NOISE LEVELS ASSOCIATED WITH SELECTED OIL AND GAS INSTALLATIONS IN OGBA/EGBEMA/NDONI LOCAL GOVERNMENT AREA OF RIVERS STATE, NIGERIA

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ABSTRACT

A study of noise levels in selected oil installations in Ogba/Egbema/Ndoni Local Government Area of Rivers State, Nigeria was carried out between January 2008 and August 2009. A sound level meter, a handheld GPS and steel tape were used to carry out measurement at interval of 100m from installations. Mean noise pollution levels were obtained from OB/OB Gas plant, Ebocha oil centre, Obite Gas plant, Obagi oil centre/flow station and Idu flow station. The mean values obtained are lesser than the Federal Environmental Protection Agency standard of 90dBA and slightly greater than WHO standard for outdoor. Results envisaged long-term health implications due to continuous daily exposure by the host communities. However, it was recommended among others that old pumps use in the installations should be replaced with electric motors, while plants or generators in use should be soundproof instead of the conventional types that are regular sources of noise.

Keywords: *sound level, oil installations, health side-effects*

INTRODUCTION

Oil explorations, exploitations and associated oil fields development continue daily in the Niger Delta region of Nigeria and these activities have led to the degradation of the environment in most cases. The industrial revolution which introduced factories, mines, transportation system and subsequently urbanization led to increasing population that have caused the spread of environmental pollution such as dust, dispersion, smoke, flare, bad and harmful odours, poor sewages and noise. Richard (2001) in his work on understanding Industrial noise referred to noise as aggravating, dangerous, and expensive and if not properly controlled in the workplace can be illegal.

Negative effects of noise such as loss of hearing ability, headaches, interference with communication, nervousness and lack of concentration, insomnia and impairment of efficiency, have all been identified and documented (Shapiro, 1993; Ebeniro, Abumere and Ogbodo (1999), Avwiri and Nte (2003). Egunjobi (1988) in his study of urban environmental noise pollution reported that noise had interference on speech and communication; and concluded that at about 65dB (A), people had to shout to be heard. Menkiti, (1989) carried out a survey on factors that constitute road traffic noise in Nigeria environment and concluded that there is a possible empirical relationship between road traffic component and psychological worries.

Nwaogozie and Owate (2000) examined the noise activities in the Port Harcourt refinery and reported that the noise level generated within the Port Harcourt refinery premises are spatially well dispersed and at the fenced boundaries, noise levels are well below FEPA's permissible limit of 90dB(A) and any noise emitted in the neighbourhood may not constitute a health hazard. Ebeniro and Abumere (2003) in a study of an oil servicing company involved in pipeline coating reported values that significantly deviated from standard. This study therefore examined the noise levels associated with oil and gas installation activities and the degree of associated environmental degradation in Ogba/ Egbema/Ndoni local Government Area of Rivers State.

MATERIALS AND METHODS

Ogba/Egbema/Ndoni local Government Area of Rivers State is the highest oil producing local government area in Nigeria with a number of oil installations and facilities such as flow stations, gas plants, well heads, massive network of pipelines and construction companies. The oil installations selected base on their accessibility were OB/OB gas plant, Ebocha oil centre, Obite gas plant, Obagi gas plant/flow station and Idu flow station.

A sound level meter, a handheld Global Position System (GPS) and steel tape were used to carry out measurement at interval of 100m from installations. Noise level measurements was carried out with a Digital sound level meter (BK Precision 732) which conforms to the IEC 651 type 2, ANSI 51.4 type 2 for sound level meters and set on A- weighting scale because of its recommendation for industrial and environmental studies (Chanlett, 1973; Avwiri and Nte, 2003). The World Health Organization (1980) summarized available scientific data on the effects of noise on human health and suggested acceptable noise levels for various situations (Table1).

The sound level meter was always held conformably in hand and the microphone point at the suspected noise source, at intervals of 100m away until noise levels become relatively normalized. Several readings were taken in the four cardinal directions of the oil installations where possible and their average computed. The calculated values are presented on Table while chart shows the mean results compared with FEPA standard. The noise pollution level of installation were obtained using the relation

$$L_{np} = l_{eq} + K\sigma$$

Where:

k = constant with a value of 2.56

σ = the standard deviation of the acquired Leq_{values}

(Avwiri and Nte, 2003).

RESULTS AND DISCUSSION

The major sources of noise include the gas flares from the gas nozzles (Ebocha Oil centre), generators, pumps, compressors, the Rivers State Government independent power supply gas turbine station (Obrikom), motor bike riders and other ancillary activities. For most stations the sound level normalizes at about 1.4 km which is within the communities at Obrikom, Idu and Obagi. The presence of brick wall around some of the facilities attenuated the noise level insignificantly; the brick walls were more of security enhancement than noise amelioration. .

The results revealed a maximum noise pollution level of 77.94dBA at OB/OB gas plant. Figure 1 shows that the obtained results are lower than the FEPA recommended values of 90dBA for 8 hours and also within the range recorded for flow stations and similar oil installations within the Niger-Delta region of Nigeria (Avwiri and Nte, 2003, NDES, 1999). The values are also far

lower than those obtained for industrial plants where fabrications and welding operations which produce high frequencies and pitch (Abumere and Enwerem, 2001). However, the results compared with the WHO recommended for outdoor (Table 1) could induce significant community annoyance more especially that most of the facilities are located in/around the host communities.

