

Studies on Control of Hazardous Noise from Portable 650 VA Power Generator

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Abstract

Experimental studies on the assessment and control of near-field noise levels due to the operation of a portable 650 VA power generator were undertaken at a residential building in Ara village, Moro local government, area of Kwara State. Smart sensor sound level meter AR824 (30-130 dB), meter rule and stop watch were used to measure the noise level produced at every two minutes risen time intervals for seven hundred and twenty minutes at ten different locations of one meter intervals. The background noise level of the environment was first taken and reported to be 47.60. The data obtained were analysed with Matlab R2010a. The results revealed that the 650 VA generating plant is safe for use when it is positioned at least 3 meters away to the building, offices, shops and so on.

Introduction

Due to inadequate power supply from Power Holding Company of Nigeria, portable generators are used very commonly in shops, offices and homes today in order to supply power during power blackouts. These generators emit very high levels of noise, in addition to noxious air emissions [Broadbent, (1983) and (1979), Berglund, Lindvall, and Schwela, (2000), Earshen, (1986), Matthews and Cannon, (1975), Sauser, Arauz, and Chambers, (1978), Singer, Acm and Schaeffer, (1990)].

The noise may be generated by aerodynamic effects or due to forces that result from combustion process or may result from mechanical excitation by rotating or reciprocating engine components. Noise levels due to the operation of a 650 VA capacity portable generator, at different locations outside a residential building have been assessed.

Materials and Method

The experiment was carried out at Ara village, Moro local government, area of Kwara State, with a smart sensor sound level meter AR824 (30-130 dB), meter rule and the stop watch to measure the noise level produced from 650 VA Power generating plant popularly called 'I better pass my neighbor' at every two minutes intervals for seven hundred and twenty minutes at ten different positions of one meter intervals. The background noise level of the environment was first taken and reported to be 47.60 dBA. The desired response of the Sound Level Meter was set at 'Slow'. When measurement were made, the microphone was located in such a way as not to be in the acoustic shadow of any obstacle in appreciable field of reflected waves. The figures below shows the experimental set-up and the connected loads.



Figure 1: Experimental set-up



Figure 2: Connected loads

Results and Discussion

The following graphs are the plots of noise level produced for loading and unloading effects. Each of the figures below shows the plot of Noise level (dBA) against Time (minutes) at the source and some distance intervals to the source of noise. At the source, the direct noise of the generating plant measured was too high and above the threshold value of 85 dBA for loading and unloading effects.

As the distance of the noise moved farther away, the noise level reduces. At 3 meters away to the source,

the noise level measured was below the threshold value of 85 dBA and safe for hearing.

