

# SECURITY REQUIREMENTS TO OIL WELL LOGGING RADIOACTIVE SOURCES: IMPROVING SECURITY CULTURE

Eunícia João Goessa<sup>1</sup>, Francisco Cesar Augusto Da Silva<sup>2</sup>

<sup>1</sup>Agência Nacional de Energia Atômica, ANEA - Moçambique

<sup>2</sup>Institute of Radiation Protection and Dosimetry, IRD/CNEN - Brasil

dasilva@ird.gov.br; euniciagoessa@gmail.com

## OBJECTIVE

The paper presents some requirements items with practical aspects Based on IAEA five basic security functions, to be used to improve security culture for oil well logging workers.



An international concern about radioactive sources after the September 11, 2001 event has led to a strengthening of security. There is evidence that the illicit use of radioactive sources, such as, "radiological terrorism" is a real possibility and may result in harmful radiological consequences for the public and the environment. Mobile radioactive sources used in industrial applications, such as, industrial gamma radiography, nuclear gauges and oil well logging gauges have become a major concern for regulatory authorities because of the possibility of using them as a "dirty bomb." Oil well logging is the operation of taking various geophysical measurements in oil wells to evaluate their performance and viability in exploration and production. Gamma sources are used for the density measurement of rock strata around the borehole of an oil well and neutron sources are used for measuring hydrogen levels in rock strata around the borehole of an oil well. Both methods are made by backscatter measurement

## FACTS

Radioactive sources use in oil well logging installations .



Gamma sources (Cs-137)

