Industrial radiography people in controlled area

Description of incident

The incomplete evacuation of a marked zone prior to radiography check is commonly linked to two simultaneous conditions: a very large exclusion zone ; and the presence of people undertaking other jobs. Under these conditions, the barriers are often placed while people are already in the area to be designated. Thus, they are not aware of the development of the situation and do not always understand the risks to themselves from remaining at their workstations. Subsequently, they may find themselves unknowingly in the vicinity of the exposed radiography source without having crossed any barriers.

This type of event is characteristic of a lack of control of the demarcarted area. In the two examples that follow, the exclusion area (a machine hall) is a vast industrial building whose dimensions (100 m by 40 m) make evacuation prior to the start of radiography difficult to verify.

Example 1

When leaving a cabin[1] installed in a machine hall, two people realized that they were inside a zone marked for carrying out radiographic checks, while gamma radiography was underway.

Example 2

Two people working within the exclusion zone for gamma radiography were only made aware of their situation due to an audio annoucement that gamma radiography was about to start. They evacuated their location immediately, only a few minutes before the exposure of the source.

It was verified that the source had not been exposed, and also that had it been exposed there would have been no eleveated dose rates on the path they used for their evacuation.

Radiological consequences

In example 1, each person received a dose of 0.04 mSv. However, it was estimated that they could have received up to 0.5 mSv based on the duration of the gamma radiography.

In example 2, no dose was received, and it is estimated that this would have been the case even if the source had been exposed.

[1] The size of the machine hall easily accomodates this type of cabin.

Lessons to be learned from the incident

The larger the exclusion area, the more it is difficult to control. Therefore, the exclusion zone should be as small as reasonably practicable.

To help ensure the absence of people in the exclusion area:

- It is necessary to coordinate and plan all activities, including radiography, so that all people involved are aware of related activities that may affect them and that provisions are implemented according to identified risks. All site radiography should require close collaboration between the radiography company and the site owners.
- It is important to undertake a risk assessment for radiography, and to define and implement local working instructions (eg, scheduling of radiography during and outside working hours, inspection of isolated or obstructed premises to ensure that nobody is there, and appointment of gamma radiography supervisors to reinforce control of the area).
- Prior to gamma radiography, especially in large exclusion zones, it is recommended that announcements are made (ie using a PA system) to notify people that radiography will be taking place shortly.

Furthermore, the site owners can assist in the evacuation of the area by deploying resources for this purpose with the gamma radiography operators.