**Lessons Learned from Moleta Incident**

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**Abstract:** Moleta is a small region in Upper Nile State in South of Sudan, very close to Palouge oil base ,with distance about more than 300 Km from the capital “Khartoum”. A projector that contains a radioactive source (Ir- 192) of about 1.9 TBq (51.35 Ci), belongs to a Sudanese NDT company was been stolen due to poor security measures. Mobile Experts Team (MET) from the regulatory body flew to the region after one day from the case, immediate meeting was held with security and HSE personnel of Palouge and Moleta regions, as a result un action plan was planned to manage the situation and mitigate the consequences , the plan depends on surveying using detection instruments, informing the public through their local language (*Dennka*), beside dissemination of posters contain other source photo (similar to the stolen source ) , more over FM Mirraya Radio was used to inform the public about the case, in addition to that the people movement was supervised in the exist and entry to the region beside that the doctor in the main hospital was been informed about the symptoms of exposed to radiation. After five searching days the source was found by truck driver not far from Moleta region. Based on the recommendation from the MET, more physical protection barriers were implemented to enhance the security levels around the radioactive sources storage. Another round of field works was conducted by the MET to collect the posters around the region in order to get the public confident, safe and secure.

Despite the hard effective efforts that has been performed by the MET, but, it doesn’t include an expert from criminal evidence directorate in order to supervise the crime scene area to take the finger prints.

1. **Practical experience with storage from “*pit”* type**

According to the experiences gained from the case, the *“pit*” storage are easily to be broken, and that is due to the poor design measures of the storage which are weak and didn’t provide any mode of advanced physical protection such; i.e. defense in depth, so that, it didn’t played any role against possible access to the stored radioactive material and thus; the intension of sabotage, steel, damage and terrorism activities against the public or to the environment are expected. Thus; more arrangements are taken, fence, container fixed to the ground with concrete, door locked with special design to delay possible access are performed.

1. **The role of information dissemination in the intervention process**

As one of the important element; dissemination of information and public communication rounds among peoples as field work has been conducted to convey information about the case are assumed as stone corner in the intervention process, which take place in form of four monitoring team with radiation detector, this take four days, where general public ,army personnel ,police personnel , security personnel and petroleum companies employees had been informed about the harm and potential risks of radiation exposure, through posted printed papers contain a photo of radiation source (similar to the stolen source) was disseminate in all areas around the location where the radioactive source has been stolen , also public have been instructed through their local language “*Denkka*” using loud speakers and FM “*Mirraya*” radio , using a very simple words, that; a dangerous ,harmful and strong radioactive sources had been stolen and could causes risk to you and your families . Moreover; local transport has been monitored, and posted with the printed photo in order to inform others in their travel, in case, the source is get out of the incident location and their passengers has been informed about the associated risk of the radioactive source. In addition to that; the official employees i.e; army, security and police who supervised the entry and exit of the location, has been informed about the source size, shape and weight, if they observed anything suspected .also the only one medical doctor was instructed to contact the MET or the representative of the official employees if he receive a patient his diagnosis shown a clear radiation symptoms.

1. **Readiness for army, security and police employees**

The support group from the participated bodies in the intervention; i.e. police, Sudan and South Sudan’s joint-army and petroleum security has to be trained about how to act, in case they found the stolen radioactive source, thus; they have to be train, practice, and exercise different scenarios and arrangements with regard to response to radiological emergency or provision of nuclear security specialists, if force is needed for the retrieval process.

Thus, when the radioactive source has been founded, some technical measures have to be conducted; for the source; e.g. verification of the source serial number, check that the source is still inside the container by measuring the dose rate, no failure in the source lock or no attempting to open or damage the source container, also, if its possible, fingers print or blood could be taken as samples for nuclear forensic. In addition to that, suitable arrangements and procedures has to be performed for safe transportation to the re-constructed storage; i.e. car marked with radiation sign, security guard, radiation detector and radiation worker or the company’s RPO.

