



# REPORT ON OCCUPATIONAL RADIATION EXPOSURES IN **CANADA** 2008–2018

NATIONAL DOSE REGISTRY

RADIATION PROTECTION BUREAU

ENVIRONMENTAL AND RADIATION HEALTH SCIENCES DIRECTORATE

HEALTHY ENVIRONMENTS AND CONSUMER SAFETY BRANCH



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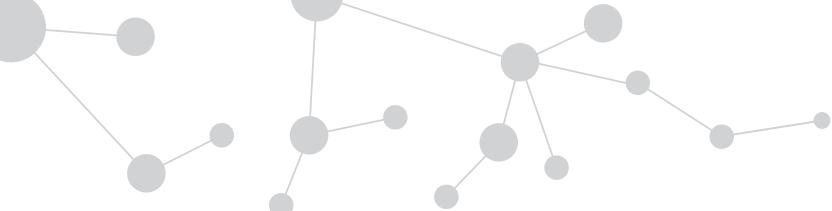
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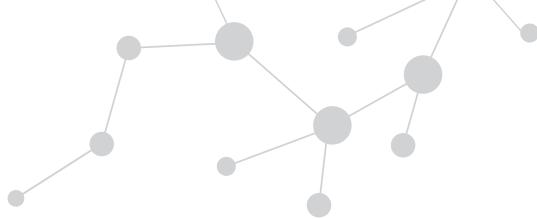
## SUMMARY

The National Dose Registry is Canada's national repository for radiation dose records of Canadian workers. It is administered by Health Canada's Radiation Protection Bureau and supports Health Canada and Canadian regulatory authorities in their mandates to protect the health and safety of Canadians exposed to ionizing radiation in the workplace including, but not limited to, nuclear power plants, uranium mines, dental offices, and hospitals. It has been in continuous operation since 1951 and now contains the records of about one million individuals who have been monitored for ionizing radiation exposure as part of their jobs, including more than 170,000 members of the present-day workforce.

The current Report on Occupational Radiation Exposures in Canada provides up-to-date statistics on occupational radiation exposures of monitored workers in Canada, spanning the period from 2008–2018, with a focus on 2018. The report was developed primarily to summarize data from the National Dose Registry for use by regulatory authorities and facilitate analysis of national, regional, and sectorial trends. It may also be useful for researchers, employers and workers.

In 2018, dose records from a total of 174,464 unique workers (median age 39y, 59% female) were reported to the National Dose Registry. From this number, 161,005 were monitored to ascertain effective dose (whole body), while the remaining were mainly monitored for extremities (hands and feet). Ontario had the highest number of monitored workers, followed by Quebec and Alberta.

For 80% of the monitored workers in 2018, all effective doses reported to the NDR were zero. The collective effective dose recorded in the National Dose Registry for 2018 was 44.77 person.Sv, which is slightly higher than for 2017 (41.57 person.Sv). This can probably be explained, in part, by the higher number of monitored workers (155,717 for 2017). The mean annual effective dose for 2018 was 0.25 mSv and the mean non-zero annual effective dose was 1.26 mSv. These are slightly higher than for 2017 (0.24 and 1.19 mSv, respectively). More than half (58%) of the monitored workers in 2018 were from the medical sector, followed by the nuclear sector at 16%. The five job categories with the highest mean effective dose in 2018 were: Reactor – Fuel Handling (2.72 mSv); Reactor – Mechanical maintenance (2.30 mSv); Reactor – Construction (1.77 mSv); Fuel Processor – Production (1.66 mSv) and Industrial radiographer (1.58 mSv).

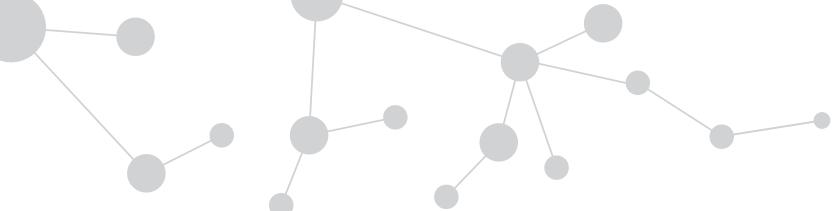


## LIST OF ABBREVIATIONS

<b>Alta:</b>	Alberta
<b>BC:</b>	British Columbia
<b>Man:</b>	Manitoba
<b>mSv:</b>	millisievert
<b>NDR:</b>	National Dose Registry
<b>NL:</b>	Newfoundland and Labrador
<b>NB:</b>	New Brunswick
<b>NS:</b>	Nova Scotia
<b>Ont:</b>	Ontario
<b>Part Accel:</b>	Particle Accelerator
<b>PEI:</b>	Prince Edward Island
<b>Que:</b>	Quebec
<b>Sask:</b>	Saskatchewan
<b>Terr:</b>	Territories (including Yukon, Northwest Territories and Nunavut)
<b>U:</b>	Uranium
<b>WLM:</b>	Working Level Month

## LIST OF TABLES AND FIGURES

- Table 1:** Characteristics of workers by province/territories
- Table 2:** Breakdown of annual effective doses by job sector for all of Canada
- Table 3:** Number of workers and mean annual effective doses by job sector and province/territories
- Table 4:** Eleven-year trend of number of workers and mean effective annual doses by job sector for all of Canada
- Figure C.1:** Eleven-year trend; mean annual effective doses by job sector, for all of Canada
- Figure C.2:** Eleven-year trend of number of workers and collective effective doses by job sector, for all of Canada



# DEFINITIONS

**Effective dose:** A measure of dose designed to reflect the amount of radiation detriment. The effective dose is obtained by multiplying the equivalent dose of each tissue or organ by an appropriate tissue weighting factor and summing the products. The equivalent dose is the absorbed dose weighted for the degree of biological effectiveness of different radiations. The absorbed dose can be defined as the radiation energy absorbed per unit mass of a substance (such as human tissue).

Source: [http://nuclearsafety.gc.ca/eng/resources/radiation/introduction-to-radiation/nuclear-and-radiation-glossary.cfm#effective\\_dose](http://nuclearsafety.gc.ca/eng/resources/radiation/introduction-to-radiation/nuclear-and-radiation-glossary.cfm#effective_dose)

**Effective collective dose (collective dose):** The sum of all effective doses of all workers in a defined group for a given year.

**Job Sectors:** Grouping of similar job categories (for a complete list of job categories by sector, see Appendix A):

**Accelerator:** Job categories where work is being performed in a particle accelerator environment. Includes scientists, technicians, maintenance staff, etc.

**Industry:** Industrial activities involving ionizing radiation that are not related to a nuclear reactor/power plant.

**Medical:** Work done with ionizing radiation in the human health sector, including environments such as hospitals, research centres, laboratories, dental and veterinarian clinics, etc.

**Mining:** All job categories in the uranium mining industry, as well as non-uranium mining activities where ionizing radiation is present.

**Nuclear:** Work done in and around nuclear power generating stations, including operation and maintenance, fuel handling, waste management, transport, etc.

**Shared:** Includes mainly support staff (such as administrative staff, students and inspectors) that can be found in the majority of workplaces, not already included in another job sector.

**Non-zero dose:** A dose reported as different (greater) than zero.



# INTRODUCTION

The National Dose Registry (NDR) is the national repository for occupational dose records for Canadian workers. It is administered by Health Canada's Radiation Protection Bureau. It has been in continuous operation since 1951 and now contains the records of about one million individuals who have been monitored for radiation exposure as part of their jobs, including about 170,000 members of the present-day workforce.

The main functions of the NDR are to:

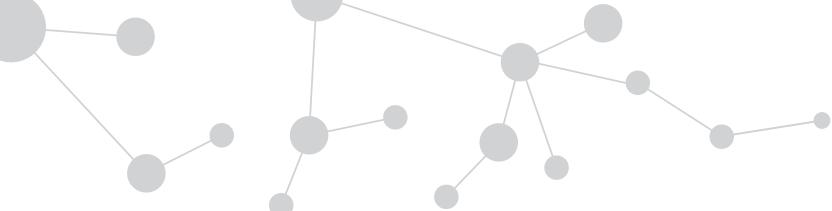
- ▶ consolidate dose records from dosimetry service providers monitoring Canadians working with or around ionizing radiation;
- ▶ assist regulatory authorities by evaluating dose trends and statistics, and by notifying them of overexposures (dose limit exceedances) within their jurisdiction;
- ▶ contribute to health research and scientific knowledge about risks from occupational exposure to ionizing radiation; and
- ▶ provide dose histories to individual workers and organizations for work planning, and for compensation and litigation cases.

The naming convention for this report has been changed this year to better reflect the data being presented.

The Report on Occupational Radiation Exposures in Canada 2008–2018 provides up-to-date statistics on occupational radiation exposures of monitored workers in Canada, spanning the period from 2008–2018, with a focus on 2018. This information will assist regulatory authorities, organizations, and private individuals in comparing incurred occupational radiation exposures with national, regional, and sectorial means and trends.

The report is a series of tables describing the current workforce, as reflected in the NDR, and enumerating mean doses by type of job and/or location of work. Tables 2 to 4 present data by "job sector" in order to facilitate reading the tables and comparing the high-level results within them. Appendix A contains a list of the job categories included in each job sector, and Appendices B and C break down the information in Tables 2 and 4 by job category and present additional dose information in graph form.

Moving forward, NDR will continue to issue summary reports like this one and make use of the Government of Canada's Open Data portal to make summary data sets available electronically. Specific aggregate data can also be requested from the NDR using the contact information below.



This report and previous editions can be found on the *Government of Canada Publications* website (<http://publications.gc.ca/site/eng/411512/publication.html>) or by sending a request to the NDR:

**National Dose Registry**

Health Canada  
Radiation Protection Building  
775 Brookfield Road, AL 6302D  
Ottawa (Ontario) K1A 1C1

Email: [hc.ndr-fdn.sc@canada.ca](mailto:hc.ndr-fdn.sc@canada.ca)  
Fax: 613-957-0960



## GENERAL COMMENTS AND LIMITATIONS

The data presented in this report were extracted from the NDR on November 12<sup>th</sup>, 2020. Changes made after this date are not reflected in the report. Being an operational database, the NDR is constantly and regularly updated. The most frequent causes for changes to a record in the database are:

- ▶ dose corrections (including, but not limited to, situations where dose is judged to be non-personal after investigation);
- ▶ updates to a worker's job category;
- ▶ dosimeters or data returned late; and
- ▶ quality assurance improvements.

Doses are submitted to the NDR by licensed Dosimetry Service Providers, who measure, monitor and report ionizing radiation doses in accordance with regulatory requirements set by the Canadian Nuclear Safety Commission (CNSC). These service providers include commercial processors, as well as in-house services operated by, for example, nuclear power generating stations and uranium mines.

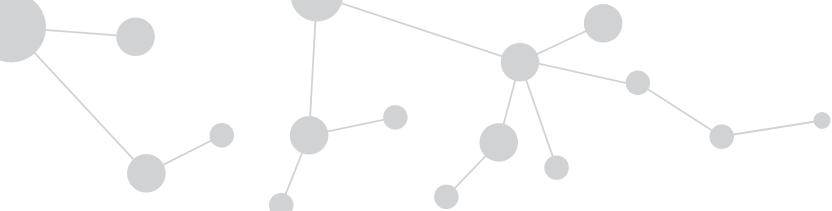
The 2018 edition of the report contained significant updates to some of the summaries published in 2017 due to a large number of late submissions from some Dosimetry Service Providers.

In 2019–2020, the NDR team continued to work closely with Dosimetry Service Providers to help them clear their backlogs and enter the late dose records into the database. This work was nearly completed at the time the data was extracted for the current report. As a result, the tables in the current report again contain updates to data published earlier.

It is important to note that the regulations and requirements for monitoring differ among jurisdictions, and some do not require dose reporting to the NDR. This can impact the completeness of the datasets used for some job sectors and categories, particularly where x-rays are the primary source of exposure.

All doses in this report are reported as effective dose, in International System (SI) units. For a given individual, if effective doses due to more than one type of radiation are of relevance, and such doses have been measured or calculated separately, then these doses have been added together in reporting the final effective dose value for the individual. Examples of doses that may have been summed together include:

- ▶ External whole body gamma
- ▶ External whole body high energy beta
- ▶ External whole body X-ray
- ▶ External whole body neutron
- ▶ Internal whole body tritium, as determined by urinalysis
- ▶ Radon progeny exposures, converted from WLM values (see below).



In the report, the radon progeny exposures are converted in mSv. The conversion used in this report is 5 mSv/Working Level Month (WLM), in accordance with the *Radiation Protection Regulations* under the *Nuclear Safety and Control Act*. Skin doses and extremity doses are not included in the report but are recorded in the database.

