

## INVESTIGATION OF ENVIRONMENTAL NOISE WITHIN CAMPUS 2, DELTA STATE UNIVERSITY, ABRAKA, NIGERIA

**Oseji Julius Otutu**

Physics Department, Delta State University, Abraka. Nigeria.

E-mail: [oseji2002@yahoo.com](mailto:oseji2002@yahoo.com)

### ABSTRACT

Noise pollution studies have been carried out within Campus 2 of Delta State University, Abraka using a digital sound level meter of type 2 model 1EC651. Noise measurements were taken from 22 locations within the campus during working hours as from 8.00am and after working hours as from 4.30 pm. The noise levels from each of these locations were taken four times each at a period (time) of ten minutes interval before the average and percentages were calculated.

The result indicate that the average noise level of 87 dB in campus 2 is mostly generated by the business centers as a result of the electricity generated from different power plants, which is attributed to the frequent power failures by the Power Holdings of Nigeria. In addition, offices using small generators from a pole interval to another with voices in and out contribute a lot to the noisy environment. The measured noise levels when compare with the exposure limits of 75 dB summarized by Prof Klosterettle Basternier as recommended by both WHO, 1980 and FEPA, 1991 calls for urgent need in employing control strategies.

### 1. INTRODUCTION

Noise is defined as any unwanted signal and in most cases the signal is nothing but sound. The extent to which noise is annoying depends on many factors such as the pitch irregularities, duration, rhythm and unexpectedness or whether the noise has any meaning for the particular observer (Ebeniro and Abumere 1999).

Noise as pollution is said to occur when the noise level is above the maximum permissible level for a given environment (WHO, 1980 and FEPA, 1991). It is also defined as the addition of sound to the environment beyond the natural sources and measured in intensity, duration and frequency of occurrence (Miller, 1979 and Burtz 1977). Noise as a polluting agent in the environment has been recognized for some time as a serious threat to the quality of life enjoyed by the populace (Abumere et al 1999). The most important measurement of noise is its loudness. This loudness depends on the physical sound pressure that is measured on the sensitivity of the human ear to it. The sensitivity of the human ear depends on the frequency of the sound (Levitt 2001).

Some of the ways to reduce noise in an area includes putting on hearing aids (Levitt 2001), the use of exhaust silencer (John foreman 1989) and planting of trees and shrubs in front of buildings

(Burgliarello, 1976). Noise has been proved to contribute to the decrease in working efficiency and an increase in the ability to make mistakes (Makis, 1997; Nunez, 1998; Taylor et al 1978 and Olawepo 2001).

The inefficiency of the Power Holdings of Nigeria to render electricity supply has led to the massive use of generators by the departmental offices, faculties, Administrative and Bursary blocks as well as most temporary structures used for business centers. The sound emanating from these generators constitutes noise and nuisance during school hours. It is thus in this end that an investigation was carried out on the environmental noise generated within the study area.

It has been a very serious concern in the Campus where generating plants of various designs and sizes are found resulting in high noise levels. This kind of noise bothers people very seriously in the Campus.

A comfortable environment is one in which there is little or no annoyance and distraction so that working or leisure tasks can be carried out unhindered either physically or mentally. Unfortunately, environmental noise has become a serious problem in many countries, and it is difficult to regulate by physical means alone (Onuu, 2000).

It is well known that environmental noise may affect sleep, conversation, academic work in terms of reading and learning, and cause annoyance as well as affect task performance.

A lot of social surveys on the effects of noise on people have been conducted throughout the world especially in Europe and Northern America with moderate climate (Schultz, 1978). Research and analysis of the difference caused by climate (Kryter, 1985) has been conducted in Nigeria. (Menkiti, 1998; Onuu and Menkiti, 1996; Kumamoto, Japan Yono, et al 1991). These are some of the few surveys that have been carried out in areas with warmer climate.

The work involves the measurement of the sound levels and percentage of occurrence at strategic areas within Campus 2 of Delta State University, Abraka during working hours as from 8/00 am and after the working hours as from 4.30 pm.

