

Environmental Engineering-I

Lecture 6- Noise Pollution

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Noise



“Sound is called noise when it becomes disagreeable or loud, particularly when it results in *physiological* or *psychological* harm”.

Sources of Noise

1. Community Noise (Transportation, Construction and Public work, and Neighborhood)
2. Occupational Noise

Sound Vs Noise

“Sound, in a physical sense, is the vibration of gas or air particles that causes pressure variations within our eardrums.”

- These pressure variations are translated by our hearing senses into what we call Sound.
- Sound is expressed as frequency in Hertz.
- The audible frequency range is from 20 to 18,000
- hertz.

Measuring Units for Noise:

- Noise is measured in **Sound Pressure Level (SPL)**
- and expressed in **DECIBELS (dB)**.

A decibel is a logarithmic ratio of two values

$$\text{Decibel } L_{\text{eq}} = 10 \log_{10} L/L^{\circ}$$

L_{eq} = Equivalent Noise level

L = Sound Intensity

L° = Reference level

Measuring Units for Noise:

- A modified decibel scale called **decibel-A (dBA)**, was developed that takes into account the way the human ear responds.
- The scale is called the **A weighting scale** and provides results which conform approximately to the response of the human ear.



Noise Pollution

Sound level and human's perception

perception

sound
level (dB)

example

very noisy
damage our
ears

annoying

noisy

acceptable

quiet

100

80

60

30

10

0

rocket taking off (190 dB)

jet plane taking off (130 dB)

crying baby (100 dB)

passing train (90 dB)

alarm clock (80 dB)

busy traffic (70 dB)

normal conversation (60 dB)

soft conversation in libraries (30 dB)

soft whisper (25 dB)

Typical Noise Levels of Construction Equipment

Equipment Type	Typical Maximum Noise Level in dBA at 50 feet
Dump Truck	88
Loader	86
Dozer	84
Grader	85
Vibratory Roller	82
Backhoe	85
Chain Trencher	85
Spreader	88
Paver	89
Water Truck	88
Pickup Truck	67
Backhoe/Skiploader	86
Forklift	86
Compactor	89
Pile Driver	85
Concrete Truck	88
Concrete Pump	82
Delivery Truck	80
Crane	83

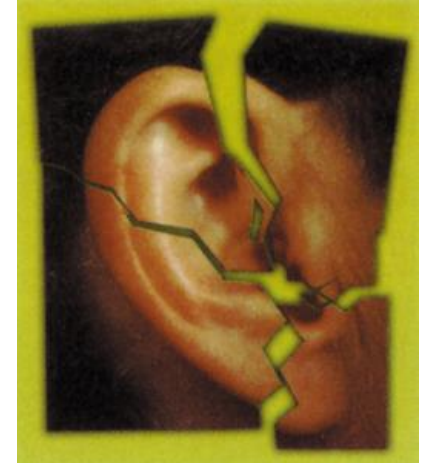
Effects of Noise Pollution

- causes mental stress
- increases the heartbeat rate and blood pressure
- disturbs our sleep & conversation
- makes us difficult to concentrate, so accidents happen more easily
- annoying, makes us become bad tempered more often



Effects of Noise Pollution

- Hearing sound level at **80 dB for a long time**, may cause temporary or permanent damage to our ears.
- Hearing sound level at **130 dB makes our ears feel pain**, because the eardrum vibrates too vigorously.
- When sound level reaches **150 dB**, Causes damage to the eardrum or ear bones, make us go deaf



Control Measures:

Road traffic: control measures include;

- Use of silencers in vehicles; restrict pressure horns; proper land-use planning; rows of trees along roads.

Air traffic: control measures include;

- Proper land-use planning

Occupational noise: control measures include;

- Land-use planning; proper lay-out of plant machinery; Sound absorbing materials; use of ear muffs/plugs, job rotation etc.

Legislation (NEQS)

