

Assessment Of Indoor Noise Level In Some Factories Of Industrial Areas Of Jammu,(J&k),India

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Abstract: The present study has been carried to assess Equivalent noise level (Leq), Noise climate (NC), Traffic noise index (TNI) for an interval of 30 seconds in a period of 10 minutes both during working and non-working hours at twelve factories of industrial areas of Jammu. The average Leq during working hours was found to be above permissible limits prescribed by CPCB.

Keywords: Equivalent noise level (Leq), Industrial area, Noise, Noise climate (NC), Traffic noise index (TNI)

INTRODUCTION

The cultural revolutions have made available to us much more energy and new technologies with which to alter and control more of the planet to meet our basic needs and increasing desires. The new machines and technologies in turn led to a switch from small-scale, localized production of handmade goods to large-scale production of machine-made goods in factories within rapidly growing industrial cities. Establishment of Small and Medium scale industries in and around cities, increasing population of Automobiles and Deforestation and clearing of Urban Greenland in the name of human development has degraded environment. In the beginning of the 20th Century, the slogan was 'develop or perish', and today it is proving like 'develop and perish'.

Noise has been defined as any audible acoustic energy that adversely affects the physiological or psychological well being of the people [Kryter, 1985]. Noise has become a very important "Stress Factor" in the environment of man [Park, Park, 1993]. Prevalence of noise is implicated in various illness of human and it is responsible for increased morbidity associated with modern life style. Immediate and serious attention must be given to control this mushrooming problem, since the overall loudness of environmental noise is doubling every ten years [Chedd, 1970]. This has encouraged scientists to discuss and study the effects of noise pollution on human's health. The Federal Occupational Safety and Health Act (OSHA) administered by the U.S. Department of Labour, requires the specified noise exposures not be exceeded. Excessive noise

pollution has been blamed not only for hearing damage and community annoyance but also for hypertension, fatigue, heart trouble, disturbed serum lipid, triglycerides, platelet count, plasma viscosity, glucose and reduced motor efficiency [Regecova and Kellerova, 1995]. The main aim of present study is to assess indoor noise level in some factories of Gangyal and Digiana (Industrial area) of Jammu.

MATERIALS AND METHODOLOGY

STUDY AREA:- The study area for the purpose of investigation of this work lies in the industrial estates of Digiana and Gangyal. The specific study areas included Five industrial units (factories) located in Industrial Estate Digiana and Seven industrial units (factories) located in Industrial Estate Gangyal.

INDUSTRIAL UNITS (FACTORIES) LOCATED IN GANGYAL INDUSTRIAL ESTATE

SITE-I (M/S S.P. LAMPS)

SITE-II (M/S NEW GODAWARI)

SITE-III (M/S PAMI TIMBER SYNDICATE)

SITE-IV (M/S K.K. ENTERPRISE)

SITE-V (M/S VARDHMAN METAL INDUSTRY)

SITE-VI (M/S J.K. TRANSFORMERS AND SWITCHING GEARS FACTORY)

SITE-VII (M/S METAL MOULDER FACTORY)

INDUSTRIAL UNITS (FACTORIES) LOCATED IN DIGIANA INDUSTRIAL ESTATE

SITE-VIII (M/S SHUVAM INDUSTRIES)

SITE-IX (M/S SHIVA DAIRY PRODUCTS FACTORY)

SITE-X (M/S JAINCO C.P. BATHROOM FITTING VARDHMAN ENTERPRISE)

SITE-XI (M/S ALUMINIUM SYSTEMS)

SITE-XII (M/S JAIN TREADS)

Noise was recorded with the help of digital sound level meter model 8928 at 'A' weightage.

At each site sampling of noise level using digital Sound Level Meter model 8928 at 'A' weightage, 20 readings of sound pressure level (SPL) in dB(A) were recorded at an interval of 30 seconds in a period of 10 minutes both during working hours and non-working hours. At the end of 20 readings, minimum and maximum sound pressure level (SPL) in dB(A) was recorded. The data obtained, has been analyzed statistically and various indices were calculated as follows:-

(i) Leq(Equivalent Continuous Sound Pressure Level)

$$Leq = 10 \log \left(\sum_{i=1}^{n=0} f_i 10^{L_i/10} \right) \text{ dB(A)}$$

Where

f_i = fraction of time for which the constant sound level persists.

i = time interval

n = number of observations.

L_i = sound intensity at a time interval.

(ii) L_{10} is the level exceeded for 10% of the time.

(iii) L_{50} is the level exceeded for 50% of the time.

(iv) L_{90} is the level exceeded for 90% of the time.

L_{10} , L_{50} , L_{90} have been calculated by histogram method (Shukla and Srivastava, 1992).

(v) L_{NP} (Noise Pollution Level).

$$L_{NP} = Leq + (L_{10} - L_{90}), \text{ dB(A)}$$

(vi) TNI (Traffic Noise Index):

$$TNI = 4. (L_{10} - L_{90}) + (L_{90} - 30) \text{ (dB)}$$

(vii) NC (Noise Climate): NC is the range over which the sound levels are fluctuating in an interval of time and is given by the following relation:

$$NC = L_{10} - L_{90}$$

Where L_{90} = the level exceeded for 90% of the time of record.

L_{10} = the level exceeded for 10% of the time of record.