1. **The role of surrounding atmosphere and stress factor in the case management:**

From the area study you have to take in your consideration the surrounding circumstances with the case you manage, taking in your mind the security condition in the case area are unstable, and that implies more efforts and stress on the regulatory body personnel, which would be reflected on their performance by affecting their ways of thinking, and their assessing and evaluation of the case which would result in taking right decisions and quick actions.

Although, you have to prepare yourself for receiving false communication when they are waiting for any contact or information about the stolen radioactive source ,because the calling one could be mad, joking, lie or eager to collect money which provided by the petroleum company as prize for the source founder.

In addition to that, when you work in a team, and act as team leader or member, by the end of any searching day, you need to send written or verbal report to the security committee in the region, which would be busy, a way, drank or didn’t take the case as serious as you consider. All these factors put more stress on the MET and they needs to be trained on the different scenarios about how to overcome those difficulties.

1. **Meetings and logistical support and good administration**

It’s very important to held meetings with different partners; i.e. security personnel, HSE employees and the contractors or sub-contractors managers, in order to listen to their information and observation about the case and the current situation in the case area, through formal report or oral discussion, gathered information would be necessary for developing suitable action plans and that leads to quick response. Although, meetings is a good opportunity to define responsibilities and tasks of other intervention parts and to form teams beside arrangement for logistical support; e.g. cars, security, food, equipment (survey meters) … etc. Although, meetings are important; but, meeting time should be minimized as possible for time consuming.

1. **Get the Public trust and confident after the case:**

The hard efforts that has been conducted during the survey time, information dissemination and public communication is not enough, a very important task has to be performed, so another round of public communication is needed, in order to collect back the posted posters and to inform the public, police, army and companies employees, that, the stolen radioactive source has been found in safe status, the situation is safe for them and the emergency preparedness situation is ended. In the same way it’s very important to communicate with other employees within different disciplines in the petroleum company about radiation and its safe application and with details on the case and how it had been managed, in order to get them trusted, confidant and safe and secure.

1. **Conclusion and recommendations:**
* The National Nuclear Security Committee (NNSC) that has been formed in 2003 by the decision of the Minister of Science and Technology needs to be re-engineered and activated.
* The National Emergency Preparedness and Response Committee (NEPRC), which has been formed in 2007 by the Minister of Interior, also need to be re-engineered and activated.
* National response action plan needs to be developed containing all the expected scenarios.
* Currently, effort, time and resources are made available in order to build the human resources in the field of nuclear forensic with national and international assistance through IAEA/ AFRA TC-project.
* Relevant institutions, other regulators and relevant partners that have relation to regulatory processes, nuclear security and emergency preparedness and response should be trained on radiation, radiation applications, radiation protection and the associated risks and consequences.
* Storage from “*pit*” type is not any more secure storage for radioactive material.
* Information dissemination and public communication is very effective and efficient tool in solving such case, if it is implemented with careful attention and good cooperation with other parties.
* Theradiationdetectorsarenotalwaysthe only one tool to findoutradioactive materials**.**
* It’s very important to keep the source special key with the company’s RSO or his technologists, in order to avoid the intention to open it.
* Qualification, education and expertise are necessary for regulators to dealing with this type of cases, taken in account managerial, technical and personal issues.
* Regulators should be able to work with team from different background and interpersonality.
* Important of coordination and cooperation between different parts in order to ensure proper defining of responsibilities and tasks.
* The convention of early notification about radiation accident has been implemented by send a detailed report to the IAEA.
1. **References**

[1] HSE department, Petrodar Operating Company, Preliminary report on a stolen Ir-projecor. 05/05/2008.

[2] HSE department, Hegleig Petroleum Service & investment Company, Moleta FBF & OBC Project, 05/05/2008

[3] Inspection Mission report, Technical Office, Radiation Protection Technical Committee, report on a stolen Ir- Projector, 14/05/2008.

[4] RPO, Forum Petroleum Services & Construction Company Limited, report on a lost of an IR projector, 04/05/2008

[5] The Stolen Industrial Radiography Projector Incident in Moleta, CN-177/41

[6] Lessons learned from accidents in industrial radiography, IAEA, safety report series, No. 7, IAEA, Vienna, 1998

[7] The radiological accident is Goiania, IAEA, Vienna, 1988