Nuclear gauge application in a road Construction industry in Ethiopia.

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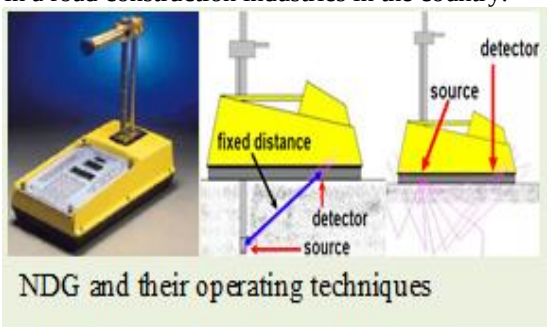
1. Background and Goal of the work

The application of ionizing radiation is an important technique for a wide variety of industries in many cases. One of these applications is portable density/moisture gauges. Portable density gauges have been used in industries such as construction, civil engineering, agriculture, and the like areas to perform in-situ measurements such as soil moisture or asphalt density. This is a non-destructive testing method which is very useful for civil engineering structures and preferable than other alternative methods. This technique can determine both the density and moisture of materials for construction control at the worksite. The simplicity, speed, and nondestructive nature offer a great advantage for quality control. However, ensuring safety in the use of nuclear gauges and security of the gauges is of paramount importance for the protection of people and the environment from any associated radiation risks. The main aim of the research work was to assess the safety and security of NDG which have been used by in a road construction industries in the country.



NDG and their operating techniques

2. Data collection and Analysis

2.1 Data Collection

The data was collected from Ethiopian Radiation Protection Authority (ERPA) data base, inspection results, questionnaires, and interviewing with the users. According to obtained data from ERPA, there are 54 registered NDG available in the country which have been used by different construction companies for road construction.

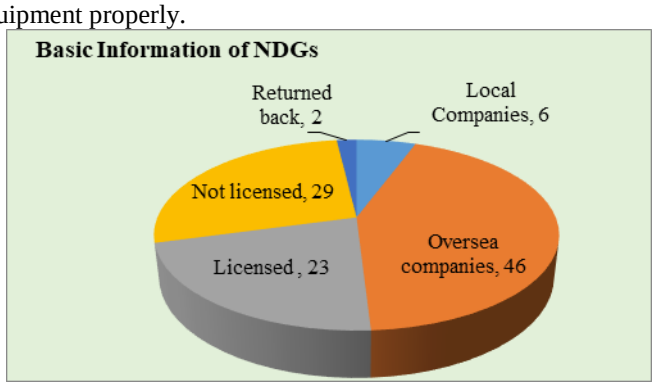
2.2 Data Analysis

Ethiopian road authority is the governmental authority which has a mission to develop and manage sustainable roads through institutional competency and optimal. One of the criteria to meet by a company to be competent is having NDG. For this reason, every company should have NDG. The collected data were analysed using Microsoft Excel 2013 version.

3. Results and Discussion

3.1 Results

Among 54 NDGs, 6 were owned by local companies, 46 were owned by overseas companies, and 2 were returned back to their original country. According to obtained data, most of the gauges are not secured. Some companies stored the gauges as ordinary equipment; like storing them on the corridor, stokes with machineries, keeping unsecured places. Regarding safety, radiation workers working with NDG are not using radiation safety equipment properly.



3.2 Challenges of Regulating NDGs

The following challenges were identified by this study

- Some sources had no information like manufacturer, type of radionuclide, manufactured date, activity, etc.
- Some sources were given to ERA by overseas companies after completion of the projects without any documents. Therefore, ERA could not be able to send the sources back the disused sources to the manufacturer because of lack of return agreements.
- Some companies were not using gauges but imported to fulfill the ERA's requirements.
- Some sources were imported without the knowledge of ERPA

3.3 Conclusion

The finding indicates that there is improper handling of gauges by the users. Regarding the safety and security, both the radiation workers and the companies have lack of knowledge to implement safety parameters and security measures.

3.4 Recommendations

Based on the finding, the following recommendations are drawn:

i. The companies should properly handle the radiation sources.
ii. The regulatory body should strongly follow up on the companies to use safely and handle the radiation sources securely.
iii. Proper training should be given to the users on how to use the sources safely and handle it securely.

Acknowledgements

I would like to thank IAEA and Scientific Secretaries for organizing this event. I also thank all those take part in the completion of this work.

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