

Response from ARPANSA to questions on notice

1. Emissions of Iodine-131 from Lucas Heights

The Australian Nuclear Science and Technology Organisation report on *Environmental & Effluent Monitoring at ANSTO sites 2003-2004* states that airborne discharges of Iodine-131 totalled approximately 26.5 gigaBecquerel (GBq). The major source of iodine emissions at ANSTO is from the production of radiopharmaceuticals (principally Iodine-131 for diagnosis and treatment of thyroid cancer). As would be expected from the nature of the activities at Lucas Heights, including radiopharmaceutical production, this does exceed the quantity of Iodine-131 discharged from the Sellafield nuclear site. The Sellafield site is a nuclear fuel reprocessing plant and as such does not produce radiopharmaceuticals. The Iodine-131 present in any material sent to Sellafield for reprocessing would have decayed away before it was received by the Sellafield plant. These two factors explain why the emissions of Iodine-131 at the ANSTO site are greater than the emissions at the Sellafield site. ANSTO and Sellafield have different processes and products and therefore have different emissions of Iodine-131.

To provide some context to what an amount of 26.5 GBq airborne discharges of Iodine-131 means, a common treatment for thyroid disease is the ablation of the thyroid using Iodine-131 capsules. Each Iodine-131 capsule can contain as much as 6 GBq of Iodine-131. Hence the total annual release of 26.5 GBq of Iodine-131 is equivalent to approximately 4 Iodine-131 therapy capsules used for treatment of thyroid disease.

From the public health point of view, when looking at discharge levels it is important to consider the total effective doses received by the public as a result, rather than a breakdown by nuclide. The effective dose is a measure of the potential health effect, irrespective of the type of radiation or the radionuclide involved. The dose for all nuclides discharged from the Lucas Heights site calculated for the nearest resident to the site was 2.6 microSieverts (μSv) in 2003-2004. This is a trivial dose comparable to what might be received on a Sydney-Melbourne flight and far below doses received from discharges from the Sellafield plant. The emission of individual nuclides are monitored to follow trends in release related to the various activities carried out by ANSTO.

The **Becquerel** (symbol: **Bq**) is the SI derived unit of radioactivity, defined as the activity of a quantity of radioactive material in which one nucleus decays per second. A gigaBecquerel (symbol: **GBq**) is one thousand million Becquerels.

The Sievert (symbol: Sv) is the SI derived unit of dose equivalent. It attempts to reflect the biological effects of radiation as opposed to the physical aspects, which are characterised by the absorbed dose. A microSievert (symbol: μSv) is one millionth of one Sievert.

2. Length of time regulatory agencies in each state and territory require uranium mining companies to keep information on radiation dose levels received by workers.

Australia's only uranium mines are located in South Australia and the Northern Territory.

In South Australia, Regulation 26(4) of the Ionizing Radiation Protection and Control (Ionising Radiation) Regulations 2000 (made under the Radiation Protection and Control Act 1982) provides that a specified employer must not destroy or dispose of any records kept under this regulation (which includes records of the personal radiation exposure record for each radiation worker) except with the approval of the Minister. The South Australian regulator advises that to date, the Minister has not received an application from any specified employer to destroy such records.

In the Northern Territory, section 26 of the Radiation (Safety Control) Act 1999 requires employers of radiation workers to keep records of radiation doses received by each of its radiation workers. Employers of radiation workers must also comply with the National Standard for Limiting Occupational Exposure to Ionizing Radiation (NOHSC: 1013 (1995)). The Standard requires that records of doses received by employees must be kept during the working life of the employee and afterwards for not less than 30 years after the last dose assessment and at least until the employee reaches the age of 75.

Notwithstanding the absence of uranium mines in other territories, ACT, Queensland, the Commonwealth, Victoria and Western Australia require records to be kept on the dose levels received by workers within their jurisdictions. Copies of the relevant sections are attached.

The ACT and Victoria do not have legislative requirements as to the length of time that employees radiation dose level records must be kept for. The regulators in both states/territories have advised that they apply industry practice and the National Standard (clause 14.2 of the National standard for limiting occupational exposure to ionizing radiation NOHSC:1013(1995)) of requiring that records be kept for at least 30 years.

Relevant state / territory regulations

ACT - Radiation Act 1983

Section 33 Records to be kept

(1) A licensee shall keep in a register on the licensed premises a record specifying all radioactive materials and irradiating apparatus that come into his or her possession and describing the use to which those radioactive materials or that apparatus are put and any change in that use.

Maximum penalty: 20 penalty units.

(2) A licensee who employs radiation workers, or the person in charge of licensed premises where radiation workers are employed, shall keep on the licensed premises a record in a form approved by the council showing—

- (a) the full name, address, age and sex of each radiation worker; and
- (b) the date of commencement of the employment of each radiation worker; and

- (c) the date from which, and the periods during which, each radiation worker has been, or may have been, exposed to ionising radiation; and

- (d) the details of all calculations of the effective dose or equivalent dose of ionising radiation received by each radiation worker; and

- (e) all facts known to the licensee or person relating to any accidental exposure of a radiation worker to ionising radiation.

Maximum penalty: 10 penalty units.

