Report from a French incident

Ordinary glass used instead of lead glass in a CT scanner installation

Description of the incident

Before setting up a CT scanner in a new clinic, a glazier installs a glass window in the shielded enclosure around the control console. Subsequently, three supplier technicians installed the CT equipment and started the calibration in collaboration with an operator from the clinic. The technicians and the operator did not wear any special protection or any dosemeters.

The first scanner tests were completed over two days. According to the technicians, these were undertaken with the primary scanner collimator closed, i.e. the primary radiation beam was not emitted. On the third day, a commissioning check on the scanner, carried out with a Plexiglas phantom, indicated the presence of scattered radiation.

The scanner was immediately stopped, and it was determined that instead of leaded glass, the glazier installed ordinary glass. The regulatory authorities were contacted, and a compliant lead glass window was installed two days after the incident.

During the three days when the equipment was being set up, different groups of workers were present behind the glass.

Radiological consequences

Several people were exposed:

- One technician was exposed on the first day of the tests.
- Two other technicians were exposed the two following days.
- The operator was exposed intermittently.

These four people were classified as *category B*, ie required to receive exposures below 6 mSv/year.

Also:

- Several persons present on the site (heating specialist, bricklayers, etc.) were probably exposed while passing behind the glass. They were not categorized as radiation workers, and were subject to a public dose limit of 1 mSv/year.

No dosimetry results were available, and a retrospective estimate of doses had to be undertaken, which concluded that the tests performed on the third day produced a dose rate at the console of 950 µSv/hr.

The three technicians and the operator were exposed for at least two hours per day over one or several days: as a minimum, each of the four people (3 technicians and 1 operator) was exposed for 2 hours and received an individual dose of 1.9 mSv. At most, at least two technicians were exposed for 2 x 2 = 4 hours and received an individual dose of 3.8 mSv.

Therefore, these four people were exposed to a dose between 1.9 mSv and 3.8 mSv. This is lower than the 6 mSv/year for category B staff, but is equivalent to the doses received by the most exposed medical staff.

The other workers present on site (heating specialist, masons, etc.) were exposed to variable doses according to occupancy pattern behind the glass. Some of these persons almost certainly received doses higher than the public dose limit of 1 mSv/year. However, it remains very difficult to estimate the actual doses: during the calibration, the X-ray emission detector was not activated and it is not possible to be certain when the collimator was actually closed.

Lessons to be learned from the incident

During the installation, it must be ensured that the work is undertaken according to radiation protection specifications and standards, and it is recommended that the installer and user should discuss in advance the provisions relating to radiation protection. It is advisable to use the services of companies specializing in the shielding of premises used for radiology. In addition, for any installation of lead glass, a compliance certificate should be required.

In the case studied, the absence of lead glass was quickly detected because the operator requested a commissioning check. The radiological consequences could have been much worse if this verification had not taken place before the first use.

It is necessary to periodically inform and make the staff aware of radiological risks and radiation protection requirements. Following this incident, the department introduced formal requirements for contractors, and a formal procedure in case of accidental incident or irradiation.

The importance of wearing dosemeters must be emphasized. External companies are responsible for providing their technicians with passive and active dosemeters.