STUDY CASE N° 11: A RADIOGRAPHY INCIDENT AT A RESEARCH ACCELERATOR IN SWEDEN

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❑ Description of the incident

One researcher entered an experimental area at a high-energy electron-beam research facility, accompanied by his son. The operator in charge of the accelerator, who had no information about their presence, directed a 100 MeV electron beam to a photon production target in a neighbouring room with the resulting well-collimated photon beam directed through the experimental set-up in the room where the two persons were located. A reconstruction indicated that they had been exposed to whole body dose rates of 30 to 60 mGy/h and 3 to 8 mGy/h respectively for the two beam currents used during the exposure. The possible exposure times were 10 minutes for the researcher and 5 minutes for the son according to their recollection. The estimated doses are of the order of 10 mGy with large uncertainties. No personal dosimeter was used.

The prime cause of the incident was that the operator had beforehand disabled the interlock system at the request of the researcher, although he was not entitled to give such an order. Underlying this was the fact that the management had shown no clear commitment to radiation protection, and in particular had not set down rules that should have given the operator clear responsibilities and the power to refuse such a request. The same research group did not want to switch-off some bending magnets that were part of the interlock system since it would have made it difficult to regain the same beam quality. Instead, another "home made" interlock arrangement was used and this proved inadequate. Together with other deficiencies such as: unclear internal responsibilities, illogical warning lights/instructions, lack of personal/warning dosimeters, lack of functional information channels and the presence of a non-authorised person (the son), this made this incident possible. There were probably no intentions to break the law, but the series of mistakes and poor decisions have to be interpreted as a consequence of a non-functional radiation protection organisation and a lack of radiological protection culture among the research team.

❑ Lessons learned

- Laboratory managers should be sensitise to their legal and judicial responsibilities in terms of radiation protection. Their commitment should rely on adequate information and training on radiological risks and their management.
- The responsibilities and information channels of the radiation protection organisation have to be clearly defined.
- The disabling of an interlock system should be allowed only in clear-cut cases where special procedures, approved by designated senior managers, should be put in place to ensure that the radiation incidents are avoided.

❑ **Point of view of the Swedish regulatory body**

By chance, the exposures and therefore the doses were quite low; though they should have been much more important with such a device, and then leading to a serious accident.

This event points out a crucial lack of radiation protection culture, both at the management of the installation and at the researcher levels. In such a case, a prosecution should be performed as a way to sensitise these stakeholders, to modify their behaviour and to avoid a future accident.