

Assessing Shielding Adequacy of Selected Radiological Facilities to Ascertain Radiation Safety
in Ibadan Metropolis, Nigeria

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Certification

This is to certify that Chigbo Igwe Okereke with matriculation number LUC/PG/001416 carried out this research work titled “Assessing Shielding Adequacy of Selected Radiological Facilities to Ascertain Radiation Safety in Ibadan Metropolis in the Department of Physics, Faculty of Natural and Applied Sciences, Lead City University, Ibadan, Oyo State, Nigeria for the Award of Master science degree (MSc) in Physics and the work has not been presented and submitted elsewhere for the award of degree, or any other purpose.

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Date

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Head of Department

Date

Dedication

I dedicate this research study to Almighty God, who Has been Jehovah-Jireh in my life.

Acknowledgement

I would like to use this opportunity to express my sincere gratitude to the administration and the entire academic community at Lead City University, Ibadan, for providing the favorable conditions and opportunities necessary to conduct this research.

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Although the institutions and individuals mentioned above provided support during the study process, I alone stand responsible for any error, if found in the work.

Abstract

The use of ionizing radiation (X-rays) in diagnostic radiography could be hazardous and cause somatic and genetic damage. Adherence to radiation safety and radiation protection practices could mitigate such risks. The aim of the study was to assess the shielding adequacy of selected radiological facilities to ascertain radiation in Ibadan Metropolis. Radiation survey meters were used to obtain the instantaneous dose rates (IDR) in the study area. The data were analysed, the estimated annual doses (D_{eff}) calculated, and compared with the NCRP standard.

Radiation dose rates of ranges (0.14 $\mu\text{Sv/hr}$ – 2.75 $\mu\text{Sv/hr}$), (0.19 $\mu\text{Sv/hr}$ – 1.28 $\mu\text{Sv/hr}$), (0.23 $\mu\text{Sv/hr}$ – 3.01 $\mu\text{Sv/hr}$), (0.09 $\mu\text{Sv/hr}$ – 0.19 $\mu\text{Sv/hr}$), (0.27 $\mu\text{Sv/hr}$ – 7.51 $\mu\text{Sv/hr}$), (0.11 $\mu\text{Sv/hr}$ – 99 $\mu\text{Sv/hr}$), (41 $\mu\text{Sv/hr}$ – 18.45 mSv/hr), (0.25 $\mu\text{Sv/hr}$ – 3.56 mSv/hr), (1.10 $\mu\text{Sv/hr}$ – 45.2 $\mu\text{Sv/hr}$) and (0.14 $\mu\text{Sv/hr}$ – 42 $\mu\text{Sv/hr}$) were respectively obtained in each of the ten radiological facilities considered. The results showed that the level of radiation safety for the personnel was low and the radiation safety guidelines were compromised. Application of shielding devices such as lead lining for protection was completely neglected in centres F, G and H. Findings from this study indicate that both the personnel working at the evaluated diagnostic centres and the people living close to the centres are exposed to radiation and are therefore at high risk of radiation-induced damage. Regular monitoring of diagnostic centres in the Ibadan metropolis to ensure continuous compliance with safety and protection practices is highly recommended.

Keywords: Ionizing radiation; radiological facilities; instantaneous dose rates; dosimeters.

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