Australian Government

Australian Radiation Protection and Nuclear Safety Agency

# *AUSTRALIAN RADIATION INCIDENT REGISTER (ARIR)*

## SUMMARY OF RADIATION INCIDENTS: 1 JANUARY TO 31 DECEMBER 2007

The total number of radiation incidents reported to the Register that occurred during the period from 1 January to 31 December 2007 was **84.** A summary of the incidents in each category is given below:

**Diagnostic Radiology: 39 Incidents**

*17 incidents involved unnecessary/unplanned CT scans or radiology procedures due to mistaken identity.* Eleven patients were incorrectly examined due to mistaken identity and received radiation doses ranging from 0.2 mSv to 21 mSv. In a couple of cases patients responded to the wrong name when called (one with limited English). There were also some cases of same/similar names, whilst several others involved staff failing to correctly identify patients prior to examination. Six cases involved the wrong patient label being placed on the request form. These patients received radiation doses of between 1.6 mSv and 25.8 mSv. An accurate dose assessment could not be provided for one of the cases as the data available was ambiguous.

*6 incidents involved CT scans/radiology examination performed on the wrong region of the patient.* Five CT cases included: the patient was incorrectly booked, the physician wrote down incorrect details in the clinical notes, and the request did not state what examination was to be performed. One incident involved the wrong region being scanned due to low staffing levels and poor legibility of the request. The patients received doses of between 1.5 mSv and 18.7 mSv. A patient was mistakenly given an X-ray of the chest instead of the prescribed right ankle due to the radiographer not confirming the procedure. The patient received a dose of 0.1 mSv.

*5 incidents involved unnecessary/unplanned CT scans given due to miscommunication/misreading of patient notes.* In the first case a patient was scanned four weeks earlier than they should have been due to a miscommunication between the ward nurses and the referring physician. The referral slip provided no indication as to when the scan should be performed. The patient received a dose of 2 mSv. In the second case, the radiographer and radiology nurse failed to read about the cancellation of the CT scan in the patient notes and performed the scan on the patient. The patient received a radiation dose of 4.2 mSv. Three cases were due to administrative errors and received radiation doses of between 1.8 mSv and 23 mSv

*4 incidents involved repeat CT scans required due to incorrect protocol being selected.* Two cases were attributable to operator error and in each one the patient received a dose of 1.4 mSv. In another case the radiographer used the wrong protocol after being distracted and interrupted by a receptionist. The patient received a radiation dose of 3.5 mSv. For one CT case a radiographer in training selected the wrong protocol.

*4 incidents involved unnecessary CT scan/X-rays not clinically required.* In the first case, it was discovered that the scan was not required after the radiologist reported the results of the scan to the doctor in charge. The estimated dose to the patient was 1.3 mSv. In the second case, the CT scan was requested by an inexperienced medical practitioner who did not realise that the scan would not yield useful results. The patient received a radiation dose of 7.2 mSv. In another case the cancellation of an X-ray procedure was not mentioned in the patient notes resulting in a radiation

dose of 1 mSv to the patient. One patient was meant to have a post-surgery CT scan but had the scan while waiting to have surgery.

*2 incidents involved repeat CT scan/X-ray due to operator error.* A radiographer deleting images failed to check whether the images had been archived. The repeat scans of the patient resulted in an additional dose of 4.2 mSv. Miscommunication between a student radiographer and a qualified radiographer resulted in an over exposure of the initial X-ray. The X-ray had to be repeated and the patient received an additional radiation dose of 0.5 mSv.

*1 incident involved possible exposure to staff from an image intensifier.* After finishing an image intensifier procedure, the radiographer moved the machine to the side wall of the theatre with the key left in and the unit still switched on. After dealing with another patient elsewhere, the radiographer came back and discovered that an extra image had been saved on the machine indicating that it had been used without the radiographer present. Any exposures to persons in the room were undetermined.

**Nuclear Medicine: 19 Incidents**

*9 incidents involved the wrong scanning agent/radiopharmaceutical*. In most of these incidents, the error was either due to a mislabelling of the radiopharmaceutical, or the staff inadvertently picking up the wrong pharmaceutical. In one case the error was due to the nuclear medicine technologist and the registrar failing to ask the patient if they had an intact gall bladder. The patients received doses ranging between 0.28 mSv and 20 mSv. In another case a bone scan dose and a gastric emptying dose of a technetium-99m radiopharmaceutical was drawn up. The bone scan dose was added to a porridge meal by mistake. The error was only discovered after the patient had eaten the meal. An activity of 894 MBq was injected into the food and the patient received a dose of approximately 5 mSv.