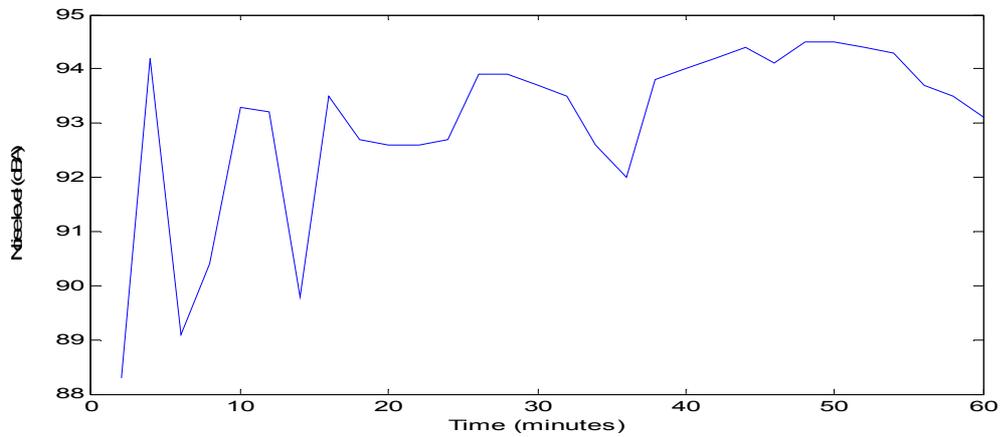


Figure 1: Noise level produced at the source for unloading effect

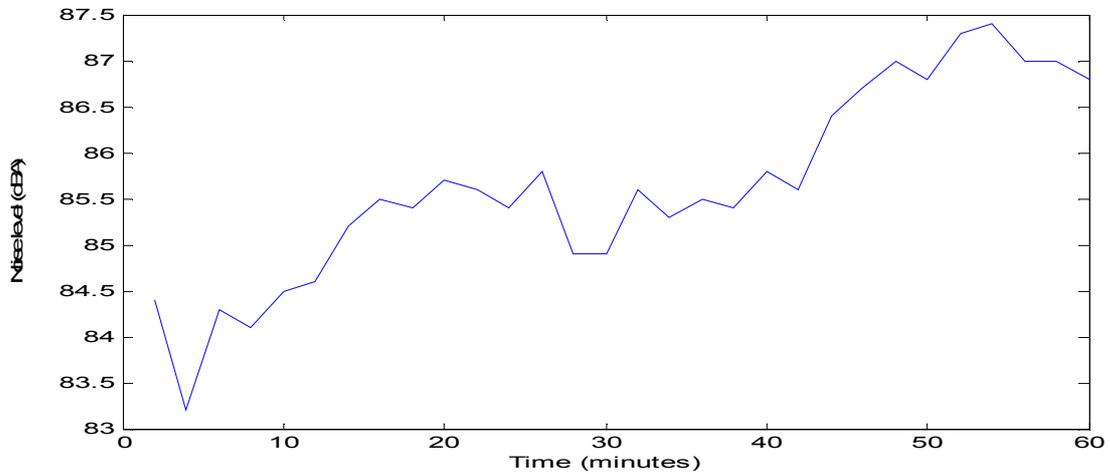


Figure 2: Noise level produced at the source for loading effect

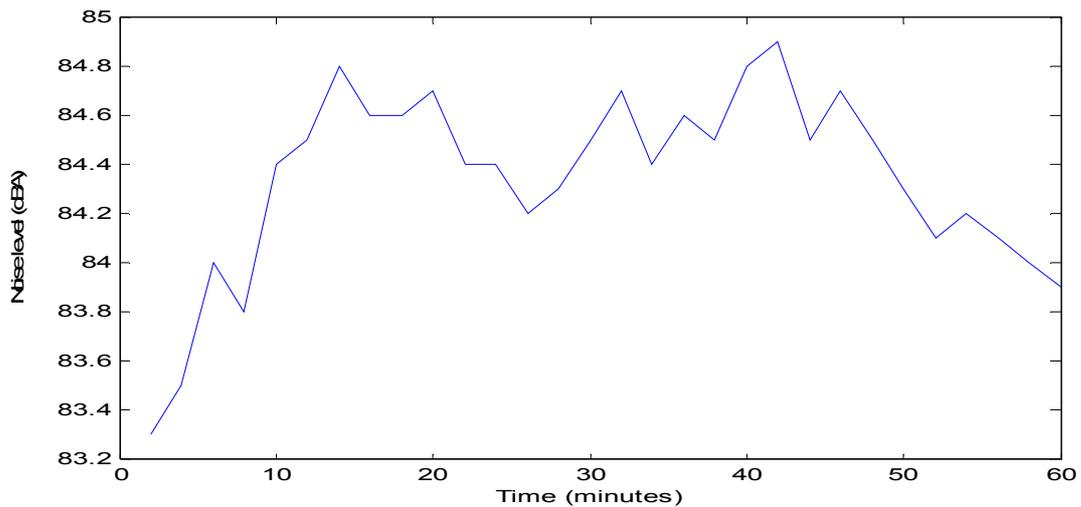


Figure 3: Noise level produced for loading effect at distance of 1 m

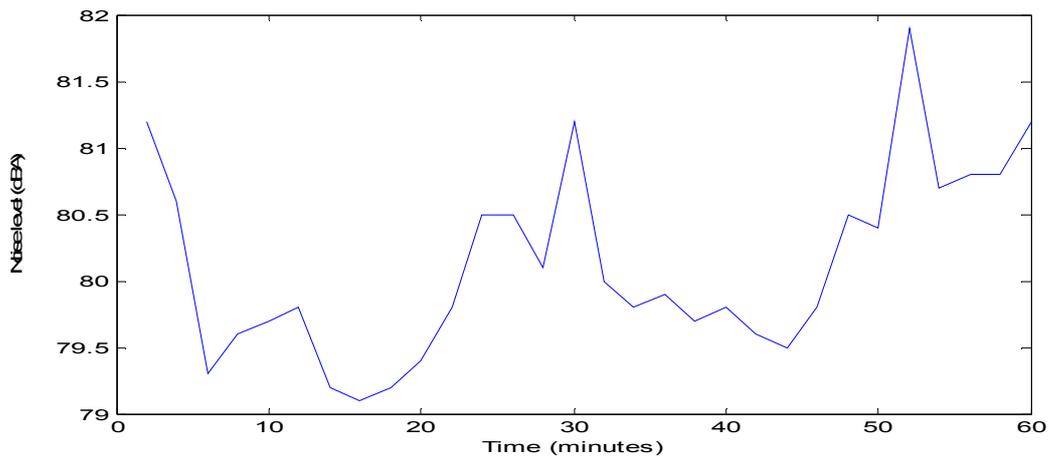