The results of the study when compared with the acceptable and allowable sound level standard as summarized by Prof. Kelostertettlwer Bastestenier (Table 1) which is in agreement with the World Health Organization Standard of 1980 and the Federal Environmental Protection Agency (FEPA) 1991. The results enable us to assess the noise levels encountered and understand the noisy environment that the employees and students are exposed to.

Situation	Acceptable Sound Level dB (A)
Working Environment (8 hours per day)	75
Bedroom inside at night	35
Indoor background level to ensure good speech intelligibility	45
Outdoor level at daytime	55
Outdoor level at night	45

Table 1 (WHO 1980 and FEPA 1995).

#### Other international Standard of noise Levels.

TYPES OF ROOMS	ALLOWABLE SOUND LEVEL
Conference Room	35
Offices	40
Workshop	45
Laboratory measurement room	50
Production area (factory)	75.

Table 2 (WHO 1980 and FEPA 1995).

## 2. STUDY AREA.

The area of study (Campus 2 of Delta State University, Abraka) lies within latitude  $5^{\circ} 6^1$  N and  $6^{\circ} 4^1$  E. It has about 30,000 people based on the recent Population census. It has a mean temperature of  $20^{\circ}$  and an annual rainfall of over  $250 \text{ cm}^3$ .

There are many temporary structures located for business purposes. Constant power failures by the Power Holdings of Nigeria Plc has led to the indiscriminate use of different grades of generating plants in virtually all offices and business centers within the Campus.

## 3. DATA ACQUISITION

The noise meter used in this paper was a digital sound level meter of type 2 model IEC 651 that has been designed to meet sound survey requirements of quality control at various environments. The external features of the digital noise meter (fig. 1) consist of the following:

1. An electric conditioned microphone.
2. A display unit that displays the sound pressure level.
3. The power and range switch that turns "on" and "off" and also selects the range of the Meter i.e. between 35 – 100 dB for low and 65 – 130 dB for high.
4. Response and maximum "hold" switch to set the meter to either the slow or fast.
5. The functional switch for measuring sound level of acoustic material.
6. The calibration control used for unit calibration.
7. Output jack that supplies AC signals and log converted DC signal for data recording.
8. The Battery cover and
9. The reset button, used to reset level indicator.

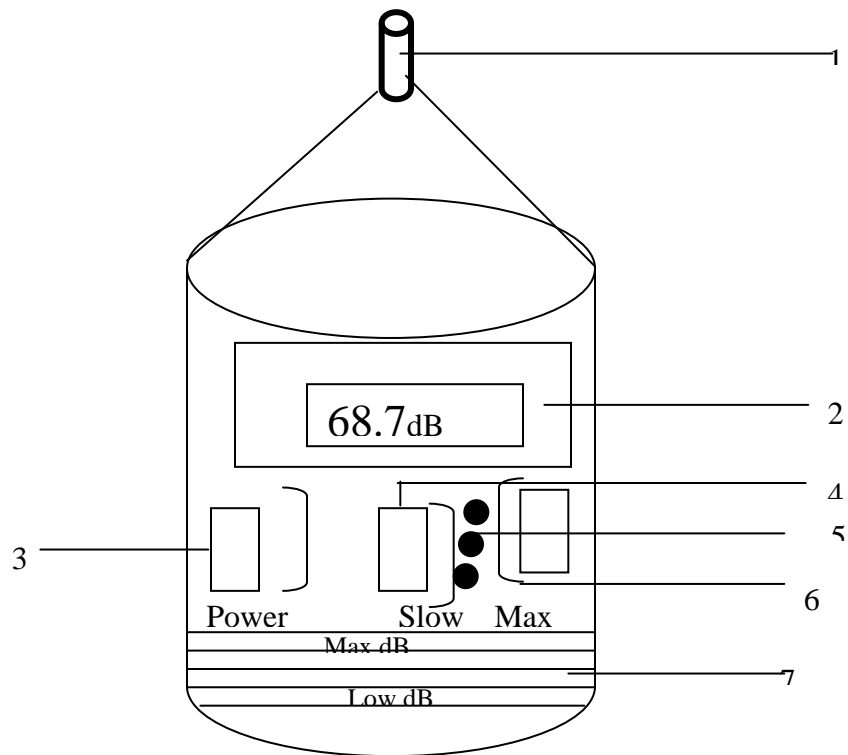


Figure 1: The external features of the digital noise meter. (Front View)