For the external whole body doses, some Dosimetry Service Providers have set reporting thresholds ranging from 0.01 to 0.1 mSv, after background subtraction, and report doses below the threshold as zero. Others will calculate doses for workers based on area monitors or other methods and will not have a reporting threshold. In calculating descriptive dose statistics, all dose values have been used as reported.

This report is based on data as reported to the NDR with the presumption that dosimeters were worn properly and in accordance with regulations. In certain cases, exposures may have been over or underestimated if the dosimeter was not worn properly. The wearing period may also influence the reported doses. Since some Dosimetry Service Providers have a reporting threshold and are reporting dose values under that threshold as zero, it is possible that, for a given exposure rate, a longer wearing period could result in a dose that just exceeds the reporting threshold (and thus resulting in a non-zero dose), while a shorter wearing period for that same exposure rate may not result in a dose that exceeds the reporting threshold (and thus the dose would be reported as zero). Finally, doses are assigned to the year in which the dosimeter was issued (with some exceptions), even though some of the dosimeters may actually have been worn during part of the subsequent year.

The province that is listed alongside a given dose in the NDR database may not always represent the province in which the radiation work has been performed. For example, a company based in one province could send workers to another province but report the dose as coming from the company's home province.

Workers may not always be assigned to job categories the same way by all employers. Job category designations are selected by each employer based on a standard list maintained by the NDR. Some have their own job classifications schemes and translate them into the NDR's standardized list prior to submission of the records.

A worker who has performed different types of work or who has been monitored by more than one Dosimetry Service Provider can have records under more than one job category or province for the same year. As a result, it should be noted that, in the tables, a worker is counted more than once if he (she) has worked in more than one job category or sector or in more than one province. For this reason, the totals and subtotals in the tables may appear to be inconsistent.

Finally, due to privacy considerations, some data were grouped or omitted to minimise the risk of re-identification, when numbers were small.



## 2018 FINAL DATA

A total of 174,464 unique workers were monitored by the NDR during the year 2018. Table 1 presents the general characteristics of these workers, grouped by province. The three territories have been combined in order to respect privacy requirements. The total number of workers for Canada reported in the table is slightly higher than the number of unique workers monitored due to some individuals doing work in more than one province/territory. In this case, they are counted in each province/territory.

**Table 1:** Characteristics of workers by province/territories

Province	Workers (n)	Sex		Age (median years)	Collective Dose (person.Sv)	Mean effective Dose (mSv)	Mean effective non-Zero Dose (mSv)
		M	F				
<b>NL</b>	2282	677	1605	38	0.17	0.07	0.45
<b>PEI</b>	310	53	257	36	0.03	0.10	0.51
<b>NS</b>	3277	795	2482	39	0.40	0.12	0.85
<b>NB</b>	4356	2715	1641	40	1.50	0.34	1.11
<b>Que</b>	37570	9735	27835	37	3.24	0.09	0.91
<b>Ont</b>	78801	40986	37815	41	32.01	0.41	1.66
<b>Man</b>	6155	1529	4626	38	0.21	0.03	0.54
<b>Sask</b>	7306	4047	3259	38	1.47	0.20	0.53
<b>Alta</b>	23681	6993	16688	36	4.67	0.20	0.98
<b>BC</b>	11845	3759	8086	37	1.06	0.09	0.44
<b>Territories</b>	539	121	417	41	0.00	0.01	0.19
<b>Canada</b>	<b>176122</b>	<b>71410</b>	<b>104712</b>	<b>39</b>	<b>44.77</b>	<b>0.25</b>	<b>1.26</b>

For Tables 2 to 4, job categories have been combined into sectors. Appendix A lists the job sectors and the categories included in each.

Table 2 shows dose information for each sector, as well as the number of workers who fall into different dose ranges. Doses below the reporting threshold of the Dosimetry Service Provider (when applicable) are considered zeros. For distribution of doses by individual job categories, see Appendix B.

**Table 2:** Breakdown of annual effective doses by job sector for all of Canada

Sector*	Workers (n)	Collective Dose (person.Sv)	Mean Effective Dose (mSv)	Mean Effective Non-Zero Dose (mSv)	Distribution of workers per dose range (n)						
					0	>0-1	>1-5	>5-10	>10-15	>15-20	>20
<b>Accelerator</b>	1151	0.12	0.10	0.36	820	301	28	1	0	1	0
<b>Industry</b>	20956	7.91	0.38	0.90	12188	6987	1477	222	68	5	9
<b>Medical</b>	104509	8.11	0.08	0.65	92100	10471	1748	147	19	6	18
<b>Mining</b>	2896	1.00	0.34	0.45	675	1948	265	7	1	0	0
<b>Nuclear</b>	28107	26.78	0.95	2.77	18434	3985	3834	1396	398	50	10
<b>Shared</b>	21324	0.85	0.04	0.39	19115	2028	169	10	1	0	1
<b>Total</b>	<b>178943</b>	<b>44.77</b>	<b>0.25</b>	<b>1.26</b>	<b>143332</b>	<b>25720</b>	<b>7521</b>	<b>1783</b>	<b>487</b>	<b>62</b>	<b>38</b>

\* Individuals working in 2 (or more) different job sectors are counted in each job sector



Table 3 shows the mean doses for each province and the territories by job sector. Territories have been combined due to small numbers. For privacy reasons, mean doses for very small sample sizes are not shown (represented by a dash sign).

**Table 3:** Number of workers and mean annual effective doses by job sector and province/territories

Job sector*	NL	PEI	NS	NB	Que	Ont	Man	Sask	Alta	BC	Territories	Canada
<b>Accelerator</b>												
<b>Workers (n)</b>	0	0	2	0	7	3	0	158	1	980	0	1151
<b>Mean dose (mSv)</b>	-	-	-	-	-	-	-	0.01	-	0.12	-	0.10
<b>Mean Non-Zero Dose (mSv)</b>	-	-	-	-	-	-	-	0.04	-	0.40	-	0.36
<b>Industry</b>												
<b>Workers (n)</b>	261	6	418	246	2531	11543	278	1127	3831	1135	27	21403
<b>Mean dose (mSv)</b>	0.19	-	0.08	0.15	0.21	0.28	0.06	0.21	0.92	0.19	0.06	0.37
<b>Mean Non-Zero Dose (mSv)</b>	0.43	-	0.48	0.48	0.97	0.56	0.41	1.22	2.07	0.84	0.32	0.89
<b>Medical</b>												
<b>Workers (n)</b>	1758	273	2554	1469	29146	34886	5241	2801	17474	8841	470	104913
<b>Mean dose (mSv)</b>	0.06	0.11	0.14	0.14	0.09	0.08	0.03	0.09	0.05	0.07	0.00	0.08
<b>Mean Non-Zero Dose (mSv)</b>	0.48	0.52	0.94	0.60	0.95	0.78	0.54	0.71	0.36	0.37	0.14	0.65
<b>Mining</b>												
<b>Workers (n)</b>	0	0	0	0	99	31	2	2769	0	4	0	2905
<b>Mean dose (mSv)</b>	-	-	-	-	0.47	0.00	-	0.34	-	-	-	0.34
<b>Mean Non-Zero Dose (mSv)</b>	-	-	-	-	0.69	0.02	-	0.44	-	-	-	0.45
<b>Nuclear</b>												
<b>Workers (n)</b>	0	0	0	2447	585	25325	0	0	0	2	0	28359
<b>Mean dose (mSv)</b>	-	-	-	0.48	0.01	1.01	-	-	-	-	-	0.94
<b>Mean Non-Zero Dose (mSv)</b>	-	-	-	1.33	0.27	2.89	-	-	-	-	-	2.74
<b>Shared</b>												
<b>Workers (n)</b>	281	31	343	264	6194	8929	730	565	3011	985	43	21376
<b>Mean dose (mSv)</b>	0.04	0.00	0.06	0.27	0.02	0.03	0.03	0.03	0.06	0.08	0.00	0.04
<b>Mean Non-Zero Dose (mSv)</b>	0.36	0.13	0.59	1.14	0.50	0.26	0.57	0.43	0.42	0.76	0.00	0.39

\* Individuals working in 2 (or more) different job sectors and/or provinces/territories are counted in each job sector/province/territory.

Table 4 summarizes the mean dose data by job sector for 2008 to 2018. Information broken down further by job categories within the job sectors can be found in Appendix C.

**Table 4:** Eleven-year trend of number of workers and mean effective annual doses by job sector for all of Canada

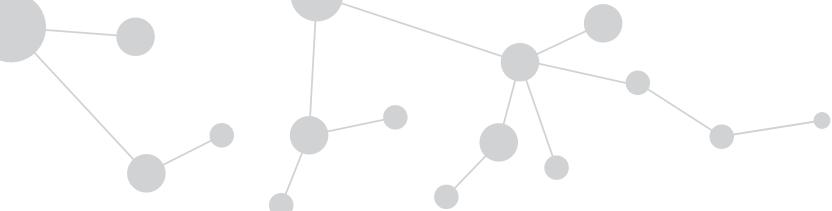
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
<b>Accelerator</b>											
<b>Workers (n)</b>	840	832	950	1056	1060	1127	1105	1116	1135	1187	1151
<b>Mean dose (mSv)</b>	0.28	0.24	0.16	0.16	0.17	0.17	0.13	0.12	0.09	0.09	0.10
<b>Mean Non-Zero Dose (mSv)</b>	0.35	0.85	0.42	0.42	0.25	0.40	0.20	0.26	0.28	0.21	0.36
<b>Industry</b>											
<b>Workers (n)</b>	26033	24285	23728	23591	23368	23008	21968	21343	20726	21091	20956
<b>Mean dose (mSv)</b>	0.53	0.50	0.50	0.50	0.53	0.48	0.48	0.41	0.35	0.36	0.38
<b>Mean Non-Zero Dose (mSv)</b>	1.34	1.23	1.27	1.27	1.39	1.23	1.19	1.01	0.85	0.88	0.90
<b>Medical</b>											
<b>Workers (n)</b>	91402	88977	90847	92022	93247	94548	96387	98613	100197	103994	104509
<b>Mean dose (mSv)</b>	0.10	0.10	0.11	0.11	0.09	0.08	0.09	0.08	0.08	0.08	0.08
<b>Mean Non-Zero Dose (mSv)</b>	0.75	0.75	0.84	0.84	0.78	0.62	0.72	0.68	0.63	0.62	0.65
<b>Mining</b>											
<b>Workers (n)</b>	5604	5228	5002	5813	6603	7484	6187	6196	4837	3565	2896
<b>Mean dose (mSv)</b>	0.63	0.75	0.73	0.73	0.59	0.58	0.64	0.72	0.63	0.56	0.34
<b>Mean Non-Zero Dose (mSv)</b>	0.75	0.89	0.82	0.82	0.67	0.69	0.74	0.84	0.71	0.62	0.45
<b>Nuclear</b>											
<b>Workers (n)</b>	26539	28117	28152	26507	25326	22221	22781	23790	26900	27894	28107
<b>Mean dose (mSv)</b>	1.10	0.98	1.09	1.09	1.04	0.79	0.70	0.72	0.73	0.90	0.95
<b>Mean Non-Zero Dose (mSv)</b>	2.97	2.67	2.95	2.95	2.86	2.47	2.26	2.41	2.32	2.77	2.77
<b>Shared</b>											
<b>Workers (n)</b>	21716	21481	21826	22357	22373	21448	21023	21514	21296	21110	21324
<b>Mean dose (mSv)</b>	0.05	0.04	0.06	0.06	0.04	0.04	0.04	0.04	0.04	0.04	0.04
<b>Mean Non-Zero Dose (mSv)</b>	0.55	0.44	0.56	0.56	0.44	0.38	0.42	0.39	0.33	0.40	0.39
<b>Total</b>											
<b>Workers (n)</b>	168104	165358	166550	167589	168167	165942	165998	168974	171066	174802	174464
<b>Mean dose (mSv)</b>	0.34	0.32	0.34	0.34	0.31	0.25	0.24	0.23	0.23	0.25	0.26
<b>Mean Non-Zero Dose (mSv)</b>	1.44	1.40	1.46	1.46	1.39	1.13	1.12	1.12	1.06	1.21	1.27



## APPENDIX A

### Classification of Job Categories by Sectors

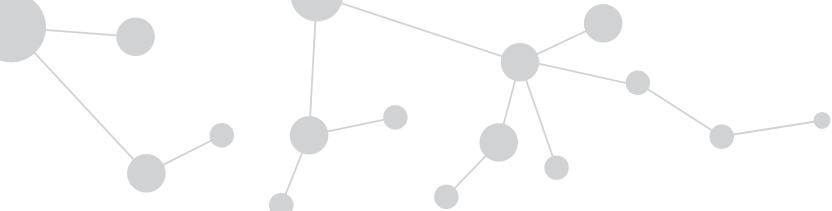
<b>Job Sector</b>	<b>Job Categories</b>
Accelerator	Particle Accelerator - Administration
	Particle Accelerator - Chemical & Radiation Control
	Particle Accelerator - Construction
	Particle Accelerator - Contractor
	Particle Accelerator - Control Technicians
	Particle Accelerator - Designers
	Particle Accelerator - Electrical Maintenance
	Particle Accelerator - Electrical Technicians
	Particle Accelerator - General Maintenance
	Particle Accelerator - Health Physics
	Particle Accelerator - Machinists
	Particle Accelerator - Mechanical Maintenance
	Particle Accelerator - Mechanical Technicians
	Particle Accelerator - Operations
	Particle Accelerator - Scientific/Professional
	Particle Accelerator - Student
	Particle Accelerator - Training
	Particle Accelerator - Visitor



