

Radiation Exposure at the McMaster Nuclear Reactor

On August 09, 2011, a McMaster employee conducting routine duties in association with the production of medical isotopes was accidentally punctured in the hand by a wire that had been contaminated with iodine-125.

The thin wire punctured the employee through multiple layers of gloves. The employee recognized what had happened, conducted a safe back-out from the task, and alerted his supervisor and the Health Physics Department.

The worker has been closely monitored and continues to work although his duties have been modified until accurate dose estimates can be finalized. No health impacts are expected with the levels of radiation involved with the incident and the worker is expected to return to normal duties in the next few days.

Dose Assessment

Although no significant injury occurred (there was no blood and the puncture site was barely detectable with the naked eye), the site of the puncture became contaminated with iodine-125.

Decontamination of the injury site was immediately undertaken and potassium iodine tablets were administered as a thyroid blocking agent. However, radiation exposure occurred which was higher than that normally encountered in this work.

The current estimate of the effective dose resulting from take up by the circulatory system from the puncture site is approximately 0.4 milli-sievert (mSv). This is less than 1% of the annual regulatory dose limit. The typical annual dose for members of this work group is approximately 4 mSv.

As would be expected, the small area of skin at the puncture site received a higher dose of radiation. The estimate of the equivalent dose is 200 mSv (40% of the annual regulatory dose limit). A typical annual dose to the hands of workers in this group is approximately 20 to 30 mSv.

Incident Investigation

The incident is currently under investigation by the McMaster Nuclear Reactor and McMaster's Health Physics Department. It was reported to The Canadian Nuclear Safety Commission, the McMaster Health Physics Advisory Committee, and the Nuclear Facilities Committee as required by the University's radiation safety program, licenses and regulations.

The wire involved in the incident was part of a ventilation hose that is normally covered by the flexible material of the hose. The wire had become exposed at some

point prior to the incident. This introduced a hazard into the process that was not previously identified. The faulty ventilation hose has since been replaced.

All steps in the production process have been reviewed in detail to ensure no further hazards exist. Employees and their supervisors within the reactor have been reminded of the danger posed by sharps contaminated with high specific radioactive material. All users of radioactive materials at McMaster should review their own areas of operation to ensure no similar hazard exists.

For assistance in this review please contact the Health Physics Department.

Background Information

The McMaster Nuclear Reactor produces medical isotopes for use in health care and research. As part of the routine production of one cancer fighting agent, employees work with iodine-125, a substance that is radioactive.

A wide range of safety measures are in place at the reactor in accordance with health and safety requirements as determined by the Canadian Nuclear Safety Commission and McMaster University.

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