*3 incidents involved a spill of a radiopharmaceutical due to equipment failure.* In one case, approximately half the contents of a syringe of technetium-99m emptied into its carrying box while being transported due to the omission of the plunger protection shield. The technologist received a dose of approximately 0.05 μSv. In the second case, a needle containing yttrium-90 became detached as pressure was applied to the syringe spraying the radiopharmaceutical on the floor, the equipment, and the face and forearms of the administering physician. The physician received a skin dose of 3.2 mSv. In the third case, the extension tubing that connects the cannula to the syringe came loose during a myocardial stress test. Contamination was limited to the ECG table, cables, keyboard and the floor of the stress testing room. There was minimal radiation exposure to persons involved.

*3 incidents involved the wrong scan being performed.* All cases involved the wrong procedure being performed due to the correct procedure not being confirmed. The patients received radiation doses between 3.2 mSv and 20 mSv.

*2 incidents involved the wrong patient given the radiopharmaceutical due to mistaken identity*. In the first case, the patient had an identical surname to the correct patient. The patient was administered technetium-99m and received a dose of 1 mSv. In the second case, an online request was made for the incorrect patient due to the referring clinician selecting the wrong name in the booking program. The mistake was only realised after the administration of the radioisotope. The patient received an injection of 193.5 MBq of gallium and received a radiation dose of 19.4 mSv.

*1 incident involved a radiopharmaceutical that was not reconstituted before its administration.* A patient was administered 122 MBq of indium-111 that had not been reconstituted with due to the product being from a different supplier than usual. The patient received a dose of 31.7 mSv.

*1 incident involved the unnecessary administration of a radiopharmaceutical.* A patient was referred for a cardiac investigation, which would normally involve the administration of a radiopharmaceutical immediately following cardiac stressing using a pharmacological stressing agent. The stressing agent was not administered before the administration of the technetium-99m due to a pump activation error. The patient received a calculated dose of 9.9 mSv.

**Transport: 5 Incidents**

*2 incidents involved damage to a package containing radiopharmaceuticals/radiation source during transport*. In the first case a package fell from a trolley, became wedged under the trolley and was dragged along the bitumen for several hundred metres. The box was torn and dented, and an edge of the plastic bucket inside the package had a hole in it, though the lead pots containing four thallium-201 sources (each of 1000 MBq) and two gallium-67 sources (800 MBq and 200 MBq) were undamaged. No persons were exposed to radiation. In the second case a package containing a sealed cobalt-57 (9.25 MBq) pen marker was discovered on the ground next to a pallet with damage to the packaging. The source was not damaged, and there were no personal exposures or contamination from this incident.

*2 incidents involved motor vehicle accidents involving vehicles transporting radiation gauges.* In the first case a motor vehicle crash involved two cars, one of which was carrying a portable density moisture gauge (one americium-241/beryllium source and a caesium-137 source) in its container. The container was undamaged and there was no contamination. In the second incident, a vehicle transporting a portable moisture density gauge rolled over. The gauge was undamaged apart from a cracked case. Both the americium-241/beryllium and the caesium-137 sources were undamaged and remained contained in the shielded enclosures. No persons received radiation doses.

*1 incident involved a source lost during transport (found later).* A 37 MBq consignment of phosphorus-33 was lost while in transit to an airport. The source was shipped as an excepted package and therefore had no radioactive labelling on the outside of the packaging. The outer packaging was damaged when found by a passing motorist however the integrity of the source was not compromised. There was no contamination of the scene and no persons received a radiation dose.

**Borehole Logging: 4 Incidents**

*3 incidents involved logging tools becoming stuck in the hole and needing to be abandoned.* In all cases, logging tools became stuck at depths, deemed unrecoverable, were cemented in-situ and abandoned. In all cases no persons were exposed to radiation. In the first case the caesium-137 (74 GBq) and americium-241/beryllium (703 GBq) were stuck at a depth of approximately 2480 m. In the second case the caesium-137 (74 GBq) and americium-241/beryllium (148 GBq) were stuck at a depth of approximately 3305 m. In the third case the caesium-137 (74 GBq) and americium-241/beryllium (148 GBq) were stuck at a depth of approximately 3250 m.

*1 incident involved the cable holding a borehole logging tool breaking, resulting in the fall of the tool.* The logging tool fell as a result of poor cable maintenance and inadequate training to staff to recognise cable faults and the consequences of cable breakage. There was no damage to the tool or the americium-241/beryllium (677 GBq) and caesium-137 (92.5 GBq) radioactive sources as a result of the fall. The tool was successfully recovered and there was minimal radiation exposure to the operators.

**Radiotherapy: 4 Incidents**

*1 incident involved a cleaner entering a brachytherapy treatment and iodine room between QA tests.* A cleaner had ignored the radiation warning sign and entered the room. At the time the room was also used as a general patient room, which may have lead to a feeling of complacency by the cleaner. The room contained a 500 MBq sealed iridium-192 brachytherapy treatment unit. The cleaner received an estimated radiation dose of 0.2 mSv.

