INES Event Rating Form (ERF)

Event Title:	Worker overexposure
Event Date:	2012-04-19
Location / Facility:	Greek Atomic Energy Commission (GAEC)
Event Country:	Greece
Event Type:	Radiation Source
INES Rating:	2 - Incident (Final)
Rating Date:	2012-07-04

Impact on people and the environment	
Release beyond authorized limits?	No
Overexposure of a member of the public?	No
Overexposure of a worker?	Yes
Impact on the radiological barriers and controls at facilities	
Contamination spread within the facility?	No
Damage to radiological barriers (incl. fuel damage) within the facility?	No
Degradation of Defence In-Depth?	No
Other information	
Person injured physically or casualty?	No
Is there a continuing problem?	No

Event Description

The Ionizing Radiation Calibration Laboratory (IRCL) of the Greek Atomic Energy Commission (GAEC) is equipped with a Co-60 irradiator, used for calibration purposes of radiotherapy dosimeters. In the period 19 - 25 April 2012 the replacement of the Co-60 source (nominal radioactivity of 20 TBq -April 2012) with a “new” Co-60 source (nominal activity of 110 TBq - April 2012) was conducted. The technical part of the source reloading was fully undertaken by the manufacturer of the irradiator (from abroad), who, also, provided the technical personnel (two technicians). Staff members of GAEC were present and supervised the works.

On 19 April 2012, the technicians started the replacement procedure which consisted of three steps:
•alignment of the source container to the irradiator head. Due to the position of the irradiator, which produces radiation beam at horizontal direction, the source container was suspended from a rigid steel frame (crane), in order to level the container and the irradiator head. This step was completed successfully on 19 April 2012.
•removal of the “old” source from the irradiator head and transfer into the safe position inside the source container. It was completed successfully on 19 April 2012 after overcoming a few technical difficulties.
•reload of the “new” source into the irradiator head. While driving the source into the head, it was stuck inside the sleeve (holding the source) in an unknown position within the container; During this process the shielding plugs had been removed, resulting levels of radiation inside the banker around 1.5 mSv/h (scattered radiation) and a few Sv/h in the primary beam. One of the technicians (referred to hereafter as A) had to work – for very short periods of time (i.e. seconds) - within the primary beam in order to prevent the accidental drop of the source outside the container. These preliminary safety works were performed on 19 April 2012. After assessing the situation and after several efforts the source was returned back to safe position inside the container on 23 April 2012. Finally, the reload of the source into the irradiator head was completed successfully on 25 April 2012.

A second technician (B) assisted technician A in the aforementioned activities

Both technicians used their personal dosimeters provided by their company.
However, at the beginning of their work in IRCL, GAEC provided technicians (A and B) with additional dosimeters (TLDs and APDs). The personal dose equivalent, Hp(10), values, according to the TLD readings, were 28.3 mSv for technician A and 12.1 mSv for technician B (for the whole operation period).
Moreover, from the second day of the work and on, given the importance of the situation and the possible exposure to the (narrow) primary beam, additional personal dosimeters (TLDs and APDs) were provided to the technician A, who operated close to the irradiator head. These dosimeters were placed on the chest, in order to record the doses in this region, which was most likely to be partially exposed to the narrow primary beam. The results, Hp(10), were 35.0 mSv.

Taking into account the national annual dose limits of the occupationally exposed workers, GAEC asked technician A to provide his official dose records, which showed that the recorded accumulated dose for 2011 was 1.22 mSv.

Following this, GAEC asked for a biological dosimetry analysis to be performed for both technicians at GAEC’s collaborative laboratory.
The results of the biological dosimetry, which was based on the analysis of solid stained dicentric chromosomes in cultured peripheral blood lymphocytes, showed that:
•technician A received a whole body dose of no more than 197 mSv (95% upper confidence level) and no less than 30 mSv (95% lower confidence level), with a mean dose of 102 mSv.
•technician B received whole body dose in the range from 0 mSv to 60 mSv (95% confidence level).

The final rating for this event is Level 2.

Rating Justification

Press Release Attached:	No
Technical Document Attached:	No
Further Information on Web:	

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