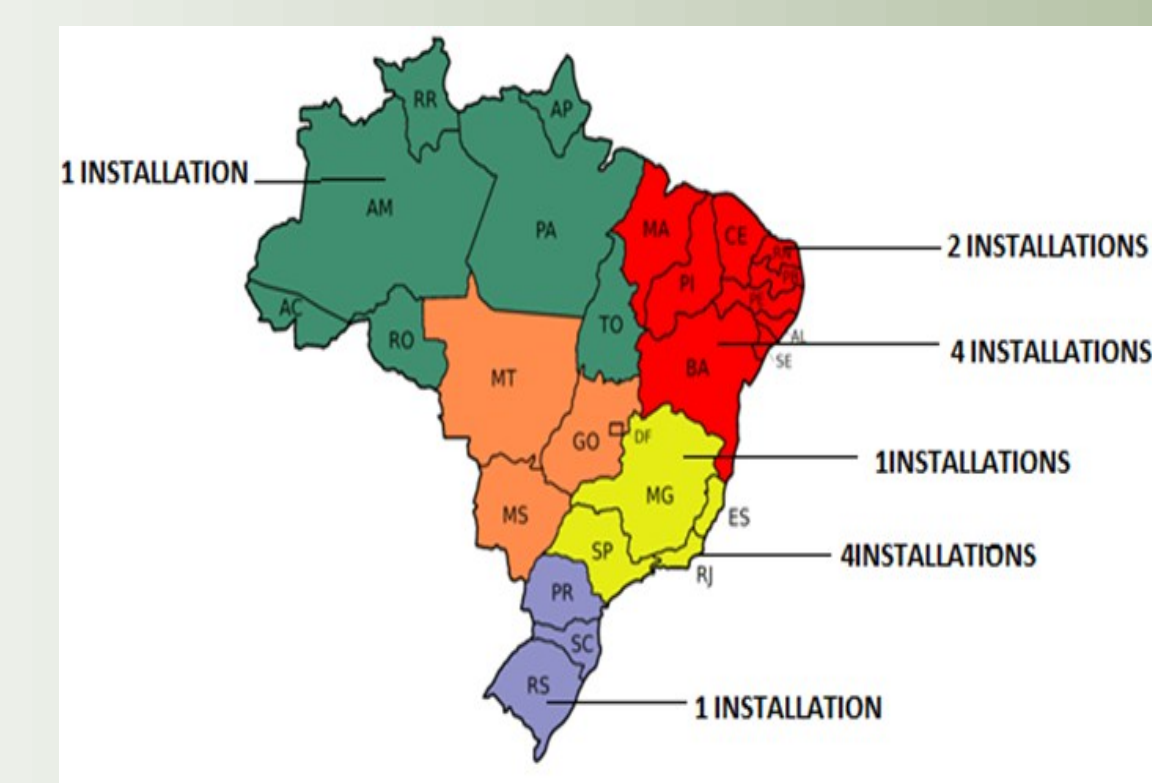


Neutron source Am-241-Be

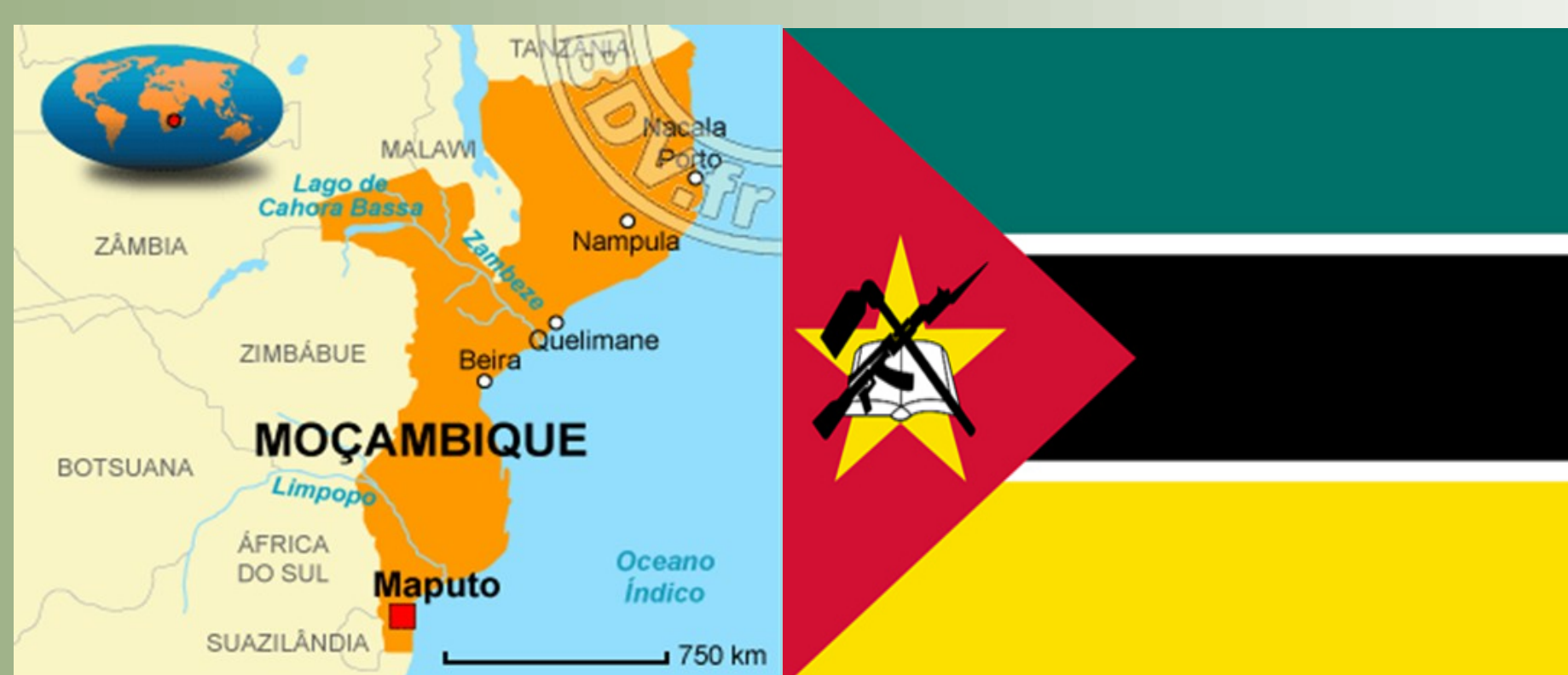


Probe used in oil well logging

Brazilian Commission of Nuclear Energy indicates that there are in Brazil about thirteen oil well logging installations with radioactive sources .



The National Atomic Energy Agency of Mozambique indicates that there exist in Mozambique about nine oil well logging installations with radioactive sources .



Radioactive sources shielding containers

The oil well logging installations in Brazil and Mozambique ,use radioactive sources classified by IAEA as Safety Category 3 (dangerous to the person) and Security Level C (reduce the likelihood of unauthorized removal of a source), occupy a prominent position due to gamma and neutron radiation emission with high radioactive sources activities, such as, Cs-137 (370 MBq), Am-241-Be (1850 GBq) and Cf-52 (720 MBq).

Safety conditions are well established in these facilities, due to the intense work of Brazilian Regulatory Authority (CNEN) and Mozambican Regulatory Authority (ANEA). But security conditions, according to the basic concepts of Deterrence (occurs when an adversary, otherwise motivated to perform a malicious act, is dissuaded from undertaking the attempt), Detection (is the discovery of an attempted or actual intrusion which could have the objective of unauthorized removal or sabotage of a radioactive source), Delay (impedes an adversary's attempt to gain unauthorized access or to remove or sabotage a radioactive source, generally through barriers or other physical means), Response (encompasses the actions undertaken following detection to prevent an adversary from succeeding or to mitigate potentially severe consequences) and Security Management (includes ensuring adequate resources, personnel and funding, for the security of sources) are not yet fully established and incorporated in industrial installations. The main cause observed was the lack of knowledge of workers on security concepts that must be established at the facilities.



Radioactive sources storage



## Safety requirements

- Use of personal dosimeters for gamma and neutron radiation
- Use of gamma and neutron radiation area monitors
- Perform leak tests on radioactive sources annually
- Qualification certification of a radioprotection supervisor
- Use of inviolable barrier and shielding on radioactive sources
- Inventory and control of movement of radioactive sources
- Equipment calibration services

## Security requirements

- Use of electronic devices for tamper indicating
- Use for electronic devices for the access control in radioactive sources storage
- Accounting records of radioactive sources
- Use of base fences
- Use CCTV system's in the radioactive sources storage
- Use of radio and cellular communication to ensure rapid intruder neutralization
- Use of specific and inviolable barrier (e.g. cage, source housing) to store sources;
- Periodic checking and through physical checks

## CONCLUSIONS

The safety and security requirements have the common objective of protecting the life of the people and environment against the harmful effects of ionizing radiation. The use of specific and inviolable barrier (e.g. cage, source housing) to store sources; to confirm the presence of the radioactive sources by periodic checking through physical checks, tamper indicating devices, is the requirements practical that integrate safety and security to be used to improve security culture for oil well logging workers