General assessment of the study showed that the noise levels will not constitute noise hazards leading to physiological or psychological damages on the short term but could have a long term effects on the host communities due to the continuous daylong activities of the stations.

CONCLUSION AND RECOMMENDATIONS

Noise levels associated with selected oil and gas installations in Ogba/ Egbema/Ndoni Local Government Areas of Rivers State, Nigeria has been studied. Obviously, noise nomatter how it is viewed, constitute nuisance within the environment it occurs. A combination of the sounds from machines in a factory can produce qa great deal of noise. Common among people in a noisy environment is shouting above the level of the voices. This action raises ones body temperature as a result of the extra strength exerted. sequel to this, a long term health implication due to continous daily exposure by the host communities interplay. Therefore, it is recommended that old pumps be replaced with electric motors and plants or generators in use should be soundproof instead of the conventional types that are regular sources of noise. Oil companies should also extend their environmental trainer programmes to the host communities and contract staff as this will help in guiding them on noise safety and other pollution impact matrices in their work and living environments.

Table 1: Noise Control Criteria

Situation	Acceptable level dB(A) leq	Comment
Working environment (8 hour/day)	75	No identifiable risk at this level
Bedroom inside at night	35	Maximum level
Indoor background level to ensure good speech intelligibility	45	Maximum level
Outdoor level, day time	55	Desirable level to prevent significant community annoyance
Outdoor level, night time criteria inside	45	Maximum level to meet sleep

Source: WHO, 1980

Table 2: Mean Noise Levels for the Oil Installations

Distance (m)	Mean noise levels for individual oil installations(dBA)				
	OB/OB Gas Plant	Ebocha Oil Centre	Obite GasPlant	Obagi Oil Centre/ Flow Station	Idu Flow Station
0	62.0	61.2	52.2	57.9	60.2
100	66.3	62.9	53.0	59.7	58.8
200	69.4	66.6	53.3	58.6	56.7
300	61.2	64.9	52.4	55.2	55.8
400	58.5	63.1	49.7	53.6	54.9
500	56.2	62.4	48.9	50.9	52.1
600	54.6	61.8	47.8	50.5	51.9
700	54.1	59.4	45.8	49.8	51.8
800	51.5	57.3	44.9	49.7	51.3
900	50.3	56.6	43.6	49.3	51.0
1000	50.8	54.6	41.3	49.1	50.2
1100	50.1	49.2	41.1	46.9	49.2
1200	48.5	47.7	40.0	44.8	48.4
1300	43.5	44.3	40.0	42.9	45.7
1400	40.3	42.1	38.3	40.3	43.6
1500	40.3	40.1	37.6	39.3	41.8
1600	38.6	38.2	35.6	38.8	40.5
1700	33.6	37.1	35.1	37.1	39.0
1800	30.5	35.6	35.0	37.0	38.7
1900	30.5	35.0	34.9	36.5	38.7
2000	30.0	35.0	34.9	36.5	38.5

Source: Fieldwork, January 2008 - August 2009

Table 3: Summary of noise pollution levels (Lnp) for oil installations

Oil Installation	Geographical Location		Leq	Lnp
	Lat. (ϕ)	Long. (λ)	(dBA)	(dBA)
OB/OB Gas plant Obrikom	5 23.32"6	6 39 27.0	58.96	77.94
Ebocha Oil Centre Ebocha	5 27 32.9	6 41 55.1	56.11	75.09
Obite Gas plant Obite	5 14 36.1	6 39 31.5	47.79	66.77
Obagi Oil Centre/flow station, Obagi	5 14 17.1	6 37 49.6	50.41	69.39
Idu Flow station Idu	5 14 44.4	6 36 01.4	52.65	71.63

Source: As calculated from acquired field data and (L_{np})

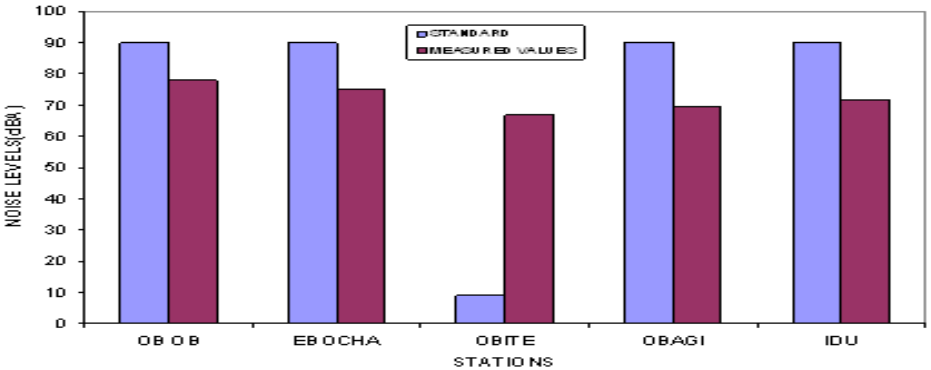

Figure 1: Mean Pollution Levels Lnp against Standard

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