Job Sector	Job Categories
Industry	Aircrew
	Dial Painter
	Fuel Processor
	Fuel Processor - Administration
	Fuel Processor - Maintenance
	Fuel Processor - Production
	Fuel Processor - Technical Support
	Ground Transportation
	Industrial Radiographer
	Instructor (Non-Medical)
	Instrument Technician
	Janitorial Staff
	Laboratory Technician (Industrial)
	Other (Industrial)
	Salesperson
	Scientist Engineer (Field)
	Scientist/Engineer (Laboratory)
	Security
	Tradesman
	Well Logger



<b>Job Sector</b>	<b>Job Categories</b>
<b>Medical</b>	Chiropractor Assistant
	Chiropractor
	Dental Assistant
	Dental Hygienist
	Dental Therapist/Nurse
	Dentist
	Gynaecologist
	Laboratory Technician (Medical)
	Medical Physicist
	Nuclear Medicine Technologist
	Nurse
	Other (Medical)
	Physician
	Radiation Therapist
	Radiological Technologist
	Radiologist (Diagnostic)
	Radiologist (Therapeutic)
	Speech-Language Pathologist
	Veterinarian
	Veterinary Technician
	Ward Aid/Orderly



Job Sector	Job Categories
Mining	Non Uranium Mine Mill Workers
	Non Uranium Mine Support Workers
	Non Uranium Mine Surface Maintenance
	Non Uranium Mine Surface Personnel
	Non Uranium Mine Underground Miner
	Non Uranium Mine Visitors
	Uranium Mine Electrician
	Uranium Mine Mill Maintenance
	Uranium Mine Mill Workers
	Uranium Mine Nurses
	Uranium Mine Office Staff
	Uranium Mine Support Workers
	Uranium Mine Surface Maintenance
	Uranium Mine Surface Miner
	Uranium Mine Surface Personnel
	Uranium Mine Surface Support Workers
	Uranium Mine Underground Maintenance
	Uranium Mine Underground Miner
	Uranium Mine Underground Personnel
	Uranium Mine Visitors



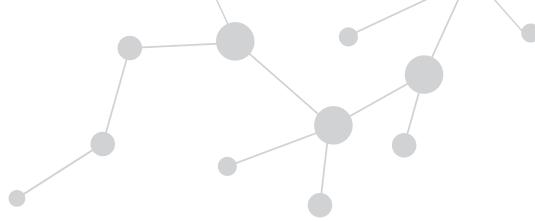
Job Sector	Job Categories
Nuclear	Reactor - Administration
	Reactor - Chemical And Radiation Control
	Reactor - Construction
	Reactor - Contractor
	Reactor - Control Technicians
	Reactor - Electrical Maintenance
	Reactor - Fuel Handling
	Reactor - General Maintenance
	Reactor - Health Physics
	Reactor - Industrial Radiographer
	Reactor - Mechanical Maintenance
	Reactor - Operations
	Reactor - Scientific/Professional
	Reactor - Summer Student
	Reactor - Training
	Reactor - Visitor
Shared	Administrator
	Inspector
	Office Staff
	Other (Administration)
	Other (Miscellaneous)
	Safety Officer
	Student
	Unknown
	Visitor

## APPENDIX B

Breakdown of annual effective doses by job category for all of Canada for 2018

For privacy reasons, data for very small sample sizes are not shown (represented by a dash sign).

Job Category*	Workers (n)	Collective Effective Dose (person-Sv)	Mean Effective Dose (mSv)	Distribution of workers per dose range (n)						
				0	>0-1	>1-5	>5-10	>10-15	>15-20	>20
<b>Accelerator</b>										
<b>Part Accel - Administration</b>	62	0.00	0.01	47	15	0	0	0	0	0
<b>Part Accel - Chemical &amp; Radiation Control</b>	8	-	-	-	-	-	-	-	-	-
<b>Part Accel - Construction</b>	1	-	-	-	-	-	-	-	-	-
<b>Part Accel - Contractor</b>	74	0.00	0.00	64	10	0	0	0	0	0
<b>Part Accel - Control Technicians</b>	43	0.00	0.08	35	7	1	0	0	0	0
<b>Part Accel - Designers</b>	25	0.00	0.06	18	6	1	0	0	0	0
<b>Part Accel - Electrical Maintenance</b>	9	-	-	-	-	-	-	-	-	-
<b>Part Accel - Electrical Technicians</b>	16	0.00	0.01	12	4	0	0	0	0	0
<b>Part Accel - General Maintenance</b>	21	0.00	0.21	9	11	1	0	0	0	0
<b>Part Accel - Health Physics</b>	5	-	-	-	-	-	-	-	-	-
<b>Part Accel - Machinists</b>	25	0.01	0.25	19	3	3	0	0	0	0
<b>Part Accel - Mechanical Maintenance</b>	7	-	-	-	-	-	-	-	-	-
<b>Part Accel - Mechanical Technicians</b>	90	0.05	0.61	45	33	10	1	0	1	0
<b>Part Accel - Operations</b>	65	0.02	0.33	26	32	7	0	0	0	0
<b>Part Accel - Scientific/Professional</b>	381	0.01	0.03	292	87	2	0	0	0	0
<b>Part Accel - Student</b>	133	0.01	0.06	79	52	2	0	0	0	0
<b>Part Accel - Training</b>	1	-	-	-	-	-	-	-	-	-
<b>Part Accel - Visitor</b>	185	0.00	0.00	156	29	0	0	0	0	0



Job Category*	Workers (n)	Collective Effective Dose (person.Sy)	Mean Effective Dose (mSv)	Distribution of workers per dose range (n)						
				0	>0-1	>1-5	>5-10	>10-15	>15-20	>20
<b>Industry</b>										
Dial Painter	6	-	-	-	-	-	-	-	-	-
Fuel Processor	1526	1.02	0.67	405	749	358	14	0	0	0
Fuel Processor - Administration	4	-	-	-	-	-	-	-	-	-
Fuel Processor - Maintenance	1	-	-	-	-	-	-	-	-	-
Fuel Processor - Production	2	-	-	-	-	-	-	-	-	-
Fuel Processor - Technical Support	8	-	-	-	-	-	-	-	-	-
Ground Transportation	197	0.05	0.26	130	52	15	0	0	0	0
Industrial Radiographer	2401	3.79	1.58	966	601	593	176	57	4	4
Instructor (Non-Medical)	437	0.01	0.02	417	19	0	1	0	0	0
Instrument Technician	1641	0.49	0.30	1185	403	45	6	1	0	1
Janitorial Staff	44	0.00	0.06	38	5	1	0	0	0	0
Laboratory Technician (Industrial)	1466	0.23	0.16	1013	394	57	2	0	0	0
Other (Industrial)	8397	1.49	0.18	4381	3737	259	14	5	0	1
Salesperson	74	0.01	0.12	51	22	1	0	0	0	0
Scientist/Engineer (Field)	1516	0.25	0.16	994	462	58	2	0	0	0
Scientist/Engineer (Laboratory)	2164	0.11	0.05	1891	253	18	2	0	0	0
Security	695	0.02	0.02	643	49	3	0	0	0	0
Tradesman	287	0.14	0.47	207	61	13	2	2	1	1
Well Logger	976	0.31	0.31	578	333	60	2	1	0	2

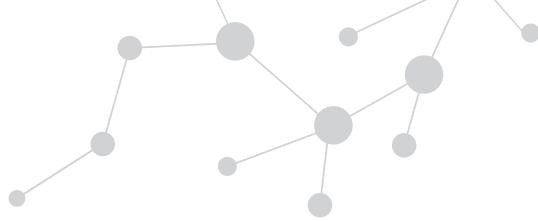
Job Category*	Workers (n)	Collective Effective Dose (person.Sy)	Mean Effective Dose (mSv)	Distribution of workers per dose range (n)						
				0	>0-1	>1-5	>5-10	>10-15	>15-20	>20
<b>Medical</b>										
<b>Chiropractor</b>	993	0.02	0.02	944	45	4	0	0	0	0
<b>Chiropractor Assistant</b>	23	0.00	0.07	20	2	1	0	0	0	0
<b>Dental Assistant</b>	16205	0.09	0.01	15781	418	6	0	0	0	0
<b>Dental Hygienist</b>	13065	0.09	0.01	12715	336	13	1	0	0	0
<b>Dental Therapist/Nurse</b>	125	0.00	0.02	112	13	0	0	0	0	0
<b>Dentist</b>	8598	0.05	0.01	8417	172	9	0	0	0	0
<b>Gynaecologist</b>	4	-	-	-	-	-	-	-	-	-
<b>Laboratory Technician (Medical)</b>	1144	0.09	0.08	966	157	21	0	0	0	0
<b>Medical Physicist</b>	412	0.01	0.03	353	57	2	0	0	0	0
<b>Nuclear Medicine Technologist</b>	1899	2.31	1.22	574	524	749	52	0	0	0
<b>Nurse</b>	8668	0.49	0.06	7147	1407	107	6	1	0	0
<b>Other (Medical)</b>	7789	0.99	0.13	5884	1657	229	13	3	0	3
<b>Physician</b>	4556	1.22	0.27	3562	802	142	27	11	4	8
<b>Radiation Therapist</b>	1310	0.08	0.06	1072	226	10	1	0	0	1
<b>Radiological Technologist</b>	15029	1.73	0.12	11381	3293	323	27	0	0	5
<b>Radiologist (Diagnostic)</b>	1971	0.37	0.19	1521	379	53	13	3	2	0
<b>Radiologist (Therapeutic)</b>	151	0.03	0.19	114	30	6	1	0	0	0
<b>Speech-Language Pathologist</b>	240	0.00	0.02	220	20	0	0	0	0	0
<b>Veterinarian</b>	7620	0.21	0.03	7298	307	13	1	0	0	1
<b>Veterinary Technician</b>	16268	0.31	0.02	15468	735	65	0	0	0	0
<b>Ward Aid/Orderly</b>	466	0.02	0.04	417	46	3	0	0	0	0



Job Category*	Workers (n)	Collective Effective Dose (person.Sy)	Mean Effective Dose (mSv)	Distribution of workers per dose range (n)						
				0	>0-1	>1-5	>5-10	>10-15	>15-20	>20
<b>Mining</b>										
<b>Non-Uranium Mine Mill Workers</b>	89	0.05	0.51	24	50	15	0	0	0	0
<b>Non-Uranium Mine Support Workers</b>	1	-	-	-	-	-	-	-	-	-
<b>Non-Uranium Mine Surface Maintenance</b>	10	0.00	0.06	8	2	0	0	0	0	0
<b>Non-Uranium Mine Visitors</b>	1	-	-	-	-	-	-	-	-	-
<b>Uranium Mine Electrician</b>	30	0.01	0.22	18	12	0	0	0	0	0
<b>Uranium Mine Mill Maintenance</b>	235	0.11	0.48	34	167	33	0	1	0	0
<b>Uranium Mine Mill Workers</b>	223	0.21	0.93	16	132	73	2	0	0	0
<b>Uranium Mine Nurses</b>	14	0.00	0.11	3	11	0	0	0	0	0
<b>Uranium Mine Office Staff</b>	431	0.04	0.09	150	277	4	0	0	0	0
<b>Uranium Mine Support Workers</b>	305	0.16	0.53	45	210	48	2	0	0	0
<b>Uranium Mine Surface Maintenance</b>	378	0.06	0.15	164	207	7	0	0	0	0
<b>Uranium Mine Surface Miner</b>	29	0.00	0.03	21	8	0	0	0	0	0
<b>Uranium Mine Surface Personnel</b>	424	0.07	0.18	137	272	15	0	0	0	0
<b>Uranium Mine Surface Support Workers</b>	860	0.13	0.15	250	587	23	0	0	0	0
<b>Uranium Mine Underground Maintenance</b>	232	0.08	0.33	47	170	14	1	0	0	0
<b>Uranium Mine Underground Miner</b>	228	0.05	0.21	35	185	8	0	0	0	0
<b>Uranium Mine Underground Personnel</b>	169	0.04	0.22	50	110	9	0	0	0	0
<b>Uranium Mine Visitors</b>	14	0.00	0.06	10	4	0	0	0	0	0