Figure 4: Noise level produced for loading effect at distance of 2 m

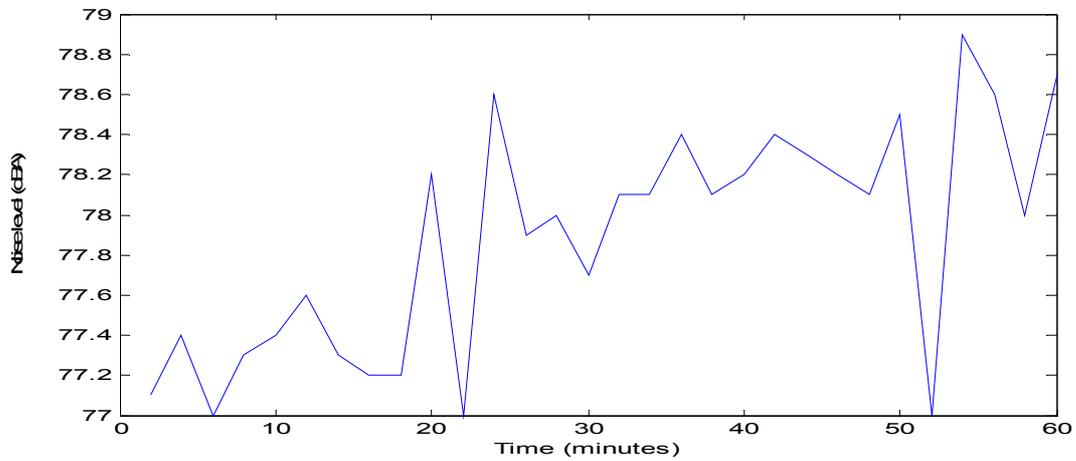


Figure 5: Noise level produced for loading effect at distance of 3 m

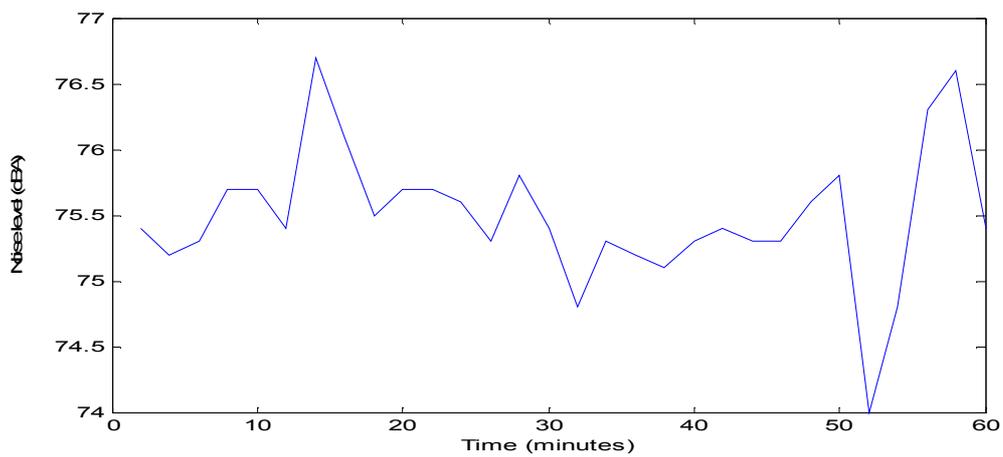


Figure 6: Noise level produced for loading effect at distance of 4 m

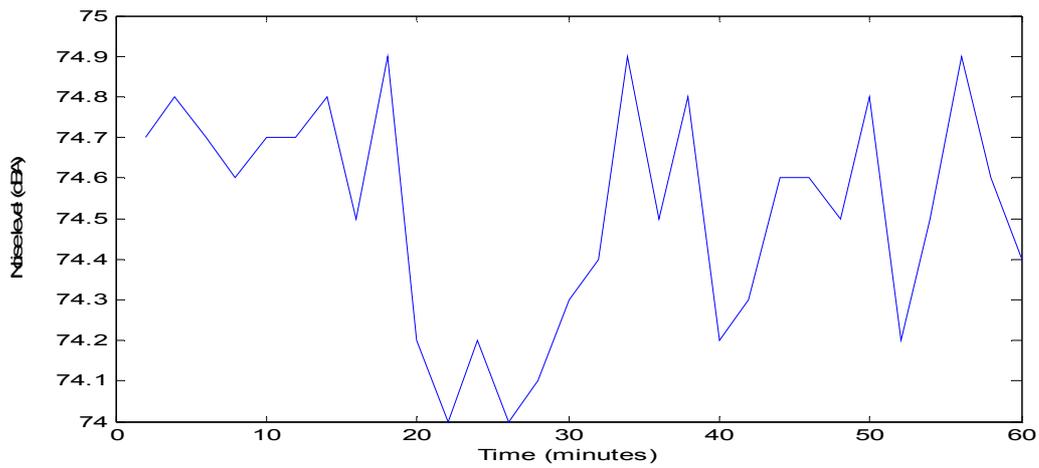


Figure 7: Noise level produced for loading effect at distance of 5 m

