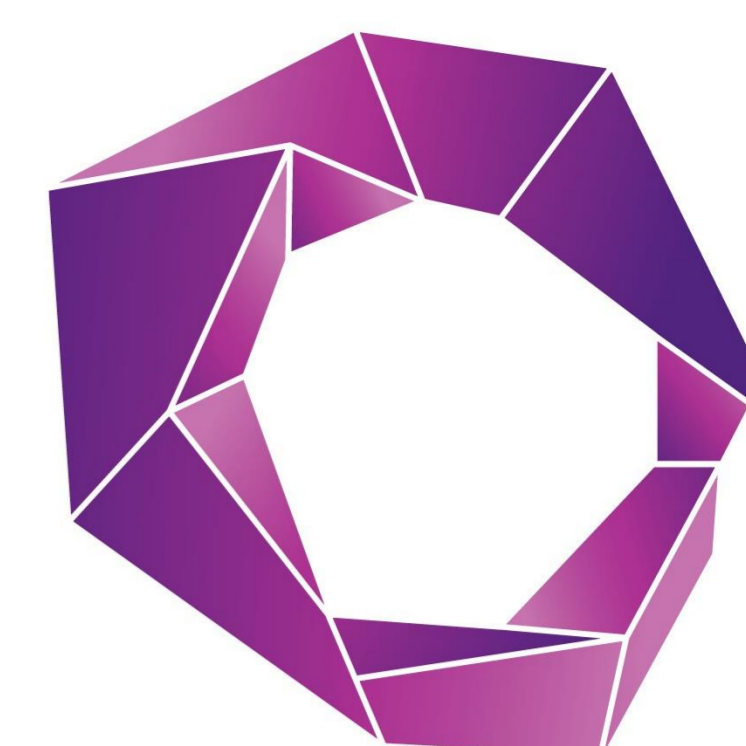


# AN ASSESSMENT OF 30 YEARS OF OCCUPATIONAL RADIATION DOSE RECORDS



**Peter Mac**  
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## Background

- The retention of personal radiation dose records presents many challenges.
- The data requirements of personal dosimetry services differs, data formats change, data quality is variable.
- Knowledge of trends in workgroup radiation dose allows for assessments of medical radiation protection measures, safety culture and facilitates benchmarking with other hospitals and users of radiation.



Figure 1: Peter Mac moved into the VCCC facility in mid 2016

## Aims

- Compile all available personal radiation dose data from different sources into a single dose register in an electronic format.
- Assess any trends in radiation dose within specific work groups over time

## Materials and Methods

A commercially available radiation safety record keeping software package (Historion, Cybermynd) was procured to host the Peter Mac dose record. Personal dose equivalent data was transferred from Landauer customer portal who have provided personal dosimeters since 2007, via the Historion data transfer tool.

Personal dose equivalents from 1987 until 2006 were obtained from the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) in csv format. These were uploaded into Historion via the Historion bulk data upload tool.

Historion was then used to;

- merge wearers to create a single record for individuals who wore dosimeters provided by both ARPANSA and Landauer
- Check for duplicate records
- Perform data quality tasks, such as missing full name, unknown date of birth, unknown gender, unknown workgroup
- Calculate the average and maximum radiation dose (Hp10) for the Nuclear Medicine Department (physicians, technologists, radiopharmacists and radiochemists), Radiology Department (radiologists, radiographers) and radiation therapists from 1989 – 2018.

## Context

Peter MacCallum Cancer Centre (Peter Mac) is a public hospital in Australia solely dedicated to the diagnosis, treatment and research of cancer. Use of medical ionising radiation currently includes:

- 17 linear accelerators
- High dose rate brachytherapy
- 4 PET & 2 SPECT
- Radionuclide therapy
- CT, interventional fluoroscopy, X-ray, mammography

Approximately 670, or 28% of Peter Mac staff members wear personal whole body dosimeters.

## Results and Discussion

An electronic register holding the radiation dose history of approximately 5,000 past and present workers has been compiled.

The register contains just over 72,000 personal dose equivalent readings.

For Nuclear Medicine and Radiology workers, radiation doses have increased over the last decade.

The last decade has seen the establishment and consolidation of PET, growth in <sup>177</sup>Lu based radionuclide therapies, interventional procedures and the number of patient episodes.