Job Category*	Workers (n)	Collective Effective Dose (person.Sy)	Mean Effective Dose (mSv)	Distribution of workers per dose range (n)						
				0	>0-1	>1-5	>5-10	>10-15	>15-20	>20
<b>Nuclear</b>										
<b>Reactor - Administration</b>	2269	0.47	0.21	1975	194	76	16	7	1	0
<b>Reactor - Chemical And Radiation Control</b>	910	1.31	1.44	383	224	197	106	0	0	0
<b>Reactor - Construction</b>	1585	2.81	1.77	637	325	419	179	24	1	0
<b>Reactor - Contractor</b>	6873	9.34	1.36	3738	1140	1358	476	142	18	1
<b>Reactor - Control Technicians</b>	417	0.33	0.79	230	84	89	13	1	0	0
<b>Reactor - Electrical Maintenance</b>	909	0.70	0.77	522	206	140	39	2	0	0
<b>Reactor - Fuel Handling</b>	73	0.20	2.72	23	17	15	14	4	0	0
<b>Reactor - General Maintenance</b>	1708	1.53	0.90	1051	303	263	64	26	1	0
<b>Reactor - Health Physics</b>	250	0.16	0.64	145	60	41	4	0	0	0
<b>Reactor - Industrial Radiographer</b>	103	0.13	1.26	34	25	39	5	0	0	0
<b>Reactor - Mechanical Maintenance</b>	1619	3.72	2.30	546	301	488	228	55	1	0
<b>Reactor - Operations</b>	2598	2.11	0.81	1340	604	574	56	24	0	0
<b>Reactor - Scientific/ Professional</b>	4462	0.31	0.07	3943	422	93	4	0	0	0
<b>Reactor - Summer Student</b>	402	0.01	0.03	375	24	3	0	0	0	0
<b>Reactor - Training</b>	140	0.04	0.25	114	16	8	2	0	0	0
<b>Reactor - Visitor</b>	6150	3.59	0.58	5156	365	360	178	67	18	6
<b>Shared</b>										
<b>Administrator</b>	687	0.02	0.03	610	74	3	0	0	0	0
<b>Inspector</b>	266	0.02	0.07	221	42	3	0	0	0	0
<b>Office Staff</b>	3635	0.10	0.03	3274	346	14	1	0	0	0
<b>Other (Administration)</b>	582	0.07	0.13	280	292	10	0	0	0	0
<b>Other (Miscellaneous)</b>	1037	0.23	0.22	672	301	61	2	1	0	0
<b>Safety Officer</b>	485	0.03	0.06	411	67	7	0	0	0	0
<b>Student</b>	14532	0.36	0.02	13671	783	70	7	0	0	1
<b>Unknown</b>	1	-	-	-	-	-	-	-	-	-
<b>Visitor</b>	208	0.02	0.11	82	125	1	0	0	0	0

\* Individuals working in 2 (or more) different job categories are counted in each job category.



## APPENDIX C

Eleven-year trend of number of workers, mean annual effective doses and mean annual non-zero doses by job category, for all of Canada

For privacy reasons, mean doses for very small sample sizes are not shown (represented by a dash sign).

<b>Job Category*</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>
<b>Accelerator Total</b>	<b>840</b>	<b>832</b>	<b>950</b>	<b>1056</b>	<b>1060</b>	<b>1127</b>	<b>1105</b>	<b>1116</b>	<b>1135</b>	<b>1187</b>	<b>1151</b>
Mean Dose (mSv)	0.28	0.24	0.20	0.16	0.17	0.17	0.13	0.12	0.09	0.09	0.10
Mean Non-Zero Dose (mSv)	0.35	0.85	1.01	0.42	0.25	0.40	0.20	0.26	0.28	0.21	0.36
<b>Part Accel - Administration</b>	47	44	55	58	69	71	69	66	67	68	62
Mean Dose (mSv)	0.04	0.01	0.00	0.03	0.02	0.11	0.02	0.01	0.00	0.01	0.01
Mean Non-Zero Dose (mSv)	0.06	0.10	0.08	0.08	0.03	0.23	0.03	0.03	0.02	0.03	0.02
<b>Part Accel - Chemical &amp; Radiation Control</b>	5	5	9	8	7	7	8	9	9	8	8
Mean Dose (mSv)	-	-	-	-	-	-	-	-	-	-	-
Mean Non-Zero Dose (mSv)	-	-	-	-	-	-	-	-	-	-	-
<b>Part Accel - Construction</b>	0	0	0	8	48	46	6	6	4	4	1
Mean Dose (mSv)	-	-	-	-	0.01	0.00	-	-	-	-	-
Mean Non-Zero Dose (mSv)	-	-	-	-	0.02	0.02	-	-	-	-	-
<b>Part Accel - Contractor</b>	53	52	58	79	78	93	89	80	83	90	74
Mean Dose (mSv)	0.05	0.05	0.08	0.07	0.03	0.02	0.03	0.01	0.01	0.00	0.00
Mean Non-Zero Dose (mSv)	0.06	0.24	0.49	0.16	0.04	0.06	0.04	0.04	0.05	0.03	0.03
<b>Part Accel - Control Technicians</b>	29	30	48	48	45	46	45	41	42	42	43
Mean Dose (mSv)	0.22	0.39	0.13	0.10	0.11	0.26	0.13	0.10	0.07	0.03	0.08
Mean Non-Zero Dose (mSv)	0.28	1.30	1.06	0.27	0.22	0.51	0.27	0.35	0.42	0.13	0.41
<b>Part Accel - Designers</b>	21	22	28	31	34	30	29	28	27	26	25
Mean Dose (mSv)	0.50	0.60	0.23	0.14	0.16	0.22	0.14	0.08	0.11	0.03	0.06
Mean Non-Zero Dose (mSv)	0.62	2.21	1.58	0.25	0.17	0.44	0.33	0.26	0.59	0.07	0.20
<b>Part Accel - Electrical Maintenance</b>	3	3	3	4	5	7	7	7	8	8	9
Mean Dose (mSv)	-	-	-	-	-	-	-	-	-	-	-
Mean Non-Zero Dose (mSv)	-	-	-	-	-	-	-	-	-	-	-
<b>Part Accel - Electrical Technicians</b>	4	6	6	9	10	9	9	11	11	13	16
Mean Dose (mSv)	-	-	-	-	-	-	-	0.02	0.02	0.06	0.01
Mean Non-Zero Dose (mSv)	-	-	-	-	-	-	-	0.03	0.04	0.11	0.05

<b>Job Category*</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>
<b>Part Accel - General Maintenance</b>	17	16	15	19	18	20	19	18	19	21	21
Mean Dose (mSv)	0.70	0.75	0.51	0.68	0.48	0.50	0.24	0.29	0.15	0.22	0.21
Mean Non-Zero Dose (mSv)	0.75	1.09	0.63	0.86	0.48	0.67	0.25	0.38	0.21	0.29	0.37
<b>Part Accel - Health Physics</b>	1	1	1	3	5	4	3	2	3	2	5
Mean Dose (mSv)	-	-	-	-	-	-	-	-	-	-	-
Mean Non-Zero Dose (mSv)	-	-	-	-	-	-	-	-	-	-	-
<b>Part Accel - Machinists</b>	31	28	28	29	24	23	25	25	24	26	25
Mean Dose (mSv)	0.28	0.24	0.30	0.34	0.25	0.38	0.26	0.35	0.29	0.27	0.25
Mean Non-Zero Dose (mSv)	0.34	1.10	1.66	0.65	0.34	1.73	0.36	0.74	1.39	0.53	1.02
<b>Part Accel - Mechanical Maintenance</b>	3	2	8	7	7	4	4	6	7	6	7
Mean Dose (mSv)	-	-	-	-	-	-	-	-	-	-	-
Mean Non-Zero Dose (mSv)	-	-	-	-	-	-	-	-	-	-	-
<b>Part Accel - Mechanical Technicians</b>	63	65	75	75	72	76	76	74	82	90	90
Mean Dose (mSv)	1.01	0.87	0.92	0.73	0.77	0.64	0.38	0.49	0.36	0.41	0.61
Mean Non-Zero Dose (mSv)	1.02	1.49	1.86	0.92	0.97	0.92	0.48	0.76	0.60	0.70	1.22
<b>Part Accel - Operations</b>	51	50	62	65	62	63	64	66	62	62	65
Mean Dose (mSv)	1.18	0.87	0.77	0.50	0.67	0.55	0.80	0.50	0.49	0.32	0.33
Mean Non-Zero Dose (mSv)	1.33	1.24	1.30	0.63	0.75	0.75	1.09	0.74	0.77	0.47	0.56
<b>Part Accel - Scientific/Professional</b>	293	302	319	320	309	346	361	354	362	379	381
Mean Dose (mSv)	0.16	0.14	0.08	0.08	0.10	0.11	0.06	0.05	0.04	0.05	0.03
Mean Non-Zero Dose (mSv)	0.18	0.60	0.55	0.26	0.15	0.24	0.08	0.12	0.12	0.11	0.14
<b>Part Accel - Student</b>	112	102	101	119	135	138	148	165	158	151	133
Mean Dose (mSv)	0.05	0.03	0.03	0.05	0.05	0.04	0.04	0.03	0.03	0.03	0.06
Mean Non-Zero Dose (mSv)	0.08	0.23	0.30	0.27	0.08	0.16	0.05	0.08	0.12	0.09	0.16
<b>Part Accel - Training</b>	2	1	1	1	1	1	1	1	1	1	1
Mean Dose (mSv)	-	-	-	-	-	-	-	-	-	-	-
Mean Non-Zero Dose (mSv)	-	-	-	-	-	-	-	-	-	-	-
<b>Part Accel - Visitor</b>	105	103	136	175	131	143	142	157	166	190	185
Mean Dose (mSv)	0.06	0.02	0.02	0.04	0.03	0.01	0.03	0.02	0.01	0.01	0.00
Mean Non-Zero Dose (mSv)	0.09	0.09	0.42	0.16	0.05	0.04	0.04	0.05	0.03	0.03	0.02



<b>Job Category*</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>
<b>Industry Total</b>	26033	24285	23728	23591	23368	23008	21968	21343	20726	21091	20956
Mean Dose (mSv)	0.53	0.50	0.49	0.50	0.53	0.48	0.48	0.41	0.35	0.36	0.38
Mean Non-Zero Dose (mSv)	1.34	1.23	1.26	1.27	1.39	1.23	1.19	1.01	0.85	0.88	0.90
<b>Aircrew</b>	22	16	7	3	3	1	1	1	0	0	0
Mean Dose (mSv)	0.33	0.10	-	-	-	-	-	-	-	-	-
Mean Non-Zero Dose (mSv)	0.74	0.56	-	-	-	-	-	-	-	-	-
<b>Dial Painter</b>	1	1	1	1	1	2	2	2	1	6	6
Mean Dose (mSv)	-	-	-	-	-	-	-	-	-	-	-
Mean Non-Zero Dose (mSv)	-	-	-	-	-	-	-	-	-	-	-
<b>Fuel Processor</b>	1480	1309	1211	1187	1165	1314	1314	1395	1274	1294	1526
Mean Dose (mSv)	1.29	1.44	1.34	1.28	1.67	1.11	1.24	0.91	0.83	0.55	0.67
Mean Non-Zero Dose (mSv)	2.06	2.23	1.95	1.77	2.27	1.44	1.64	1.19	1.11	0.78	0.91
<b>Fuel Processor-Administration</b>	0	0	0	0	0	0	0	0	0	0	4
Mean Dose (mSv)	-	-	-	-	-	-	-	-	-	-	-
Mean Non-Zero Dose (mSv)	-	-	-	-	-	-	-	-	-	-	-
<b>Fuel Processor-Maintenance</b>	0	0	0	0	0	0	0	0	0	0	1
Mean Dose (mSv)	-	-	-	-	-	-	-	-	-	-	-
Mean Non-Zero Dose (mSv)	-	-	-	-	-	-	-	-	-	-	-
<b>Fuel Processor - Production</b>	9	8	11	12	23	0	0	0	0	2	2
Mean Dose (mSv)	-	-	1.04	0.62	0.55	-	-	-	-	-	-
Mean Non-Zero Dose (mSv)	-	-	1.04	0.62	0.55	-	-	-	-	-	-
<b>Fuel Processor-Technical Support</b>	0	0	0	0	0	0	0	0	4	4	8
Mean Dose (mSv)	-	-	-	-	-	-	-	-	-	-	-
Mean Non-Zero Dose (mSv)	-	-	-	-	-	-	-	-	-	-	-
<b>Ground Transportation</b>	114	130	110	134	118	117	143	151	165	158	197
Mean Dose (mSv)	1.05	0.52	0.76	0.63	0.60	0.53	0.51	0.53	0.31	0.25	0.26
Mean Non-Zero Dose (mSv)	1.93	1.14	1.26	1.22	1.17	1.02	1.05	1.15	0.71	0.67	0.75
<b>Industrial Radiographer</b>	2845	2776	2668	2841	2939	2931	2840	2711	2536	2360	2401
Mean Dose (mSv)	2.01	1.55	1.64	1.93	2.17	1.83	1.87	1.61	1.17	1.58	1.58
Mean Non-Zero Dose (mSv)	3.46	2.67	2.93	3.33	3.50	3.06	3.07	2.68	2.16	2.76	2.64
<b>Instructor (Non-Medical)</b>	393	384	400	413	412	430	430	421	446	437	437
Mean Dose (mSv)	0.05	0.04	0.03	0.02	0.01	0.01	0.02	0.03	0.03	0.03	0.02
Mean Non-Zero Dose (mSv)	0.72	0.33	0.37	0.45	0.16	0.35	0.27	0.69	0.48	0.64	0.48