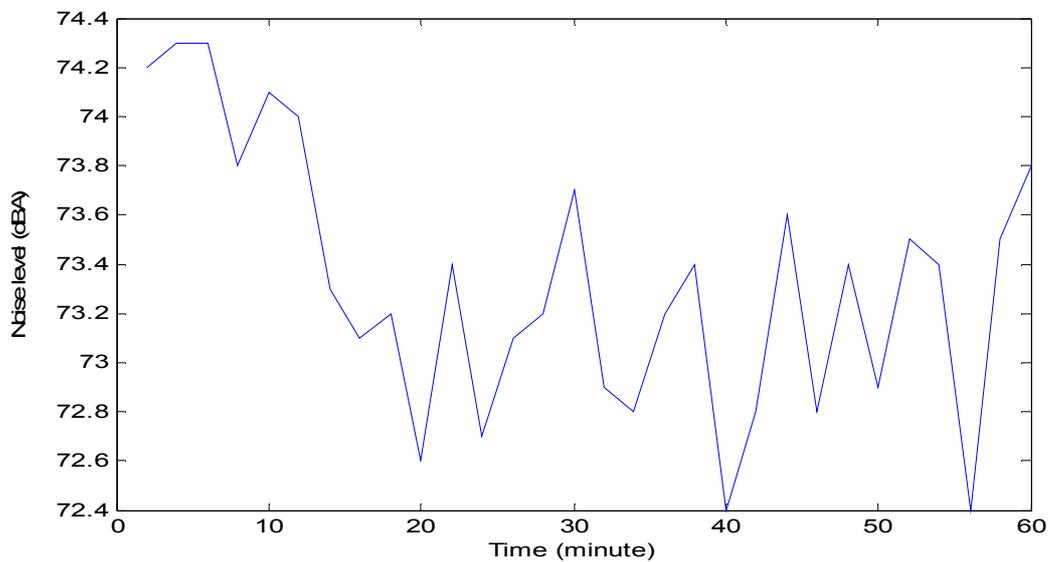


Figure 8: Noise level produced for loading effect at distance of 6 m

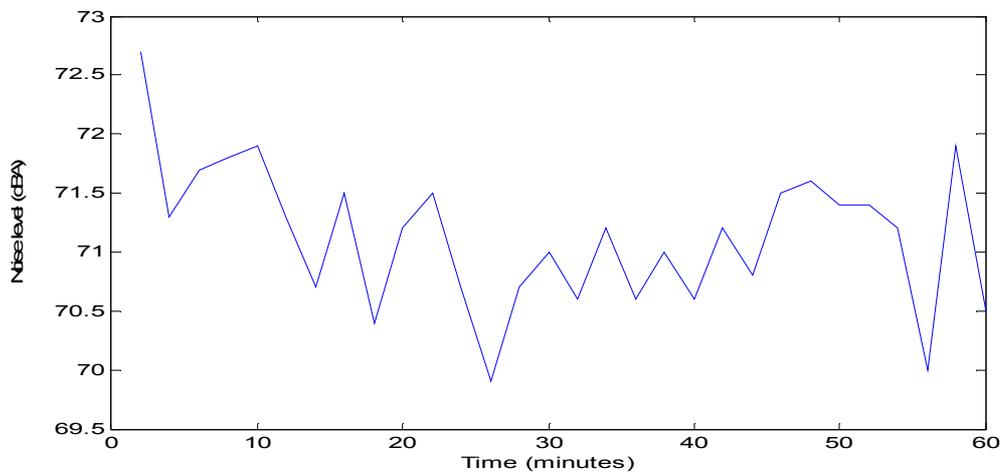


Figure 9: Noise level produced for loading effect at distance of 7 m

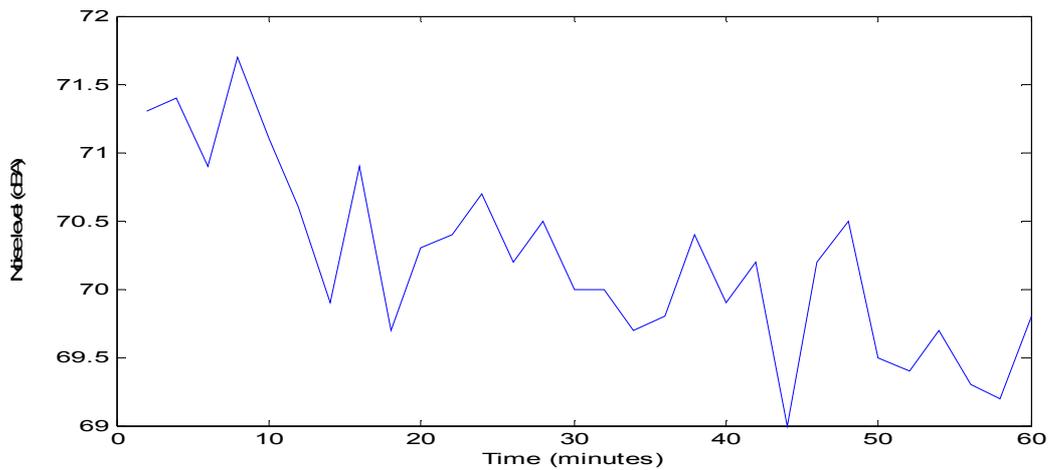


Figure 10: Noise level produced for loading effect at distance of 8 m

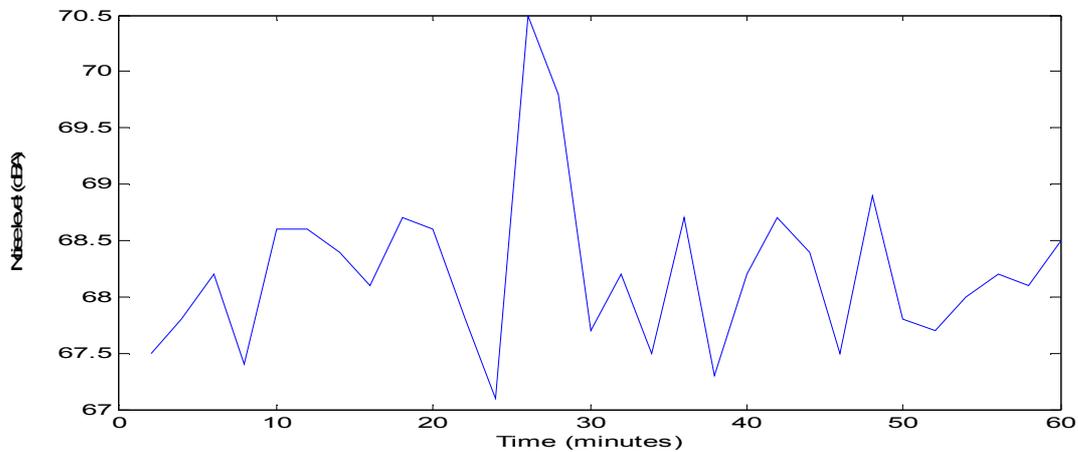


