

# THE CURRENT STATUS OF NORM INDUSTRIES IN ZIMBABWE AND SUGGESTION ON REGULATORY FRAMEWORK.

## 1. Introduction

The Earth's crust contains various types of elements trapped within it since its formation such as Uranium and Thorium with radioactive isotopes like Uranium-237(237U), Uranium-238 (238U), Thoron-232 (232Th). Materials that contain radioactive elements that are found naturally in the environment are called Naturally Occurring Radioactive Materials (NORM).

According to the International Atomic Energy Agency (IAEA), the principle NORM industries are distributed as follows: [1]

- (1) Extraction of rare earth elements;
- (2) Production and use of thorium and its compounds;
- (3) Production of niobium and ferro-niobium;
- (4) Mining of ores other than uranium ore;
- (5) Production of oil and gas;
- (6) Manufacture of titanium dioxide pigments;
- (7) The phosphate industry;
- (8) The zircon and zirconia industries;
- (9) Production of tin, copper, aluminum, iron and steel, zinc and lead;
- (10) Combustion of coal;
- (11) Water treatment.

## 2. Materials and Results

In this study, elements of the regulatory framework of NORM in Zimbabwe were analyzed, particularly, by exploring the Radiation Protection (Naturally Occurring Radioactive Material) Regulations under Statutory Instrument 99 of 2013. Regulations therein were compared to the international standards recommended by the International Atomic Energy Agency (IAEA), United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) and the International Commission on Radiological Protection (ICRP). From the review of the current literature on the topic of this thesis, ways in which we could achieve the objective, that is, to have enhanced radiation protection for the public, workers and the environment, were formulated by proposing amendments to the current regulation of NORM in Zimbabwe.

After the reviews, suggestions on the modification of the current regulatory framework for improvements were then made. The criteria used to come up with proposals on the regulations will be based on maximizing the following:

- I. Radiation protection of the public, workers and the environment against ionizing radiation.
- II. Implementation of the graded approach

## 3.1 Norm Regulation in Zimbabwe

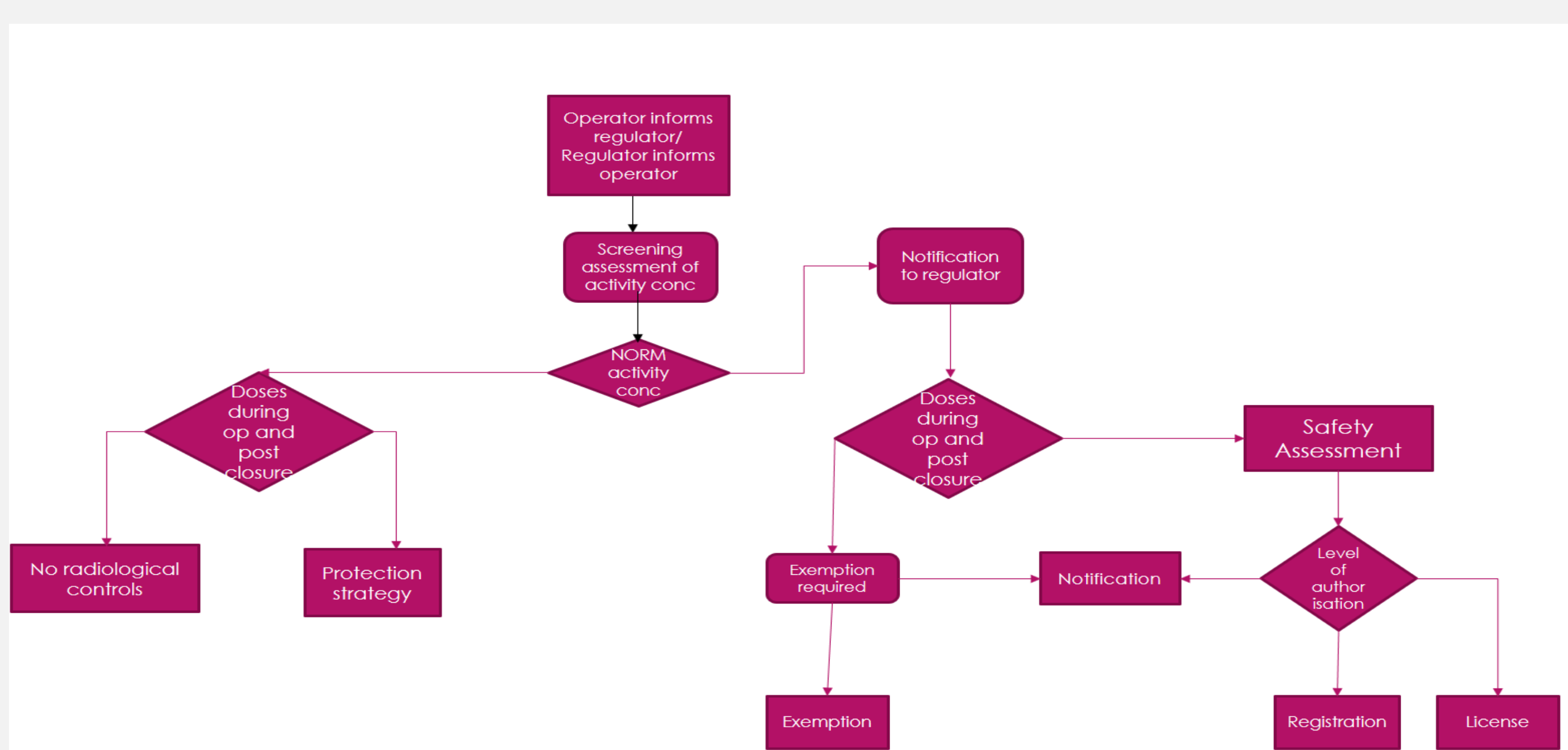


Fig. 1. Regulation criteria for NORM

## 3.2 The Radiation Protection Act

The regulatory body in Zimbabwe responsible for NORM is the Radiation Protection Authority of Zimbabwe (RPAZ). The organization was formed in 2009 according to an Act of Parliament, the Radiation Protection Act [Chapter 15:15] of 2004. The main criteria of NORM regulation involve monitoring NORM levels in industries related to NORM in order to establish radiation exposure levels to workers handling NORM by-products or processed products and investigating radionuclide concentrations in consumer products intentionally or inadvertently used with NORM in order to ensure the public is not exposed to unacceptable radiation.

Regulations	Stipulation In the Radiation Protection Act	Suggested Amendments
Organization/s established for NORM regulation.	The government, through the regulatory authority monitors and regulates NORM.	Establishment of a technical support institute
Waste Disposal	Disposal of waste has to be done so that the general public exposure dose not exceed 0.25mSv/yr.	Disposal methods for different types of NORM.
Radon at workplaces	No regulation at for radon exposure at work places.	Workplace monitoring should be introduced as part of regulation Provisions , aircrew monitoring should be introduced in the act.
Natural Radiation	The act does not encompass cosmic or terrestrial radiation.	

## 4. Conclusions

There is need to extend regulation to cover natural radiation from cosmic and terrestrial.

Provisions should be made in the law for establishment of an independent institute for technical support to the regulatory body.

Update of regulations according to new data and the best international practices should be made

## References

1. IAEA. (2005). Naturally Occurring Radioactive Materials (NORM IV). International Atomic Energy Agency.