<b>Job Category*</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>
<b>Instrument Technician</b>	2070	1867	1868	1922	1981	1827	1715	1657	1686	1844	1641
Mean Dose (mSv)	0.15	0.21	0.22	0.20	0.17	0.19	0.18	0.15	0.19	0.14	0.30
Mean Non-Zero Dose (mSv)	0.57	0.62	0.69	0.61	0.63	0.66	0.59	0.56	0.67	0.49	1.08
<b>Janitorial Staff</b>	98	79	81	60	60	49	51	52	58	51	44
Mean Dose (mSv)	0.23	0.06	0.24	0.25	0.27	0.21	0.19	0.11	0.04	0.03	0.06
Mean Non-Zero Dose (mSv)	0.85	0.29	0.83	1.68	3.23	0.84	1.09	1.40	0.30	0.41	0.48
<b>Laboratory Technician (Industrial)</b>	2721	2538	2412	2278	2266	2206	1911	1673	1575	1569	1466
Mean Dose (mSv)	0.24	0.24	0.21	0.18	0.15	0.16	0.16	0.15	0.17	0.18	0.16
Mean Non-Zero Dose (mSv)	0.79	0.81	0.66	0.54	0.59	0.55	0.54	0.48	0.49	0.53	0.51
<b>Other (Industrial)</b>	8846	8248	8293	8398	8161	8247	7795	7618	7804	8248	8397
Mean Dose (mSv)	0.38	0.42	0.40	0.33	0.26	0.23	0.22	0.22	0.22	0.22	0.18
Mean Non-Zero Dose (mSv)	0.87	0.95	0.93	0.81	0.65	0.59	0.53	0.49	0.48	0.46	0.37
<b>Salesperson</b>	114	114	111	86	65	63	73	89	83	84	74
Mean Dose (mSv)	0.05	0.13	0.09	0.09	0.14	0.13	0.18	0.11	0.21	0.11	0.12
Mean Non-Zero Dose (mSv)	0.21	0.41	0.30	0.25	0.47	0.53	0.59	0.36	0.59	0.41	0.39
<b>Scientist/Engineer (Field)</b>	1649	1663	1622	1603	1679	1746	1639	1616	1590	1489	1516
Mean Dose (mSv)	0.34	0.32	0.32	0.30	0.27	0.21	0.23	0.22	0.23	0.20	0.16
Mean Non-Zero Dose (mSv)	0.72	0.68	0.73	0.64	0.62	0.52	0.54	0.55	0.57	0.52	0.48
<b>Scientist/Engineer (Laboratory)</b>	3857	3484	3321	3086	2963	2660	2489	2517	2411	2405	2164
Mean Dose (mSv)	0.05	0.05	0.05	0.04	0.06	0.08	0.05	0.06	0.04	0.05	0.05
Mean Non-Zero Dose (mSv)	0.37	0.35	0.47	0.41	0.50	0.65	0.37	0.47	0.29	0.39	0.39
<b>Security</b>	185	217	212	231	287	292	399	483	539	623	695
Mean Dose (mSv)	0.01	0.02	0.03	0.02	0.06	0.04	0.02	0.01	0.03	0.03	0.02
Mean Non-Zero Dose (mSv)	0.20	0.25	0.53	0.24	0.73	0.49	0.30	0.33	0.39	0.40	0.32
<b>Tradesman</b>	155	165	153	170	207	210	187	183	174	182	287
Mean Dose (mSv)	0.16	0.08	0.08	0.10	0.40	1.13	1.31	0.85	0.58	0.57	0.47
Mean Non-Zero Dose (mSv)	0.37	0.25	0.23	0.31	0.90	2.20	2.66	2.17	1.23	1.54	1.70
<b>Well Logger</b>	2140	1796	1666	1617	1520	1565	1535	1304	872	976	976
Mean Dose (mSv)	0.43	0.34	0.38	0.34	0.31	0.41	0.32	0.18	0.23	0.25	0.31
Mean Non-Zero Dose (mSv)	0.74	0.66	0.74	0.64	0.65	0.88	0.71	0.43	0.55	0.61	0.77



<b>Job Category*</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>
<b>Medicine Total</b>	<b>91402</b>	<b>88977</b>	<b>90847</b>	<b>92022</b>	<b>93247</b>	<b>94548</b>	<b>96387</b>	<b>98613</b>	<b>100197</b>	<b>103994</b>	<b>104509</b>
Mean Dose (mSv)	0.10	0.10	0.09	0.11	0.09	0.08	0.09	0.08	0.08	0.08	0.08
Mean Non-Zero Dose (mSv)	0.75	0.75	0.72	0.84	0.78	0.62	0.72	0.68	0.63	0.62	0.65
<b>Chiropractor Assistant</b>	<b>74</b>	<b>64</b>	<b>72</b>	<b>57</b>	<b>46</b>	<b>45</b>	<b>40</b>	<b>41</b>	<b>42</b>	<b>36</b>	<b>23</b>
Mean Dose (mSv)	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.07
Mean Non-Zero Dose (mSv)	0.13	0.13	0.40	0.00	0.10	0.10	0.00	0.00	0.15	0.16	0.51
<b>Chiropractor</b>	<b>1150</b>	<b>1133</b>	<b>1117</b>	<b>1080</b>	<b>1063</b>	<b>1042</b>	<b>1035</b>	<b>1002</b>	<b>1025</b>	<b>1014</b>	<b>993</b>
Mean Dose (mSv)	0.04	0.03	0.03	0.04	0.04	0.04	0.05	0.05	0.03	0.01	0.02
Mean Non-Zero Dose (mSv)	0.57	0.44	0.53	0.94	0.77	0.47	0.68	1.41	0.48	0.23	0.35
<b>Dental Assistant</b>	<b>14343</b>	<b>13597</b>	<b>14122</b>	<b>14184</b>	<b>14301</b>	<b>14869</b>	<b>15300</b>	<b>15349</b>	<b>15407</b>	<b>16006</b>	<b>16205</b>
Mean Dose (mSv)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Mean Non-Zero Dose (mSv)	0.25	0.21	0.24	0.19	0.22	0.18	0.28	0.26	0.26	0.25	0.21
<b>Dental Hygienist</b>	<b>10340</b>	<b>10055</b>	<b>10618</b>	<b>10960</b>	<b>11345</b>	<b>11763</b>	<b>11949</b>	<b>12234</b>	<b>12399</b>	<b>12879</b>	<b>13065</b>
Mean Dose (mSv)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01
Mean Non-Zero Dose (mSv)	0.22	0.22	0.24	0.22	0.34	0.31	0.22	0.25	0.25	0.23	0.27
<b>Dental Therapist/Nurse</b>	<b>140</b>	<b>134</b>	<b>140</b>	<b>164</b>	<b>161</b>	<b>156</b>	<b>144</b>	<b>138</b>	<b>126</b>	<b>128</b>	<b>125</b>
Mean Dose (mSv)	0.03	0.03	0.03	0.02	0.01	0.02	0.01	0.01	0.03	0.01	0.02
Mean Non-Zero Dose (mSv)	0.19	0.17	0.24	0.21	0.20	0.18	0.19	0.15	0.27	0.12	0.19
<b>Dentist</b>	<b>7879</b>	<b>7676</b>	<b>7834</b>	<b>7842</b>	<b>7780</b>	<b>7970</b>	<b>8061</b>	<b>8157</b>	<b>8330</b>	<b>8517</b>	<b>8598</b>
Mean Dose (mSv)	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Mean Non-Zero Dose (mSv)	0.25	0.22	0.24	0.23	0.33	0.27	0.27	0.25	0.30	0.27	0.27
<b>Gynaecologist</b>	<b>11</b>	<b>7</b>	<b>4</b>	<b>3</b>	<b>6</b>	<b>4</b>	<b>3</b>	<b>5</b>	<b>5</b>	<b>3</b>	<b>4</b>
Mean Dose (mSv)	0.00	-	-	-	-	-	-	-	-	-	-
Mean Non-Zero Dose (mSv)	0.00	-	-	-	-	-	-	-	-	-	-
<b>Laboratory Technician (Medical)</b>	<b>2757</b>	<b>2446</b>	<b>2250</b>	<b>2053</b>	<b>1805</b>	<b>1561</b>	<b>1479</b>	<b>1335</b>	<b>1237</b>	<b>1134</b>	<b>1144</b>
Mean Dose (mSv)	0.09	0.10	0.09	0.12	0.10	0.07	0.12	0.07	0.11	0.10	0.08
Mean Non-Zero Dose (mSv)	0.71	0.74	0.65	0.82	0.74	0.59	0.92	0.54	0.61	0.61	0.50
<b>Medical Physicist</b>	<b>440</b>	<b>366</b>	<b>365</b>	<b>402</b>	<b>418</b>	<b>417</b>	<b>413</b>	<b>439</b>	<b>430</b>	<b>413</b>	<b>412</b>
Mean Dose (mSv)	0.03	0.13	0.03	0.09	0.05	0.03	0.05	0.03	0.04	0.04	0.03
Mean Non-Zero Dose (mSv)	0.32	1.02	0.23	0.62	0.42	0.26	0.30	0.20	0.27	0.27	0.20
<b>Nuclear Medicine Technologist</b>	<b>1930</b>	<b>1848</b>	<b>1885</b>	<b>1962</b>	<b>2033</b>	<b>1984</b>	<b>1924</b>	<b>1929</b>	<b>1918</b>	<b>1901</b>	<b>1899</b>
Mean Dose (mSv)	1.54	1.37	1.31	1.39	1.28	1.26	1.25	1.30	1.35	1.25	1.22
Mean Non-Zero Dose (mSv)	2.02	1.81	1.72	1.81	1.74	1.70	1.74	1.71	1.72	1.70	1.74

<b>Job Category*</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>
<b>Nurse</b>	8142	8022	7889	8039	8047	7983	8178	8664	8852	9126	8668
Mean Dose (mSv)	0.09	0.12	0.12	0.12	0.09	0.08	0.06	0.06	0.07	0.06	0.06
Mean Non-Zero Dose (mSv)	0.51	0.55	0.58	0.60	0.55	0.46	0.37	0.35	0.38	0.33	0.32
<b>Other [Medical]</b>	8982	8273	7966	7752	7754	7430	7215	7011	6795	7703	7789
Mean Dose (mSv)	0.15	0.14	0.13	0.15	0.13	0.09	0.25	0.09	0.11	0.12	0.13
Mean Non-Zero Dose (mSv)	0.65	0.60	0.59	0.67	0.59	0.41	1.10	0.42	0.45	0.52	0.52
<b>Physician</b>	3378	3321	3399	3455	3505	3485	3629	4104	4389	4673	4556
Mean Dose (mSv)	0.30	0.42	0.36	0.45	0.32	0.22	0.19	0.29	0.25	0.23	0.27
Mean Non-Zero Dose (mSv)	1.15	1.49	1.43	1.72	1.37	0.98	0.87	1.35	1.10	1.02	1.23
<b>Radiation Therapist</b>	1749	1477	1498	1483	1449	1443	1399	1543	1455	1339	1310
Mean Dose (mSv)	0.05	0.11	0.04	0.12	0.04	0.03	0.06	0.04	0.03	0.04	0.06
Mean Non-Zero Dose (mSv)	0.24	0.51	0.24	0.65	0.26	0.21	0.35	0.29	0.20	0.23	0.36
<b>Radiological Technologist</b>	14045	13756	13966	14220	14209	14200	14575	14769	14967	15163	15029
Mean Dose (mSv)	0.10	0.10	0.09	0.11	0.10	0.09	0.10	0.10	0.11	0.12	0.12
Mean Non-Zero Dose (mSv)	0.44	0.45	0.44	0.51	0.48	0.42	0.43	0.43	0.42	0.45	0.47
<b>Radiologist [Diagnostic]</b>	2031	1920	2109	2231	2204	2132	2132	2206	2235	2189	1971
Mean Dose (mSv)	0.44	0.29	0.26	0.38	0.34	0.23	0.27	0.23	0.29	0.22	0.19
Mean Non-Zero Dose (mSv)	2.06	1.29	1.26	1.76	1.88	1.05	1.37	1.18	1.23	1.00	0.81
<b>Radiologist [Therapeutic]</b>	222	179	176	192	194	169	150	155	156	158	151
Mean Dose (mSv)	0.14	0.06	0.07	0.11	0.07	0.33	0.33	0.10	0.13	0.17	0.19
Mean Non-Zero Dose (mSv)	0.80	0.36	0.37	0.55	0.47	1.59	1.58	0.51	0.79	0.80	0.77
<b>Speech-Language Pathologist</b>	106	112	125	139	125	135	146	173	192	216	240
Mean Dose (mSv)	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.02	0.02	0.02
Mean Non-Zero Dose (mSv)	0.11	0.16	0.16	0.19	0.20	0.11	0.15	0.14	0.17	0.31	0.20
<b>Veterinarian</b>	5952	6064	6259	6422	6536	6801	6902	7030	7260	7446	7620
Mean Dose (mSv)	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.02	0.02	0.03
Mean Non-Zero Dose (mSv)	0.31	0.29	0.31	0.39	0.33	0.27	0.32	0.35	0.33	0.46	0.65
<b>Veterinary Technician</b>	8784	9226	9939	10636	11319	12102	12816	13455	14225	15267	16268
Mean Dose (mSv)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02
Mean Non-Zero Dose (mSv)	0.34	0.28	0.26	0.32	0.34	0.27	0.31	0.32	0.36	0.36	0.38
<b>Ward Aid/Orderly</b>	1037	953	908	854	831	725	676	656	610	582	466
Mean Dose (mSv)	0.05	0.04	0.04	0.04	0.02	0.03	0.04	0.04	0.04	0.04	0.04
Mean Non-Zero Dose (mSv)	0.42	0.34	0.31	0.35	0.31	0.32	0.34	0.42	0.38	0.36	0.34