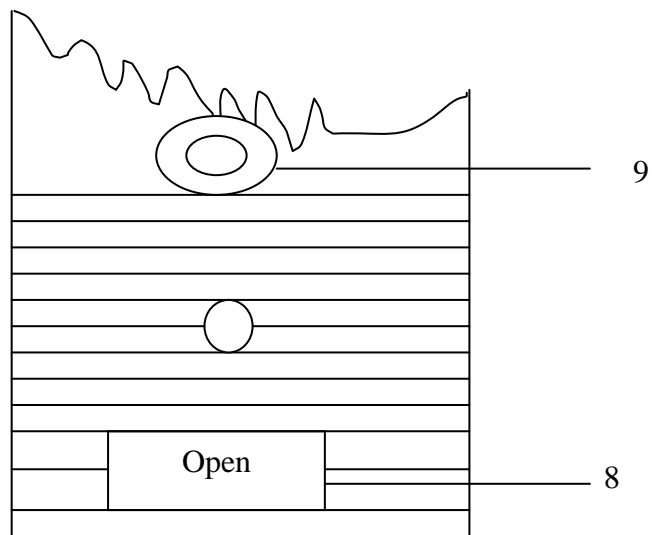


Figure 2: The external features of the digital noise meter. (Back View)

The noise meter was fixed at a low range of between 35 – 100 dB and placed on top of a 1.2 ft stool for uniform vertical distance above the ground level. The low range was chosen because it has been found to correlate well with human response. The meter was then adjusted to “A” weighting so as to determine the noise level. The “A” weighting network was used because it is most commonly employed for industrial and environmental studies. In addition, the

rate of hearing loss tends to follow the “A”– scale in that one can tolerate higher levels of low frequency noise for a longer period without hearing impairment (Avwiri and Nte, 2003).

Four readings each from 22 locations were taken with the aid of the sound level meter, at a period of 10 minutes interval and the average for each location was recorded. The readings were taken in the morning, during working hours as from 8.00 am and in the evening, after working hours as from 4.30 pm. The data was collected for 20 working days and the average and percentage of occurrence were recorded as shown in table 3.

S/N	Location of measurement	AVERAGE READING		% OF OCCURRENCE	
		MORNING	EVENING	MORNING	EVENING
1	Bravo Restaurant	66.2	66.2	4.8	3.2
2	Business centers1	86.4	86.4	6.3	4.2
3	Catholic church	57.6	57.6	4.2	3.0
4	ASCAN Hall	57.6	57.6	4.1	2.8
5	School Library	52.7	52.7	3.8	2.6
6	Student affairs office	67.1	67.1	4.9	3.4
7	Faculties building	57.0	57.0	4.1	2.7
8	Art Auditorium	58	58	4.2	2.8
9	Science Auditorium	60.0	60.0	4.3	2.8
10	DELSU co-operative	74	74	5.4	3.6
11	Botany Laboratory	57.0	57.0	4.1	2.7
12	Chemistry Laboratory	66.0	66.0	4.8	3.1
13	Physics laboratory	66.0	66.0	4.2	2.8
14	Exam Hall	58.0	58.0	3.1	2.4
15	Physics office	48.4	48.4	3.7	2.5
16	School gate	70.0	70.0	5.1	3.5
17	Council hall	50.0	50.0	3.4	2.3
18	All State Bank	74.0	74.0	3.4	3.6
19	Bursary	72.3	72.3	3.2	3.2
20	Health Center “ in”	58.0	58.0	4.2	2.8
21	Health Center front	75.5	75.5	5.5	3.6
22	Business Center 2	67.0	67.0	4.9	3.2

Table 3. Showing the average reading and percentage of occurrence of Noise in the morning and evening respectively

#### 4. DISCUSSION OF RESULTS.

Figures 3a, 3b, 4a and 4b are the graphical representations of the noise levels for morning and evening as well as the percentage of occurrence respectively. Study of these observations reveal that business centers which render documentary services has the maximum (peak level) of noise of about 86.4 dB with 6.3% during working hours in the and 4.2% after working hours.

