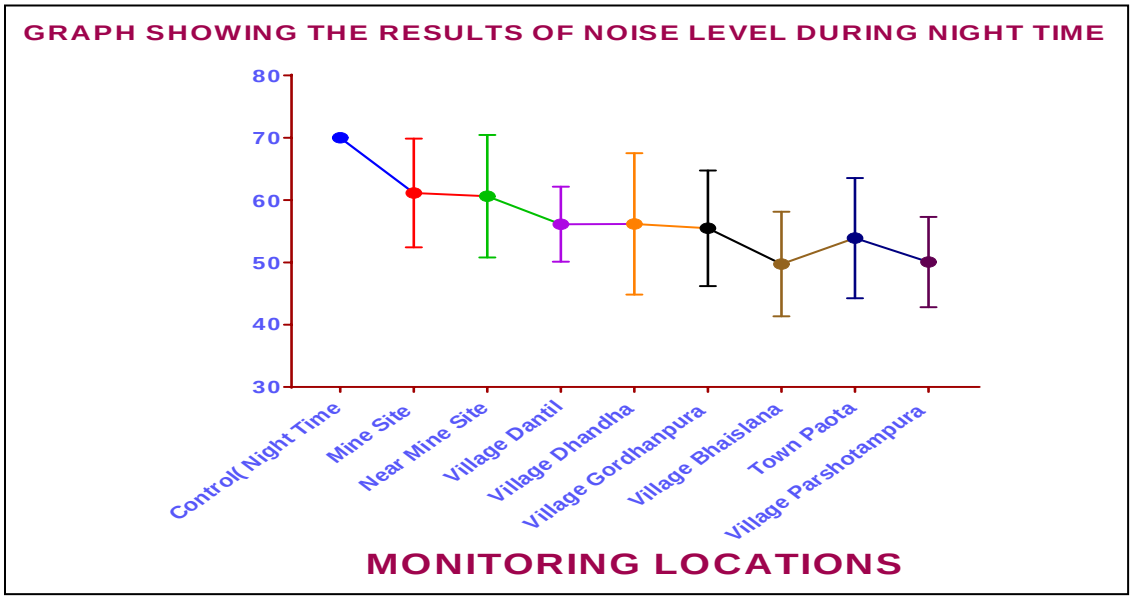

Figure 1.2 (B): Graph showing the Noise Levels of Different Locations at Night Time in Summer Season 2014