<b>Job Category*</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>
<b>Mining Total</b>	<b>5604</b>	<b>5228</b>	<b>5002</b>	<b>5813</b>	<b>6603</b>	<b>7484</b>	<b>6187</b>	<b>6196</b>	<b>4837</b>	<b>3565</b>	<b>2896</b>
Mean Dose (mSv)	0.63	0.75	0.82	0.73	0.59	0.58	0.64	0.72	0.63	0.56	0.34
Mean Non-Zero Dose (mSv)	0.75	0.89	0.95	0.82	0.67	0.69	0.74	0.84	0.71	0.62	0.45
<b>Non-Uranium Mine Mill Workers</b>	0	0	0	0	0	82	94	95	92	88	89
Mean Dose (mSv)	-	-	-	-	-	0.14	0.57	0.46	0.53	0.53	0.51
Mean Non-Zero Dose (mSv)	-	-	-	-	-	0.28	0.76	0.66	0.64	0.64	0.70
<b>Non-Uranium Mine Support Workers</b>	0	0	0	0	0	0	0	0	0	0	1
Mean Dose (mSv)	-	-	-	-	-	-	-	-	-	-	-
Mean Non-Zero Dose (mSv)	-	-	-	-	-	-	-	-	-	-	-
<b>Non-Uranium Mine Surface Maintenance</b>	0	0	0	0	0	8	12	12	11	11	10
Mean Dose (mSv)	-	-	-	-	-	-	0.24	0.15	0.18	0.03	0.06
Mean Non-Zero Dose (mSv)	-	-	-	-	-	-	0.37	0.26	0.25	0.18	0.32
<b>Non-Uranium Mine Surface Personnel</b>	17	10	6	6	4	0	0	0	0	0	0
Mean Dose (mSv)	0.01	0.01	-	-	-	-	-	-	-	-	-
Mean Non-Zero Dose (mSv)	0.05	0.04	-	-	-	-	-	-	-	-	-
<b>Non-Uranium Mine Underground Miner</b>	1	1	1	1	1	1	1	0	0	0	0
Mean Dose (mSv)	-	-	-	-	-	-	-	-	-	-	-
Mean Non-Zero Dose (mSv)	-	-	-	-	-	-	-	-	-	-	-
<b>Non-Uranium Mine Visitors</b>	1	1	2	1	1	1	1	1	1	1	1
Mean Dose (mSv)	-	-	-	-	-	-	-	-	-	-	-
Mean Non-Zero Dose (mSv)	-	-	-	-	-	-	-	-	-	-	-
<b>Uranium Mine Electrician</b>	22	18	11	7	19	33	172	190	59	34	30
Mean Dose (mSv)	0.19	0.26	0.29	-	0.17	0.12	0.25	0.14	0.44	0.37	0.22
Mean Non-Zero Dose (mSv)	0.22	0.35	0.36	-	0.22	0.25	0.27	0.21	0.48	0.70	0.56
<b>Uranium Mine Mill Maintenance</b>	604	450	491	428	432	486	913	907	516	308	235
Mean Dose (mSv)	0.61	0.80	0.80	0.79	0.64	0.71	0.48	0.49	0.58	0.62	0.48
Mean Non-Zero Dose (mSv)	0.68	0.85	0.86	0.84	0.71	0.77	0.52	0.56	0.62	0.67	0.57
<b>Uranium Mine Mill Workers</b>	347	341	340	298	322	308	321	326	312	252	223
Mean Dose (mSv)	0.93	1.03	1.05	1.07	1.05	1.15	1.18	1.33	1.41	1.39	0.93
Mean Non-Zero Dose (mSv)	1.02	1.10	1.11	1.14	1.17	1.29	1.25	1.43	1.45	1.44	1.01
<b>Uranium Mine Nurses</b>	30	32	25	31	31	26	21	19	20	13	14
Mean Dose (mSv)	0.11	0.11	0.13	0.16	0.11	0.15	0.25	0.22	0.14	0.17	0.11
Mean Non-Zero Dose (mSv)	0.14	0.15	0.16	0.19	0.14	0.19	0.26	0.27	0.14	0.19	0.13

<b>Job Category*</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>
<b>Uranium Mine Office Staff</b>	670	686	807	889	942	986	811	822	733	582	431
Mean Dose (mSv)	0.18	0.18	0.21	0.23	0.19	0.21	0.24	0.23	0.20	0.14	0.09
Mean Non-Zero Dose (mSv)	0.22	0.22	0.26	0.27	0.22	0.25	0.29	0.28	0.24	0.16	0.14
<b>Uranium Mine Support Workers</b>	221	279	408	532	779	1108	524	510	425	374	305
Mean Dose (mSv)	1.32	1.29	1.04	0.91	0.65	0.65	0.89	1.11	0.83	0.71	0.53
Mean Non-Zero Dose (mSv)	1.44	1.40	1.17	1.02	0.72	0.73	1.03	1.17	0.90	0.79	0.62
<b>Uranium Mine Surface Maintenance</b>	952	750	609	809	805	907	691	846	672	360	378
Mean Dose (mSv)	0.27	0.27	0.32	0.23	0.26	0.24	0.26	0.32	0.31	0.21	0.15
Mean Non-Zero Dose (mSv)	0.33	0.31	0.39	0.29	0.32	0.33	0.35	0.39	0.38	0.27	0.27
<b>Uranium Mine Surface Miner</b>	171	154	81	90	107	67	33	22	23	17	29
Mean Dose (mSv)	0.47	0.49	0.42	0.19	0.18	0.22	0.40	0.40	0.20	0.06	0.03
Mean Non-Zero Dose (mSv)	0.66	0.64	0.75	0.43	0.37	0.50	0.57	0.44	0.21	0.07	0.10
<b>Uranium Mine Surface Personnel</b>	659	603	572	580	702	732	700	636	597	485	424
Mean Dose (mSv)	0.19	0.18	0.18	0.19	0.17	0.18	0.19	0.24	0.22	0.20	0.18
Mean Non-Zero Dose (mSv)	0.25	0.25	0.25	0.25	0.21	0.26	0.25	0.32	0.30	0.26	0.26
<b>Uranium Mine Surface Support Workers</b>	2236	1870	1632	2041	2384	2423	2008	1881	1532	1136	860
Mean Dose (mSv)	0.22	0.19	0.25	0.24	0.22	0.24	0.21	0.27	0.21	0.20	0.15
Mean Non-Zero Dose (mSv)	0.29	0.26	0.33	0.30	0.27	0.32	0.28	0.34	0.27	0.24	0.21
<b>Uranium Mine Underground Maintenance</b>	291	296	407	438	506	776	424	532	386	357	232
Mean Dose (mSv)	0.90	0.95	0.85	0.92	0.65	0.58	0.67	0.72	0.67	0.51	0.33
Mean Non-Zero Dose (mSv)	1.00	1.06	0.94	0.98	0.73	0.67	0.76	0.79	0.74	0.57	0.42
<b>Uranium Mine Underground Miner</b>	451	508	622	648	677	687	553	517	434	285	228
Mean Dose (mSv)	2.32	2.92	2.30	2.17	1.76	1.50	1.93	2.17	1.46	1.24	0.21
Mean Non-Zero Dose (mSv)	2.50	3.13	2.45	2.27	1.91	1.67	2.12	2.24	1.50	1.29	0.25
<b>Uranium Mine Underground Personnel</b>	201	215	258	280	340	406	353	372	313	204	169
Mean Dose (mSv)	0.76	0.99	0.89	0.92	0.68	0.66	0.75	0.81	0.56	0.47	0.22
Mean Non-Zero Dose (mSv)	0.94	1.17	1.03	1.04	0.78	0.76	0.82	0.89	0.68	0.58	0.31
<b>Uranium Mine Visitors</b>	35	13	14	8	15	11	7	6	6	6	14
Mean Dose (mSv)	0.14	0.23	0.23	-	0.22	0.25	-	-	-	-	0.06
Mean Non-Zero Dose (mSv)	0.23	0.43	0.40	-	0.41	0.30	-	-	-	-	0.19



<b>Job Category*</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>
<b>Nuclear Total</b>	<b>26539</b>	<b>28117</b>	<b>28152</b>	<b>26507</b>	<b>25326</b>	<b>22221</b>	<b>22781</b>	<b>23790</b>	<b>26900</b>	<b>27894</b>	<b>28107</b>
Mean Dose (mSv)	1.10	0.98	0.95	1.09	1.04	0.79	0.70	0.72	0.73	0.90	0.95
Mean Non-Zero Dose (mSv)	2.97	2.67	2.70	2.95	2.86	2.47	2.26	2.41	2.32	2.77	2.77
<b>Reactor - Administration</b>	<b>3256</b>	<b>2793</b>	<b>2988</b>	<b>2938</b>	<b>2927</b>	<b>2620</b>	<b>2513</b>	<b>2353</b>	<b>2390</b>	<b>2357</b>	<b>2269</b>
Mean Dose (mSv)	0.15	0.14	0.14	0.16	0.20	0.22	0.18	0.16	0.16	0.14	0.21
Mean Non-Zero Dose (mSv)	1.12	1.46	1.52	1.36	1.50	1.48	1.19	1.28	1.24	1.20	1.61
<b>Reactor - Chemical And Radiation Control</b>	<b>1002</b>	<b>991</b>	<b>1060</b>	<b>1110</b>	<b>1152</b>	<b>1019</b>	<b>976</b>	<b>954</b>	<b>935</b>	<b>910</b>	<b>910</b>
Mean Dose (mSv)	1.89	1.78	1.84	1.56	2.16	1.81	1.74	1.54	1.54	1.24	1.44
Mean Non-Zero Dose (mSv)	2.93	2.69	2.78	2.31	3.28	2.67	2.62	2.30	2.42	2.00	2.49
<b>Reactor - Construction</b>	<b>1527</b>	<b>1600</b>	<b>1968</b>	<b>1838</b>	<b>1299</b>	<b>1136</b>	<b>1090</b>	<b>1182</b>	<b>1539</b>	<b>1651</b>	<b>1585</b>
Mean Dose (mSv)	0.74	1.38	1.59	1.08	1.08	1.44	0.95	1.31	1.18	1.65	1.77
Mean Non-Zero Dose (mSv)	1.85	2.52	2.90	2.09	2.33	2.72	1.85	2.49	2.15	2.81	2.96
<b>Reactor - Contractor</b>	<b>2417</b>	<b>2689</b>	<b>2905</b>	<b>1903</b>	<b>2257</b>	<b>2595</b>	<b>2945</b>	<b>4156</b>	<b>6132</b>	<b>6849</b>	<b>6873</b>
Mean Dose (mSv)	0.91	1.29	1.61	1.50	1.70	1.15	0.58	1.05	0.67	1.80	1.36
Mean Non-Zero Dose (mSv)	2.57	2.96	3.64	3.16	3.46	2.85	1.89	2.90	2.00	4.14	2.98
<b>Reactor - Control Technicians</b>	<b>622</b>	<b>596</b>	<b>616</b>	<b>570</b>	<b>534</b>	<b>478</b>	<b>440</b>	<b>390</b>	<b>442</b>	<b>431</b>	<b>417</b>
Mean Dose (mSv)	0.62	0.59	0.81	0.75	0.72	0.90	0.57	0.83	0.52	0.68	0.79
Mean Non-Zero Dose (mSv)	1.24	1.08	1.49	1.36	1.43	1.85	1.16	1.67	1.04	1.39	1.77
<b>Reactor - Electrical Maintenance</b>	<b>1377</b>	<b>1303</b>	<b>1210</b>	<b>1195</b>	<b>1221</b>	<b>1000</b>	<b>1018</b>	<b>933</b>	<b>998</b>	<b>970</b>	<b>909</b>
Mean Dose (mSv)	1.07	0.93	0.90	0.90	0.85	0.85	0.83	0.76	0.85	0.56	0.77
Mean Non-Zero Dose (mSv)	2.17	1.99	2.00	1.94	1.67	1.90	1.70	1.63	1.75	1.39	1.80
<b>Reactor - Fuel Handling</b>	<b>87</b>	<b>86</b>	<b>67</b>	<b>69</b>	<b>80</b>	<b>81</b>	<b>98</b>	<b>60</b>	<b>73</b>	<b>86</b>	<b>73</b>
Mean Dose (mSv)	2.28	1.06	1.24	0.68	0.69	0.96	1.77	1.26	2.83	2.39	2.72
Mean Non-Zero Dose (mSv)	3.10	1.50	2.19	1.38	1.02	1.34	2.63	1.85	4.04	3.31	3.97
<b>Reactor - General Maintenance</b>	<b>3045</b>	<b>3195</b>	<b>2763</b>	<b>2651</b>	<b>2550</b>	<b>1492</b>	<b>1722</b>	<b>1475</b>	<b>1953</b>	<b>1796</b>	<b>1708</b>
Mean Dose (mSv)	2.12	1.40	0.88	1.17	0.88	0.88	0.76	0.62	0.73	0.52	0.90
Mean Non-Zero Dose (mSv)	4.03	2.64	1.93	2.48	1.74	2.52	1.95	2.04	1.92	1.64	2.33
<b>Reactor - Health Physics</b>	<b>134</b>	<b>160</b>	<b>148</b>	<b>144</b>	<b>221</b>	<b>243</b>	<b>235</b>	<b>215</b>	<b>234</b>	<b>229</b>	<b>250</b>
Mean Dose (mSv)	0.77	0.80	0.18	0.26	0.17	0.17	0.25	0.18	0.70	0.29	0.64
Mean Non-Zero Dose (mSv)	1.64	1.81	0.60	0.66	0.37	0.42	0.54	0.70	1.77	0.79	1.51