This was followed by the front of Health center, Delsu multipurpose co-operative society and the outside of All State Trust Bank. The investigation was carried out when students were paying their school fees and examinations are going on. Meanwhile, the examination halls record the lowest noise level in the school.

In the evenings, as from 4.30 pm, the administrative and bursary blocks as well as most business centers close from the day's activities and the percentage of occurrence of noise drastically reduced (see table 3). This goes a long way to establish the fact that the major source of noise in campus 2 is that emanating from the indiscriminate use of electricity generators due to the frequent power failures by the Power Holdings Company of Nigeria PLC (PHCN). In addition, the bakery installed by Bravo Restaurant within the campus contributes a lot to the noisy environment. The measured noise levels when compared with the exposure limit of 75 dB summarized by Prof. Klostertettle Basternier as recommended by both WHO 1980 and FEPA 1991 calls for urgent need in employing control strategies.

## 5. CONCLUSION AND RECOMMENDATION

This study revealed that the major source of noise within campus 2 of Delta State University Abraka emanated from the indiscriminate use of power plants to generate electricity and this is due to the constant power failures by the Power Holding Company of Nigeria PLC (PHCN).

Noise should be seen as a nuisance that constitutes health hazard to the recipients and on this basis, some control measures that include the following should be adopted.

1. Government should ensure that the efficiency of the services of Power Holding Company of Nigeria PLC (PHCN) is increased, so that the need for private power plant will be reduced.
2. Departmental offices, Faculties, Administrative and Bursary blocks should make effort to have a centrally controlled stand-by power plant located away from the premises as this will help to reduce the noise emanating from different electric generators.
3. Business centers should be located away from school premises.
4. The students and employees in campus 2 of the University as well as the workers in the business centers should have access to ear protector devices whenever they are made to go closer to noise sources.
5. Occupational health and safety commission should provide a national code of practices that provide advice on management of noise in the workplace.

## 6. REFERENCES

- [1]. Abumere, O.E, Ebeniro, J.O and Ogbodo, S.N. (1999): "Investigation of Environmental Noise within Port-Harcourt city Metropolis" Nig. Journ. of Physics Vol.11 Pp(129 – 132).
- [2]. Avwiri, G.O and Nte, F. (2003): "Environmental sound quality of some selected flow stations in the Niger delta of Nigeria" Journal of App.Sc. Environ. Mgt Vol 7 (2) Pp (75 – 77).
- [3]. Bugliarello, G (1976): "The impact of Noise pollution" New york.
- [4]. Burtz, J. S. (Jr.): "Noise, Encyclopedia of science and technology" Vol. 5 MacGraw-Hill Books Company, New york.
- [5]. Ebeniro, J. O. and Abumere, O.E (1999) "Environmental Noise Assessment of an Industrial Plant" Nigeria Journal of Physics. Vol. 11/201 Pp (97 – 105).
- [6]. Federal Environmental Protection Agency (1995): Guidelines and standard for Environmental Pollution Control in Nigeria (FEPA), Abuja. Pp(67,220 – 228).
- [7]. John, E. K. Foreman (1989): "Sound Analysis and Noise Control, Nostrand Reinhold, New York. Pp(191 – 209 and 224 – 235).
- [8]. Levitt Henry (2001) "Noise Reduction in Hearing Aid" Journal of Rehabilitation Research and Development, 75<sup>th</sup> street, Jackson Heights, Ny 11370. Vol.38 No 1.
- [9]. Makis Tsapopas (1997): "Noise Modern Nuisance Worst Pollution of our time, Daily Express, London, England Awake November 8.
- [10]. Millers.G.Tayer. (1979): "An introduction to Environmental Science" Wadsworth publishing company, Belmont, California 94002.
- [11]. Nunez, D. E. (1998): "Cause and Effects of Noise Pollution. Student's papers spring.
- [12]. Olawepo, R.A. (2001): " Environmental Pollution and management techniques, part C. Empirical issues. Taylor, A.C. and Lipscomb, D. M. (1978): "Noise Control, Handbook of principles and practices" Publ. Van Nostrand Reinhold Copy. Pp(10 – 31 and 62 – 81).
- [13]. World Health Organization (1980): "International Standard/Acceptable Levels. Nigeria.