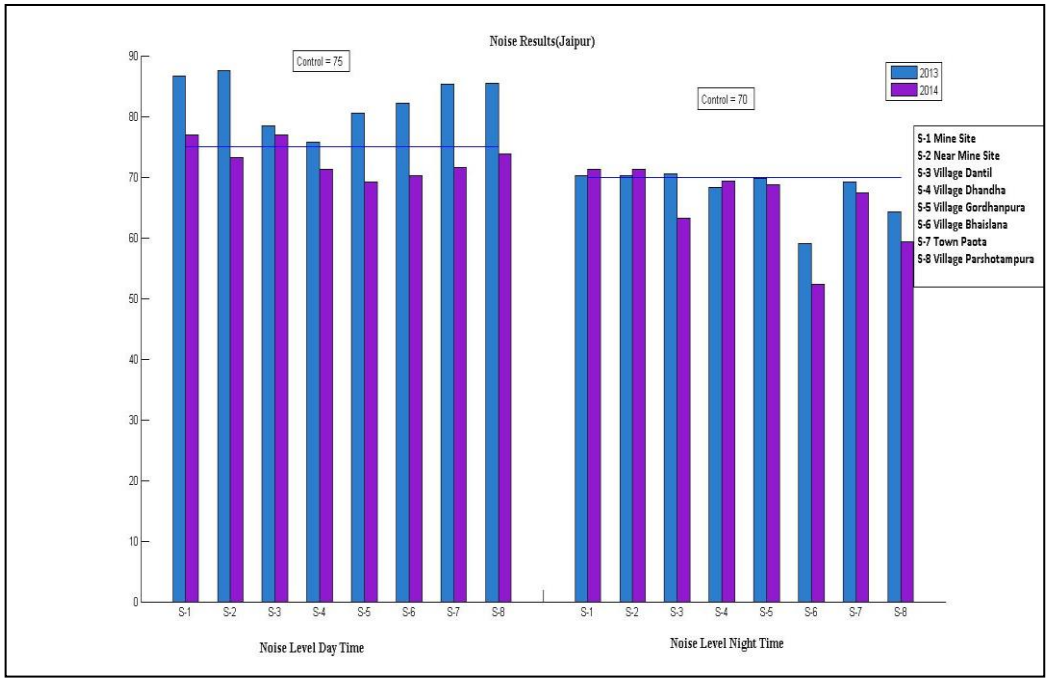

Figure 1.3 : Comparative Study Showing the Results of Noise in Summer Season 2013 & 2014

By the continuously exposure to noise for a large extent causes severe damage to the auditory systems and its sense organs. Excessive of noise have various effects like the hearing loss, it mainly depends on the frequency and time limit of sound. Hearing loss is matter of serious concern it is also called as occupational disease in the mining area. From the present study, we observed that there is a negative correlation between the noise from the mining. Noise is often regarded as a nuisance rather than an occupational hazard. However over exposure to noise can cause serious hearing loss. Results were found statistically significant in relation to the noise parameters .By using Analysis of Variance (ANOVA) in Summer Season 2013 the adjusted P Value for day time is 0.0428 and the R square is 0.1644 the results shown that they are statistically significant matching($P<0.05$)**. In the summer Season 2014 the P value for Noise level in day time is 0.0592 and the R square is 0.4211 which also shows the statistically significant matching.

In the Summer Season 2013 in the night time the results were found not statistically significant matching the adjusted P Value is 0.3582 and the R Square is 0.09462 whereas in the Summer Season 2014 the results were found statistically significant ($P<0.05$)* the adjusted P Value is 0.0272 and the R Square is 0.4123.

From the present study in Summer Season 2013 we have observed that Control is Significant with Village- Bhaislana the P Value is 0.0492, Town –Paota the P Value is 0.0325 and the Village – Parshotampura the P Value is 0.0258.Near Mine Site is significant with Village-Gordhanpura the P Value is 0.0487 and Village- Bhaislana is 0.0365.Village Dhandha was significant with Village-Gordhanpura the adjusted P Value is 0.0412 and Village-Bhaislana is 0.0354.

In the Summer Season 2014 the Control was significant with Village Dandha adjusted P Value is 0.0156 and Village Gordhanpura the P Value is 0.0368.Mine Site is significant with Village Gordhanpura the P Value 0.0254 and the Village – Bhaislana is 0.0147.Village- Dantil was significant with Town Paota the P Value is 0.0245 and the Village Parshotampura the P Value is 0.0496.

From the Study in Summer Season 2013 in night time there is no statistically significant matching .Control were found significant with Village-Bhaislana the adjusted P Value is 0.0053 and in the Town –Parshotampura the P Value is 0.0488.Village Gordhanpura was significant with Village-Bhaislana the P Value is 0.0354 and the Town Paota is 0.0256. In the Summer Season 2014 the results were shown a significant matching ($P<0.05$)*.Control is significant with Village- Dantil the P Value is 0.0262, Village Bhaislana-0.0214 and the Village- Parshotampura the adjusted P Value is 0.0122.Village-Dantil was significant with Village- Bhaislana the P Value is 0.0354, Town- Paota is 0.0523.

Table 5: CPCB Noise Standards

Area Code	Category of Area	LIMITS IN dB (A)	
		Day Time	Night Time
(A)	Industrial area	75	70
(B)	Commercial area	65	55
(C)	Residential area	55	45
(D)	Silence zone	50	40

Source-CPCB Standards

Conclusion:

From the present study reveals that due to blasting, loading and unloading, transportation, hammering processing plants, blasting and machinery among others were create the noise in the study area. In the Summer Season 2013 we observed that mine is on the initial phase so the level of noise is as higher as compared to be in Summer Season 2014 which were above the permissible limits by CPCB (table 5.).

But in the night we have observed that there is no large extent of sound in the night time in the study area. But PPE devices will be provided to the workers.

***Associate Professor**
****Associate Professor**
*****Research Scholar**
SBRM Govt. College Nagaur,
S.S. Jain Subodh P.G. College,
Jaipur (Raj.)

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