The average dose to Radiation Therapy workers decreased sharply in 2006, corresponding to a change in dosimeter type (TLD to OSL) and service provider. This has been investigated recently (Kron & Gilhen 2019).

Prior to 2006, the 'Radiation Therapy' workgroup also included oncologists and medical physicists, therefore this data must be interpreted cautiously.

Some dose readings for 'Radiation Therapy' were suspected as being accidental (dosimeters left in treatment bunkers) rather than occupationally exposures. However there was insufficient information to exclude these from the data set.

Knowledge of long term trends in radiations dose to medical workers facilitates further assessment and optimisation of radiation protection practises.

Standardisation of workgroup descriptions used by personal dosimetry providers in Australia would enable easier analysis of data sets obtained from different sources and over long time scales

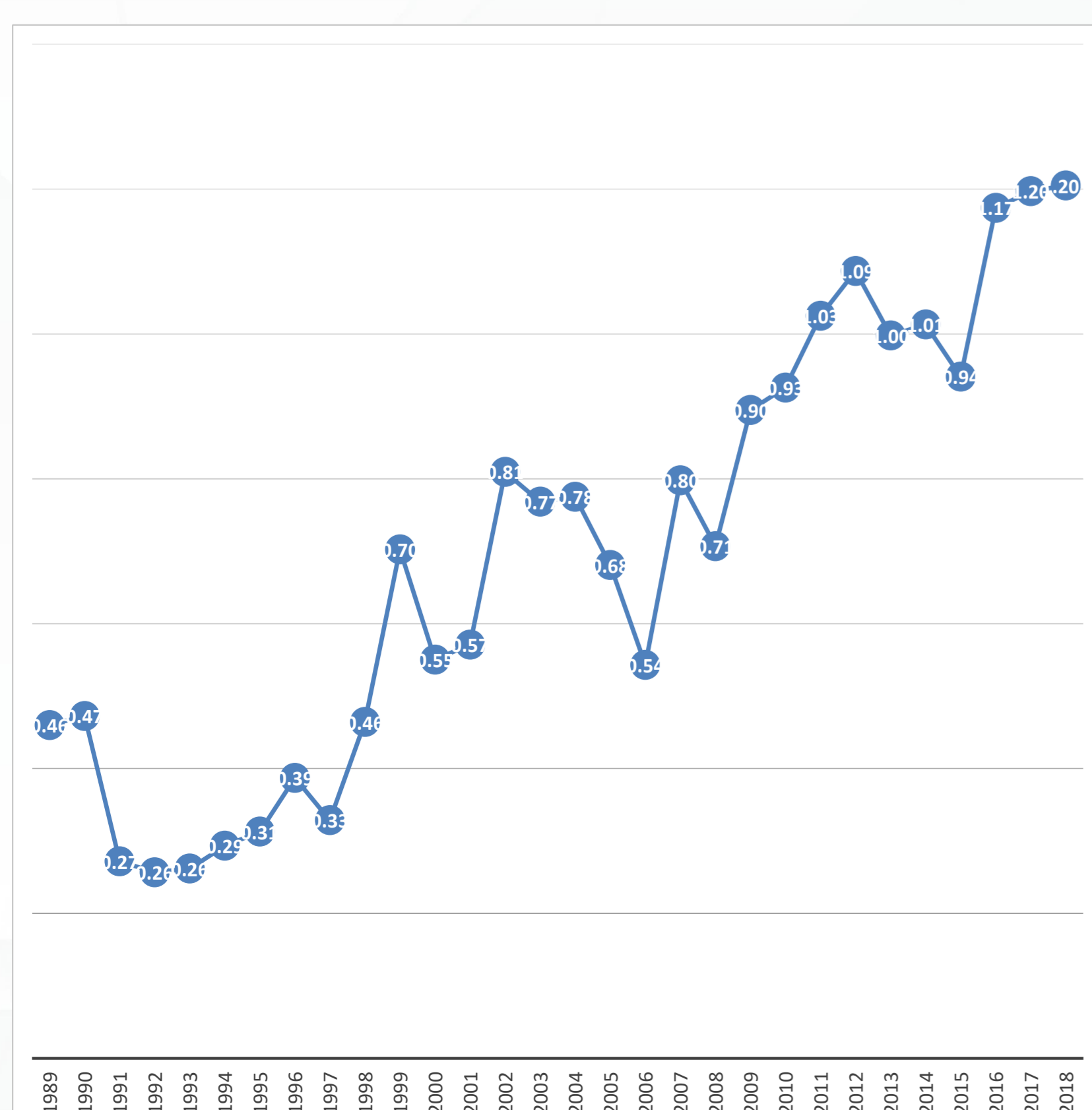


Figure 2: Average personal dose equivalent – Nuclear medicine

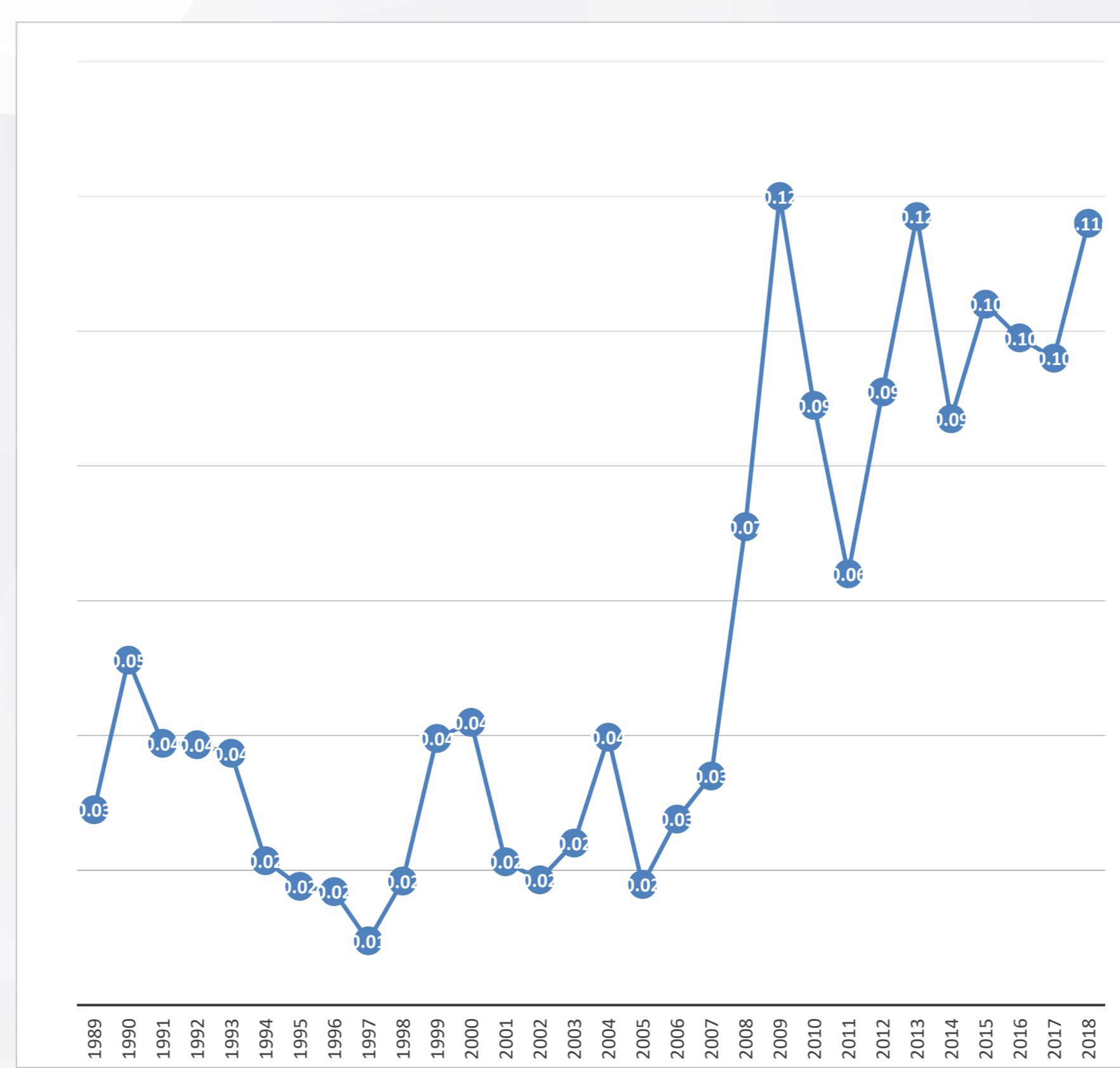


Figure 3: Average personal dose equivalent – Radiology

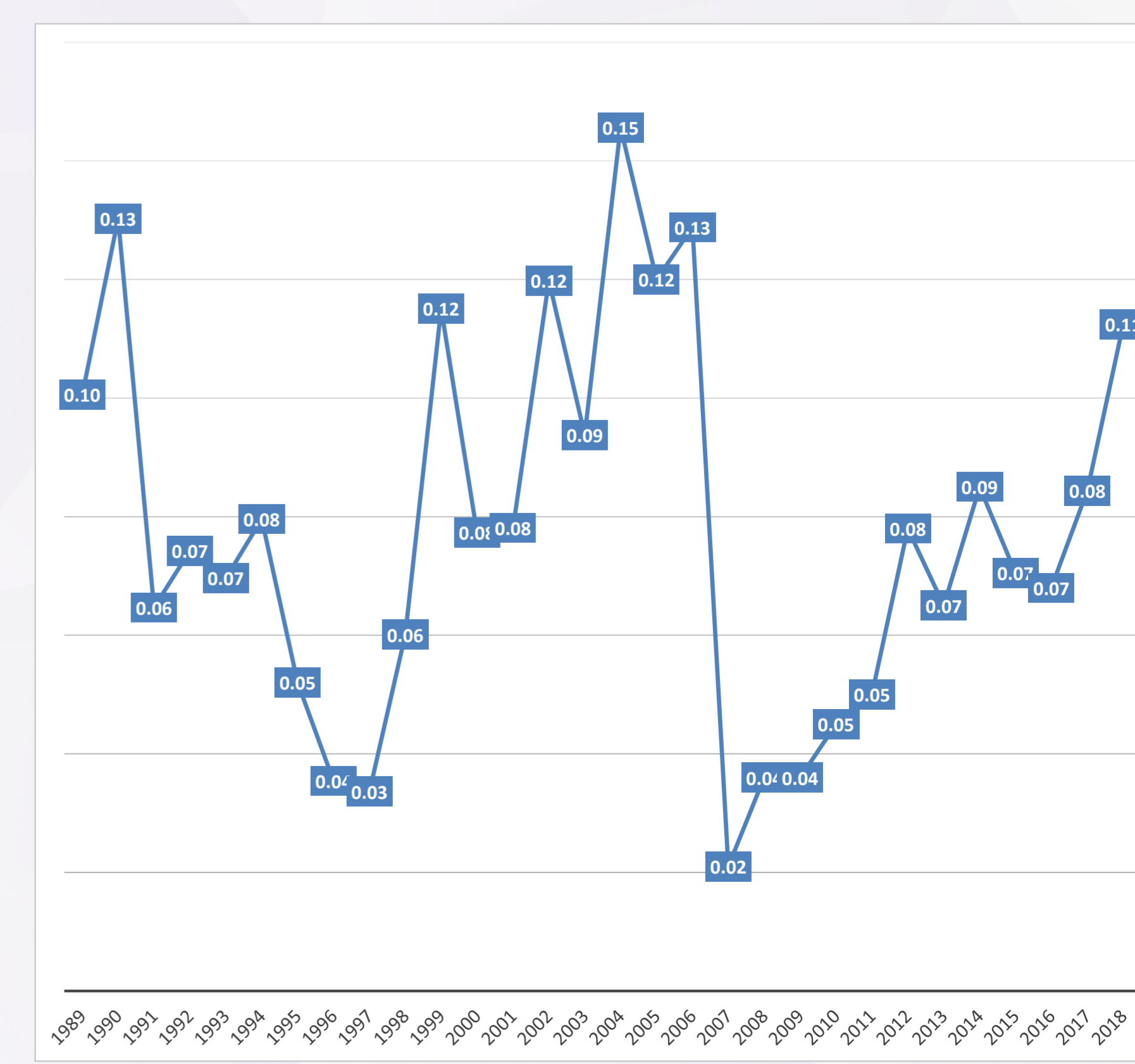


Figure 4: Average personal dose equivalent – Radiation Therapy