

Security requirements to oil well logging radioactive sources: improving security culture

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. There are in Brazil about 1850 medical, industrial and research installations with radioactive sources. The thirteen oil well logging installations, with 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-252 (720 MBq).

Safety conditions are well established in these facilities, due to the intense work of Brazilian Regulatory Authority (CNEN). 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.

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

State

Brazil

Gender

Male

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