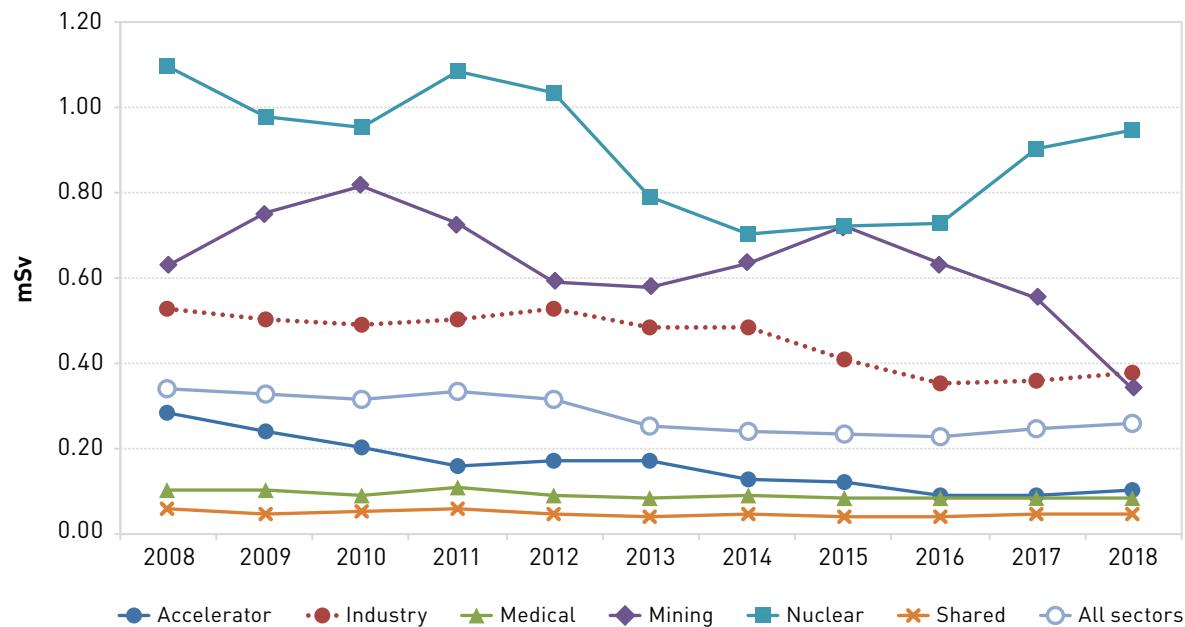
<b>Job Category*</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>
<b>Reactor - Industrial Radiographer</b>	86	101	107	108	107	123	120	111	115	119	103
Mean Dose (mSv)	1.79	1.52	1.48	1.39	1.92	1.11	0.78	0.88	1.30	0.81	1.26
Mean Non-Zero Dose (mSv)	2.52	2.33	2.17	2.28	2.78	2.11	1.17	1.61	1.92	1.36	1.89
<b>Reactor - Mechanical Maintenance</b>	1797	1717	1654	1791	1646	1491	1458	1448	1491	1511	1619
Mean Dose (mSv)	2.08	1.74	1.95	2.20	2.59	1.95	2.27	1.90	2.14	1.71	2.30
Mean Non-Zero Dose (mSv)	3.20	2.82	3.35	3.45	4.05	2.98	3.42	2.87	3.22	2.69	3.47
<b>Reactor - Operations</b>	2583	2556	2604	2462	2505	2384	2335	2369	2429	2540	2598
Mean Dose (mSv)	1.20	1.07	1.01	0.94	1.01	0.96	1.03	0.91	0.99	0.83	0.81
Mean Non-Zero Dose (mSv)	2.18	2.03	1.97	1.78	1.83	1.84	1.98	1.75	1.88	1.64	1.68
<b>Reactor - Scientific/Professional</b>	4544	4977	5052	4911	4749	4250	4060	3996	4187	4378	4462
Mean Dose (mSv)	0.19	0.20	0.16	0.14	0.13	0.11	0.08	0.06	0.07	0.05	0.07
Mean Non-Zero Dose (mSv)	1.15	1.18	1.05	1.00	0.93	0.99	0.68	0.64	0.72	0.53	0.61
<b>Reactor - Summer Student</b>	191	226	191	173	139	161	221	245	268	359	402
Mean Dose (mSv)	0.18	0.08	0.12	0.02	0.04	0.07	0.02	0.06	0.03	0.02	0.03
Mean Non-Zero Dose (mSv)	0.76	0.41	0.56	0.21	0.27	0.89	0.19	0.53	0.34	0.28	0.41
<b>Reactor - Training</b>	117	120	128	113	133	135	129	133	129	133	140
Mean Dose (mSv)	0.28	0.19	0.12	0.08	0.11	0.17	0.16	0.08	0.15	0.06	0.25
Mean Non-Zero Dose (mSv)	1.42	1.17	1.34	0.95	1.37	1.25	1.05	0.53	0.85	0.49	1.37
<b>Reactor - Visitor</b>	7125	7447	7612	7263	6638	4735	5066	5591	6115	5774	6150
Mean Dose (mSv)	0.98	0.87	0.74	1.37	0.99	0.42	0.46	0.38	0.49	0.29	0.58
Mean Non-Zero Dose (mSv)	3.68	3.40	3.01	4.43	4.26	3.32	4.18	3.52	3.92	2.42	3.61



<b>Job Category*</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>
<b>Shared Total</b>	<b>21716</b>	<b>21481</b>	<b>21826</b>	<b>22357</b>	<b>22373</b>	<b>21448</b>	<b>21023</b>	<b>21514</b>	<b>21296</b>	<b>21110</b>	<b>21324</b>
Mean Dose (mSv)	0.05	0.04	0.05	0.06	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Mean Non-Zero Dose (mSv)	0.55	0.44	0.53	0.56	0.44	0.38	0.42	0.39	0.33	0.40	0.39
<b>Administrator</b>	675	630	637	660	663	675	684	665	774	708	687
Mean Dose (mSv)	0.11	0.09	0.08	0.06	0.06	0.05	0.04	0.04	0.03	0.03	0.03
Mean Non-Zero Dose (mSv)	0.44	0.37	0.40	0.29	0.30	0.28	0.27	0.25	0.17	0.22	0.27
<b>Inspector</b>	77	86	103	120	129	178	268	311	296	285	266
Mean Dose (mSv)	0.05	0.13	0.24	0.47	0.11	0.10	0.12	0.08	0.08	0.10	0.07
Mean Non-Zero Dose (mSv)	0.51	0.79	0.93	1.57	0.67	0.42	0.93	0.67	0.71	0.95	0.43
<b>Office Staff</b>	3983	3699	3731	3621	3481	3517	3390	3411	3545	3620	3635
Mean Dose (mSv)	0.05	0.03	0.03	0.08	0.04	0.03	0.03	0.03	0.03	0.02	0.03
Mean Non-Zero Dose (mSv)	0.43	0.32	0.31	0.77	0.35	0.29	0.28	0.25	0.22	0.21	0.27
<b>Other (Administration)</b>	473	490	530	586	556	558	561	629	627	586	582
Mean Dose (mSv)	0.31	0.24	0.25	0.16	0.16	0.12	0.14	0.11	0.14	0.15	0.13
Mean Non-Zero Dose (mSv)	0.66	0.50	0.48	0.34	0.31	0.24	0.25	0.21	0.23	0.27	0.24
<b>Other (Miscellaneous)</b>	574	575	576	641	817	728	698	675	657	697	1037
Mean Dose (mSv)	0.18	0.13	0.15	0.17	0.16	0.15	0.12	0.13	0.12	0.12	0.22
Mean Non-Zero Dose (mSv)	0.72	0.51	0.65	0.68	0.54	0.49	0.42	0.47	0.39	0.50	0.62
<b>Safety Officer</b>	270	242	258	521	614	632	647	623	574	513	485
Mean Dose (mSv)	0.15	0.12	0.11	0.09	0.05	0.04	0.05	0.06	0.07	0.07	0.06
Mean Non-Zero Dose (mSv)	0.55	0.48	0.44	0.55	0.36	0.38	0.41	0.40	0.43	0.45	0.40
<b>Student</b>	15338	15243	15533	15742	15411	14330	14222	14942	14666	14554	14532
Mean Dose (mSv)	0.04	0.03	0.04	0.04	0.03	0.03	0.04	0.03	0.03	0.04	0.02
Mean Non-Zero Dose (mSv)	0.61	0.48	0.61	0.57	0.54	0.48	0.61	0.53	0.42	0.52	0.42
<b>Unknown</b>	9	14	24	73	10	2	5	2	2	0	1
Mean Dose (mSv)	-	-	0.09	0.08	0.02	-	-	-	-	-	-
Mean Non-Zero Dose (mSv)	-	-	0.20	0.22	0.11	-	-	-	-	-	-
<b>Visitor</b>	375	569	560	492	762	911	616	334	283	239	208
Mean Dose (mSv)	0.03	0.07	0.16	0.04	0.04	0.05	0.06	0.10	0.12	0.12	0.11
Mean Non-Zero Dose (mSv)	0.17	0.34	0.68	0.20	0.18	0.17	0.16	0.18	0.20	0.21	0.19
<b>Total (n)</b>	<b>168104</b>	<b>165358</b>	<b>166550</b>	<b>167589</b>	<b>168167</b>	<b>165942</b>	<b>165998</b>	<b>168974</b>	<b>171066</b>	<b>174802</b>	<b>174464</b>
Mean Dose (mSv)	0.34	0.32	0.31	0.34	0.31	0.25	0.24	0.23	0.23	0.25	0.26
Mean Non-Zero Dose (mSv)	1.44	1.40	1.41	1.46	1.39	1.13	1.12	1.12	1.06	1.21	1.27