Figure 11: Noise level produced for loading effect at distance of 9 m

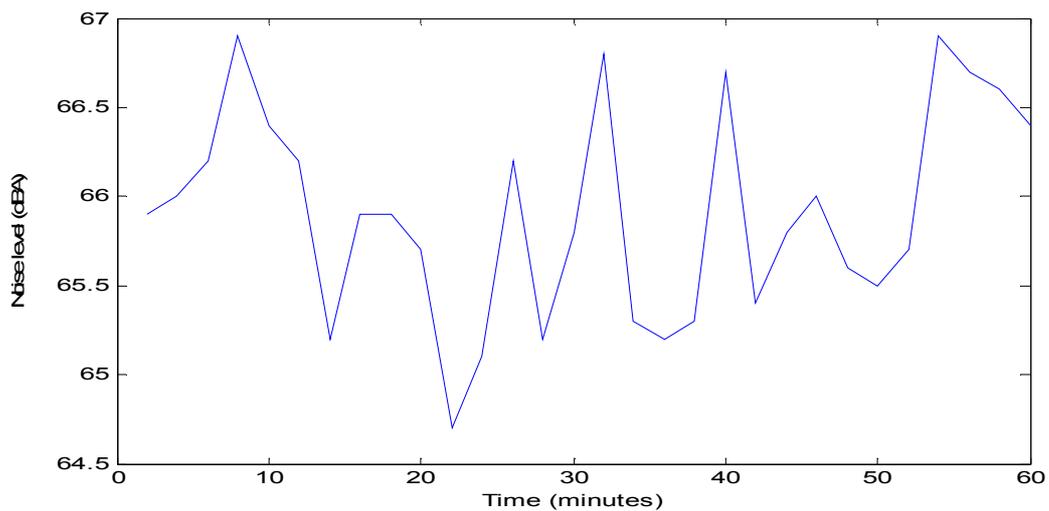


Figure 12: Noise level produced for loading effect at distance of 10 m

Conclusion

Within the limit of the experiment error, the safe position for the 650 VA power generator should not be less than 3 meters away to the offices, and residential buildings. At less than 3 meters to the power generator, the value of the noise produced was too closed and some even higher than the threshold value of 85dBA.

Recommendation

Based on the study carried out, I therefore recommend that the 650 VA power generator should not be positioned in a place less than 3 meters to the offices, shops and residences.

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