Queensland - Radiation Safety Act 1999

38 Radiation monitoring—possession and use licensees

(1) This section applies to the following persons—

- (a) a possession licensee who—

- (i) under the licence, possesses a radiation source for a radiation practice; and
 - (ii) provides to another person (the *monitored person*) a personal monitoring device, as required by the licensee's approved radiation safety and protection plan for the practice;

- (b) a possession licensee who, under the licensee's approved radiation safety and protection plan for a radiation practice under the licence, is a person (also the *monitored person*) required to be provided with a personal monitoring device;

- (c) a use licensee (also the *monitored person*) who, as a condition of the licence, is required—

- (i) to wear a personal monitoring device when using a radiation source to carry out a radiation practice under the licence; and

- (ii) to have the device assessed from time to time.

(2) The licensee must, as soon as practicable after receiving the result of an assessment of the device under the plan or condition, give the chief executive written notice of the result.

Maximum penalty—50 penalty units.

(3) Without limiting subsection (2), the licensee is taken to comply with subsection (2) if the notice is given to the chief executive, on the licensee's behalf, by the person who conducted the assessment, as soon as practicable after the assessment is carried out.

(4) The licensee must keep an up-to-date record for the monitored person (a *personal monitoring record*), containing the following information—

- (a) the results of all the assessments;
- (b) other information prescribed under a regulation.

Maximum penalty—100 penalty units.

(5) Without limiting the ways in which a possession licensee or use licensee may comply with subsection (4), a possession licensee or use licensee is taken to comply with subsection (4) if the personal monitoring record is kept, on the licensee's behalf, by another person under arrangements approved in writing by the chief executive.

(6) For subsection (4), the personal monitoring record must be kept until the later of the following days—

- (a) the day that is 30 years after the day when the last assessment happened;
- (b) the day when the monitored person turns, or would have turned, 75 years.

(7) The licensee must make the personal monitoring record available for inspection by the chief executive or an inspector at any reasonable time. Maximum penalty for subsection (7)—50 penalty units.

Commonwealth – Australian Radiation Protection and Nuclear Safety Regulations 1999

47 Compliance with National Standard for Limiting Occupational Exposure to Ionizing Radiation

- (1) This regulation does not apply to conduct and dealings with controlled apparatus of a kind mentioned in regulation 4.

Note Regulation 4 describes kinds of apparatus that are controlled apparatus.

- (2) The holder of a source licence or a facility licence must ensure that conduct and dealings with controlled materials, controlled apparatus and controlled facilities comply with the *National Standard for Limiting Occupational Exposure to Ionizing Radiation*.

Victoria - Health (Radiation Safety) Regulations 1994

56. Personal monitoring records

- (1) A person to whom this Part applies must, in accordance with sub-regulation (2), keep adequate records of—
- (a) doses assessed to have been received by employees; and
 - (b) details of monitoring results and dose calculation methodologies; and
 - (c) the effective dose computed for emergency or accidental exposure.

Penalty: 25 penalty units.

- (2) The effective dose computed for emergency or accidental exposure is not to be included in the assessment of compliance with occupational limits which are specified in Schedule 1.

- (3) A person who keeps a record must make it available at any reasonable time for inspection by a specially authorised officer.
Penalty: 10 penalty units.

*Western Australia - RADIATION SAFETY (GENERAL) REGULATIONS 1983
- REG 11*

11 . Personal files

- (1) The employer of a radiation worker shall —

- (a) keep a continuing personal file relating to the radiation worker;
- (b) include in the personal file referred to in paragraph (a) the results of all personal monitoring of the radiation worker carried out in accordance with these regulations; and
- (c) dispose of the personal file referred to in paragraph (a) —
 - (i) by forwarding it to;
 - (ii) in a manner directed in writing by, the Council and in no other manner.

- (2) On the termination of the employment of a radiation worker, the employer of the radiation worker shall —

- (a) supply the Council, on request, with a report in writing on —
 - (i) the effective dose of ionising radiation received by; or
 - (ii) the exposure to non-ionising radiation of, the radiation worker as shown in his personal file or, if no personal monitoring or incomplete personal monitoring of the radiation worker has been carried out, on —
 - (iii) the estimated effective dose of ionising radiation received by; or
 - (iv) the estimated exposure to non-ionising radiation of, the radiation worker; and
- (b) if the effective dose or estimated effective dose of ionising radiation

received by the radiation worker has been such as to require action to be taken under regulation 15 or the radiation worker's exposure or estimated exposure to non-ionising radiation exceeds the appropriate maximum permissible exposure level, include in the report referred to in paragraph (a) particulars of the circumstances leading to that dose or exposure, as the case requires.

(3) An employer who employs or formerly employed a radiation worker shall, at the request of the radiation worker, furnish the radiation worker with a report on the effective dose or estimated effective dose of ionising radiation received by, or the exposure or estimated exposure to non-ionising radiation of, the radiation worker as shown in the personal file relating to him.

(3a) Where an employer receives a dose assessment report from a radiation monitoring organization, the employer shall promptly inform each radiation worker assessed of the results of his assessment.

(4) When a radiation worker whose employment has been terminated is again employed as a radiation worker, his new employer shall –

(a) if he is not the former employer of the radiation worker, obtain from that former employer, and that former employer shall, if he possesses the personal file relating to the radiation worker, give to the new employer of the radiation worker, a copy of the relevant contents of that personal file; and

(b) obtain from the Council, and the Council shall give to the new employer of the radiation worker –

(i) a copy of each report supplied to the Council under subregulation (2) in respect of the radiation worker; and

(ii) if the Council possesses the personal file relating to the radiation worker, a copy of the relevant contents of that personal file.

(5) In subregulation (4) –

“the relevant contents”, in relation to a personal file, means those contents of the personal file consisting of the results referred to in subregulation (1)(b) or otherwise relevant to radiation safety.