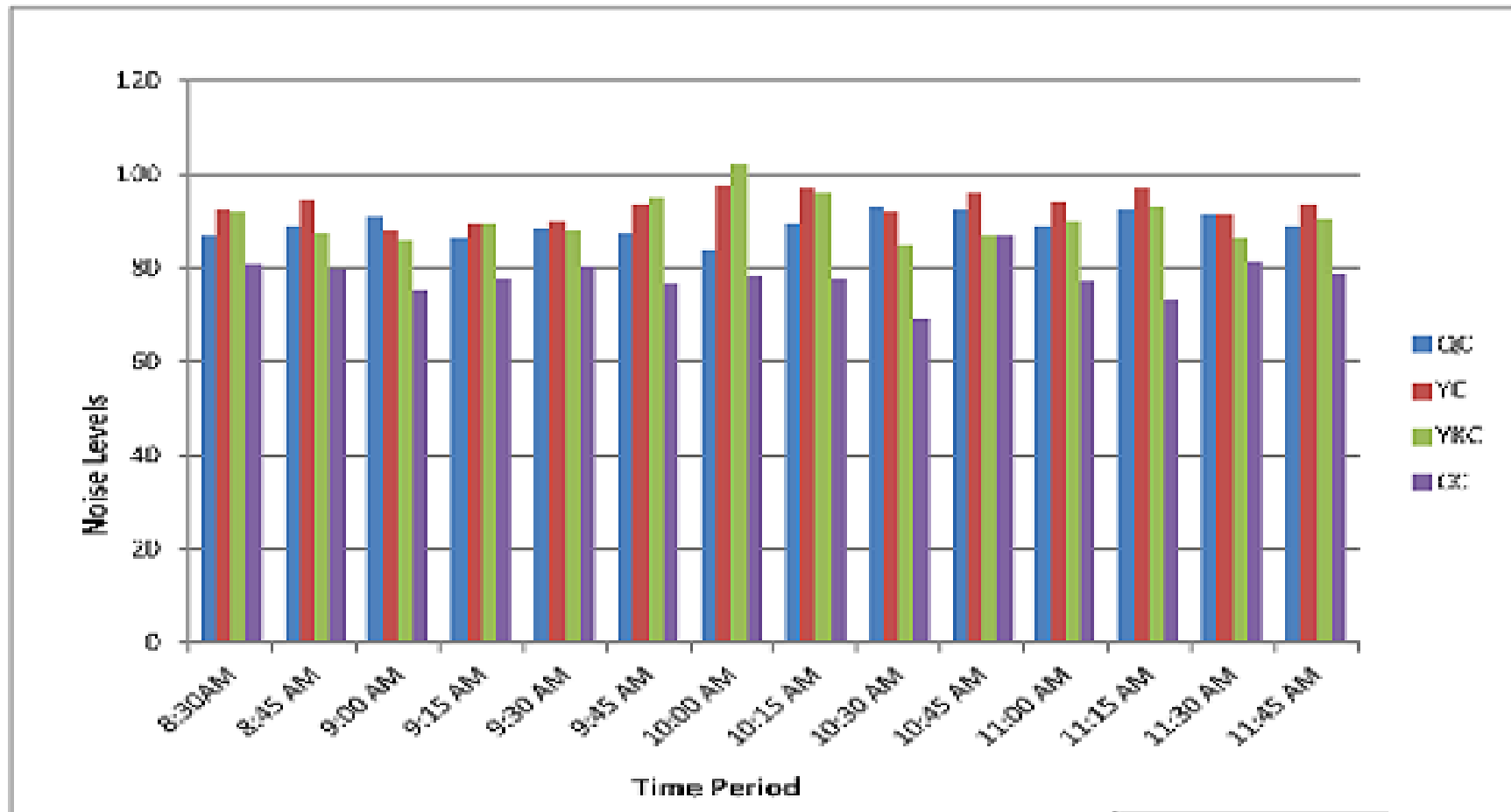
National Environmental Quality Standards for Noise

S. No.	Category of Area / Zone	Effective from 1st July, 2010		Effective from 1st July, 2012	
		Limit in dB(A) Leq **			
		Day Time	Night Time	Day Time	Night Time
1.	Residential area (A)	65	50	55	45
2.	Commercial area (B)	70	60	65	55
3.	Industrial area (C)	80	75	75	65
4.	Silence Zone (D)	55	45	50	45

A scenario of Noise levels in different cities of Pakistan

Cities Names	Maximum Noise record level db(A)	Minimum Noise record levels db(A)	Averages	Sorce
Gujranwala	100	41	72.5	JICA Report 2003
Faisalabad	100	47	72	Irfan, L, 2002
Islamabad	104.5	47	72.5	Shaukat,L,2002
Rawalpindi	108.5	48	72.5	Mehdi,M.R.et/al. 2002
Karachi	88.9	52.4	76.5	Tajik S.H, 2001
Peshawar	708	68.2	86	EPA

NOISE LEVELS IN LAHORE



QC	Qurtaba Chowk
YC	Yadgar Chowk
YKC	Yateem Khana Chowk
CC	Club Chowk, Model Town

Source: NCBA&E, Lahore