The analysis of the data of noise level in all industries reveal that minimum sound pressure level, maximum sound pressure level and Leq exhibited higher values during working hours as compared to that of non-working hours. The minimum SPL (Sound Pressure level) of 40.7 dB(A) was observed at Site IV (M/S K.K. Enterprise, Gangyal) during non-working hours whereas minimum SPL (Sound Pressure Level) of 57.6 dB(A) was observed at Site IX (M/S Jainko C.P. Bathroom Fitting Vardhman Enterprises, Digiana) during working hours. **(Table I)**

Table I :- Average indoor noise level of study area.

SITES	WORKING HOURS					NON-WORKING HOURS				
	MIN.	MAX.	L _{eq}	NC	TNI	MIN	MAX.	L _{eq}	NC	TNI
Site-I	78.8	100.2	86.3	7.5	79.8	58.4	99.3	65.5	5.0	53.0
Site-II	77.6	88.4	82.4	5.9	73.9	45.2	88.3	73.0	22.1	1.9.0
Site-III	59.3	94.8	77.4	19.3	110.0	48.1	62.8	55.3	6.7	48.6
Site-IV	72.9	87.7	82.9	4.8	69.7	40.7	86.1	66.9	22.6	111.8
Site-V	62.8	100.8	83.5	12.8	94.4	53.3	79.6	64.8	8.5	59.9
Site-VI	63.7	97.0	73.0	705	68.7	58.2	81.2	66.8	7.5	60.5
Site-VII	71.7	86.0	78.1	6.9	71.8	62.4	83.9	67.6	3.9	52.0
Site-VIII	78.6	88.1	83.4	4.3	69.9	45.2	80.2	57.3	11.6	65.5
Site-IX	57.6	98.6	77.2	7.3	71.4	58.8	80.1	69.4	9.5	71.5
Site-X	77.0	95.9	82.0	6.0	73.0	75.4	86.3	77.5	3.4	60.0
Site-XI	65.0	100.1	79.0	10.3	82.5	56.6	79.8	64.2	6.9	56.0
Site-XII	68.5	106.6	84.4	8.6	82.2	62.6	97.4	84.5	4.2	52.3
Average			80.8±3.8.	8.4±4.1	78.9±4. 1			67.7± 7.9	9.3±6. 5	66.6±21.3

Leq: Equivalent Noise Level (10 minutes)**NC: Noise Climate****TNI: Traffic Noise Index**

DISCUSSION

The maximum SPL (Sound Pressure Level) of 99.3 dB(A) was exhibited by Site I (M/S S.P. Lamps, Gangyal) during non-working hours whereas maximum SPL (Sound Pressure Level) of 106.6 dB(A) was exhibited by site XII (M/S MRF Pretreads Jain Treads, Digiana) during working hours. **(Table I)**.The analysis of the data of Leq during non-working and working hours at different factories reveal minimum Leq of 55.3 dB(A) at Site III (M/S Pami Timber Syndicate, Gangyal) and maximum Leq of 84.5 dB(A) at Site XII (M/S MRF Pretreads Jain Treads, Digiana) during non-working hours whereas minimum Leq of 73 dB(A) at Site VI (M/S J.K. Transformers and Switching Gears Factory, Gangyal) and maximum Leq of 86.3 dB(A) at Site I (M/S S.P. lamps, Gangyal) was observed during working hours. **(Table I)**The Noise climate i.e. fluctuation in noise exhibited minimum value of 3.4 dB(A) at Site X (M/S Shiva Dairy Products Factory, Digiana) and maximum value of 22.6 dB(A) at Site IV (M/S K.K. Enterprises, Gangyal) during non-working hours and Noise climate exhibited minimum value of 4.3 dB(A) at Site VIII (M/S Shuvam Industries Manufacturers of Wire Nails, HB/BA Wires etc, Digiana) and maximum value of 19.3 dB(A) at Site III (M/S Pami Timber Syndicate, Gangyal) during working hours.The analysis of data of Traffic Noise Index (TNI) reveal minimum value of 48.6 dB(A) at Site III (M/S Pami Timber Syndicate) and maximum value of 111.8 at Site IV (M/S K.K. Enterprises, Gangyal) during non-working hours and minimum value of 68.7 dB(A) at Site VI (M/S J.K. Transformers & Switching Gears Factory, Gangyal) and maximum value of 110 dB(A) at Site III (M/S Pami Timber Syndicate Gangyal) during working hours. **(Table I)** Kumar et.al(2000) also reported 72-98 dB(A) in industrial zone. Bedi(2006),Kumar et.al(2008) also observed the values of noise levels above the noise level values of of industrial areas as prescribed by Central Pollution Control Board . Naik and Purohit (2001) also calculated average Leq of industrial location above 80.8 dB (A). Mndeme and Mkoma(2012) also reported maximum noise level above 100 dB(A).The completion of data of all the factories during working as well as non-working hours revealed that an average factory exhibited an average Leq of 67.7 ± 7.9 dB(A) during non-working hours and maximum Leq of 80.8 ± 3.8

during working hours. This noise level is more than the permissible or acceptable noise level of 75 dB(A) in the industrial area. To minimize the indoor equivalent noise level during working hours the factories must use latest noiseless machinery so that workers in these industries suffered to the least. Factories are one of the important and common source of earning in developing countries like India. In Jammu, large number of factories are operating in the industrial areas. The reduction in the noise level in these factories will not only protect workers but also protect surroundings to the minimum possible extent.

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