*1 incident involved a greater dose given to a brachytherapy patient than intended as a result of incorrect set-up of equipment.* As a result of a miscalculation and misinterpretation of the instructions on the treatment planning system, the patient received a local tissue dose of 15 Gy, rather than the intended 10 Gy.

*1 incident involved misalignment of the treatment area*. The therapist did not perform the required 10 cm shift superiorly from the set-up tattoo, as documented, resulting in the patient receiving a 1.8 Gy dose to an area inferior to the treatment field.

*1 incident involved the wrong patient given a scan due to mistaken identity*. A patient was mistakenly given the prescribed treatment of 3.0 Gy to the right eye intended for another patient after staff failed to correctly verify the identity of the patient.

**Radiation Gauge: 3 Incidents**

*1 incident involving the unauthorised transport of radiation gauges.* An organisation purchased several items from an auction overseas. The container received was opened months later, at which time eight industrial radiation gauges, each containing 3.7 GBq of caesium-137, were found in addition to the purchased items. The container was not transported in accordance with the Transport Code, nor was it declared at Customs as containing radioactive substances. No dose was received by any persons from the organisation.

*1 incident involving maintenance personnel exposed whilst working on a radiation gauge.* Maintenance personnel were working on the electronic components of an in-stream analysis gauge containing 1.11 GBq of americium-241. A shielding plate that was incorrectly positioned upside down allowed a small beam to be emitted through a screw hole in the shield. A maintenance worker received an estimated dose of 355 μSv.

*1 incident involved a radiation gauge found on the ground at a mining site unattended.* A pipe spool, with density gauge containing 762.2 MBq of caesium-137 and associated detector, warning sign, etc. still attached was found on the ground at a mining site. The gauge was removed from the work area and transported to the radiation store. No persons were exposed to radiation as the shutter was still locked.

**Industrial Radiography: 2 Incidents**

*1 incident involving the emergency retrieval of a detached iridium-192 pigtail.* While setting up for a radiographic examination, the radiographer's personal radiation monitor gave an indication that there was a higher than normal radiation level. It was discovered that the pigtail containing a 1.11 TBq iridium-192 source had become detached, and after disconnecting the guide hose and winder cable the pigtail fell out of the camera. The Radiation Safety Officer reconnected it and wound it back into the camera. The radiographer received a dose of 370 μSv and the RSO received a dose of 470 μSv.

*1 incident involved exposure of personnel due an industrial X-ray unit firing automatically.* One organisation reported that they had had several instances where X-ray units had fired whilst personnel were nearby (minimal exposures). Investigation found that this was because the operators had forced a 5 pin plug into the wrong socket (4 pin) when connecting the systems.

**Luminising / Luminous Device: 1 Incident**

*1 incident involved the breakage of a Gaseous Tritium Light Source (GTLS).* The GTLS was part of a compass which was broken. The GTLS was double bagged to reduce contamination and the person's hands washed immediately with negligible exposure.

**Laser: 1 Incident**

*1 incident involved the firing of a laser whilst vehicles were in the laser hazard area.* The Class 4 laser was part of a targeting system being trialled. There were no reports of eye injury.

**PDMG: 1 Incident**

*1 incident involved the crushing of a portable density moisture gauge containing radioactive sources.* A PDMG containing 296 MBq of caesium-137 and 1.48 GBq of americium-241/beryllium was crushed by a front end loader on a road works site. Although the electronics of the gauge were crushed, the source holders remained intact, the sources were undamaged and there were no doses received.

**Sources Found: 1 Incident**

*1 incident involved a sealed radiation source discovered at a rubbish tip site.* A radiation gauge was located at a tip. It was in good condition and measured radiation levels indicated that the gauge shutter was securely closed. The local regulator took possession of the gauge pending further investigation into its ownership.

**Sources Lost: 1 Incident**

*1 incident involved the loss of a sealed source when device disposed of.* A 370 MBq nickel-63 sealed source in a gas chromatograph was lost during the decommissioning of a forestry site when the device was disposed of.

**Ultraviolet: 1 Incident**

*1 incident involved the exposure of a student to ultraviolet radiation during an experiment.* While extracting DNA bands from a gel, a student received a small burn to their right hand from a UV trans-illuminator. Despite wearing protective equipment, the cuff of the labcoat had rolled up and exposed the skin of their wrist. The estimated exposure was 5 kJ/m2.

**External Exposure: 1 Incident**

*1 incident involved the handling of a radioactive source due to equipment malfunction.* The reaction vessel used in manufacturing yttrium-90 microspheres was not functioning properly and therefore required manual handling of the reaction vessel by hand through a "telescopic glove". The operator received an extremity dose of 800 mSv to the left hand, and 498 mSv to the right hand.

**High Recorded Dose: 1 Incident**

*1 incident involved a badge being exposed to radiation after falling from the wearer*. When positioning a patient, the radiotherapist's TLD badge fell off and became trapped within the bedding. The badge received a dose of 14.86 mSv but no actual dose was received by the radiotherapist.