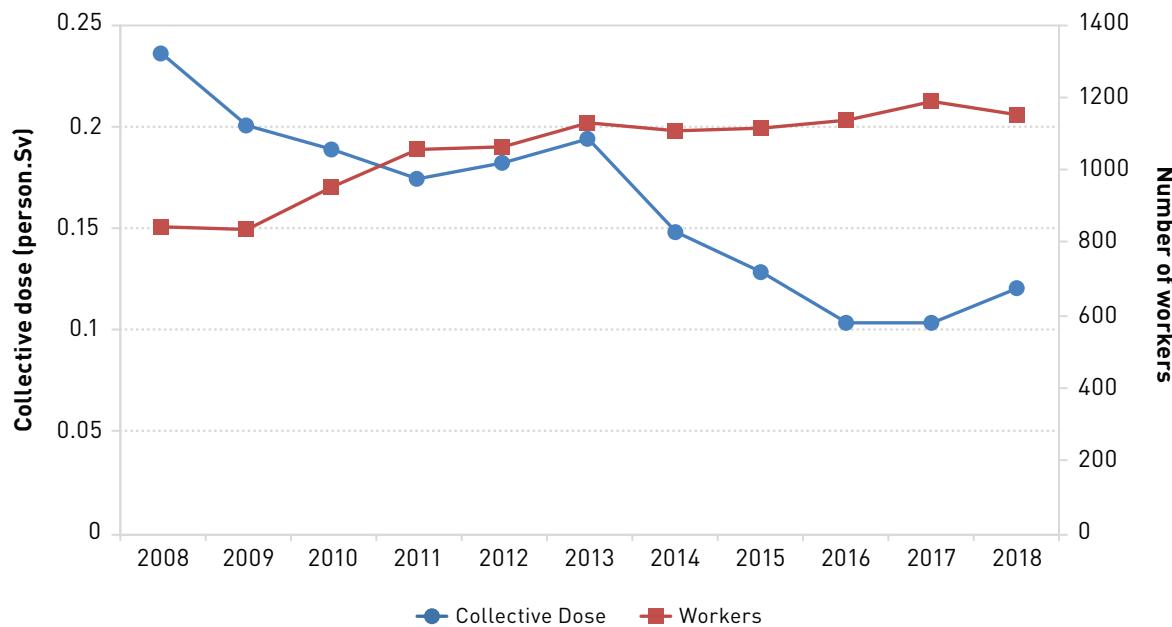
\* Individuals working in 2 (or more) different job categories are counted in each job category.

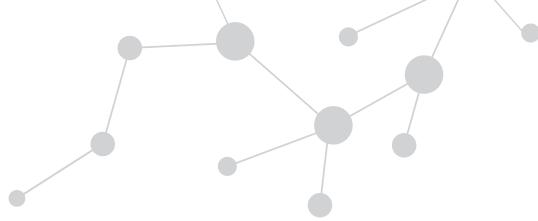
**Figure C.1:** Eleven-year trend; mean annual effective doses by job sector for all of Canada



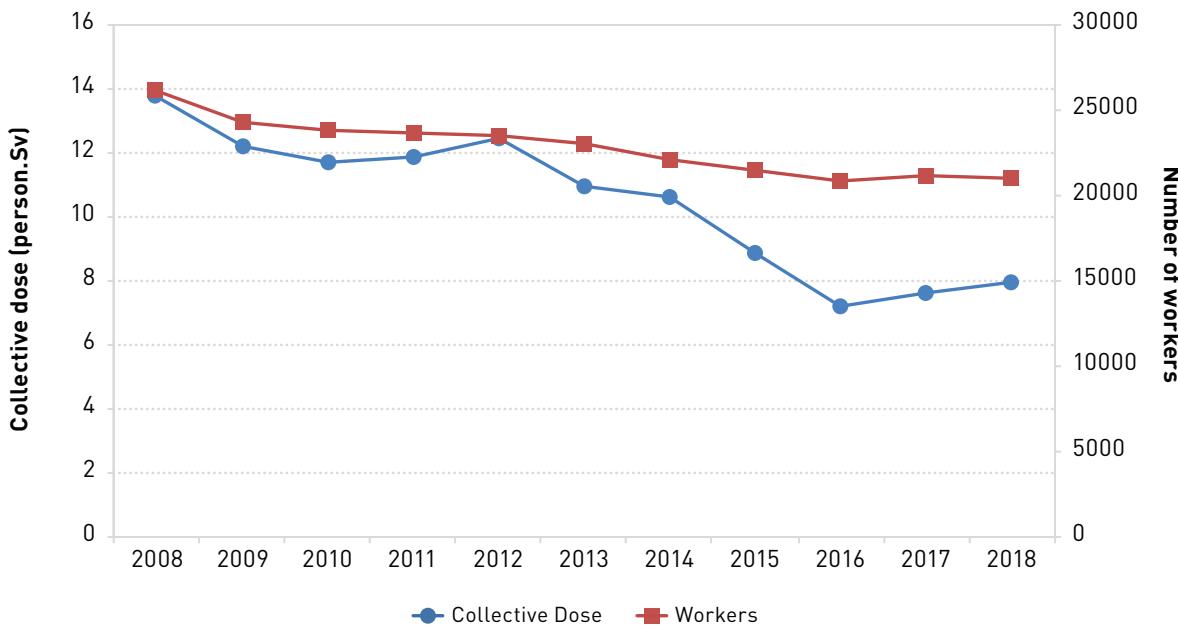
**Figure C.2:** Eleven-year trend of number of workers and collective effective doses by job sector for all of Canada

### a) Accelerator

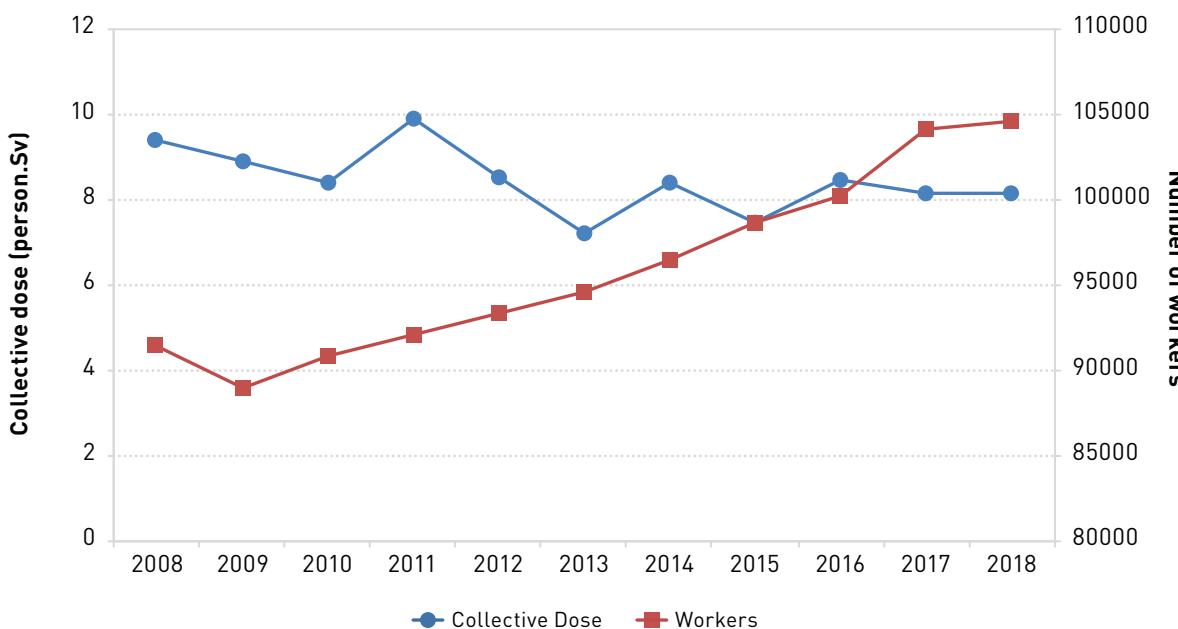




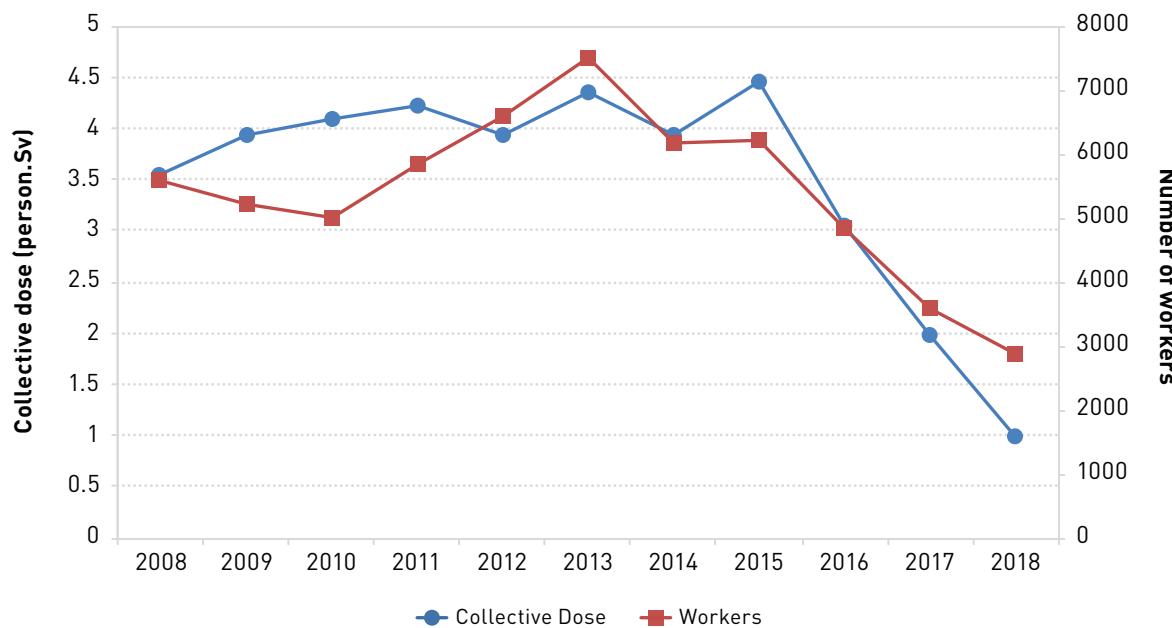
### b) Industry



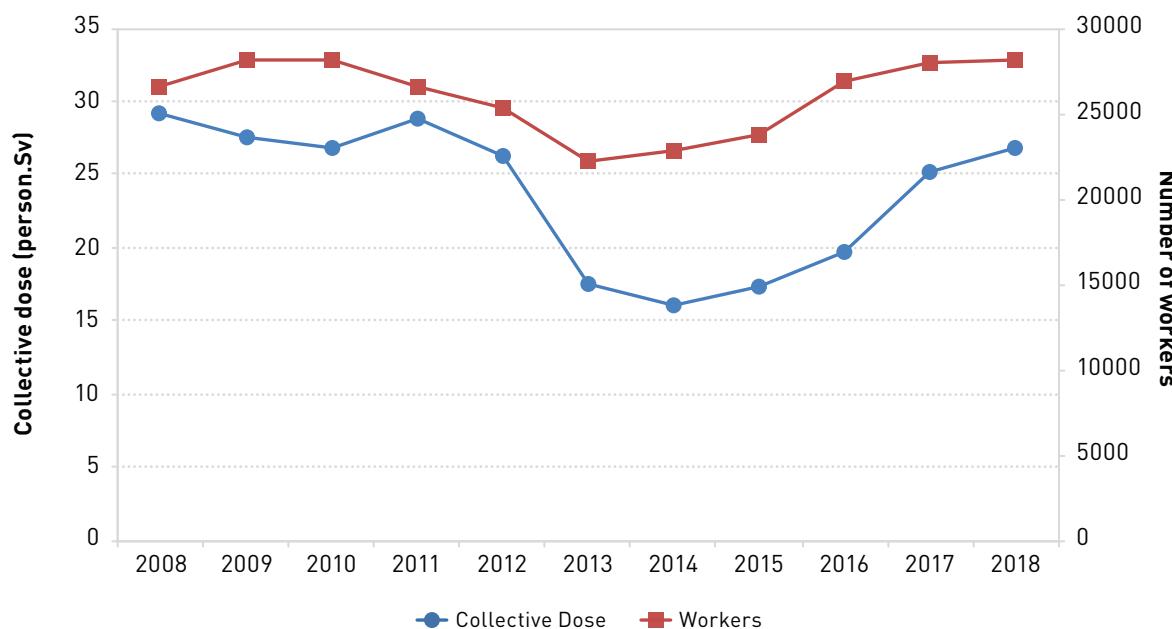
### c) Medical

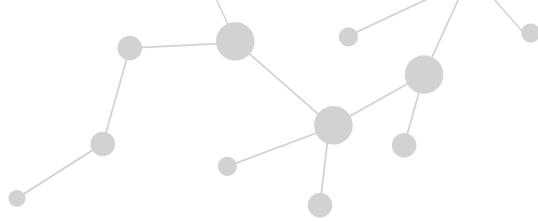


d) Mining

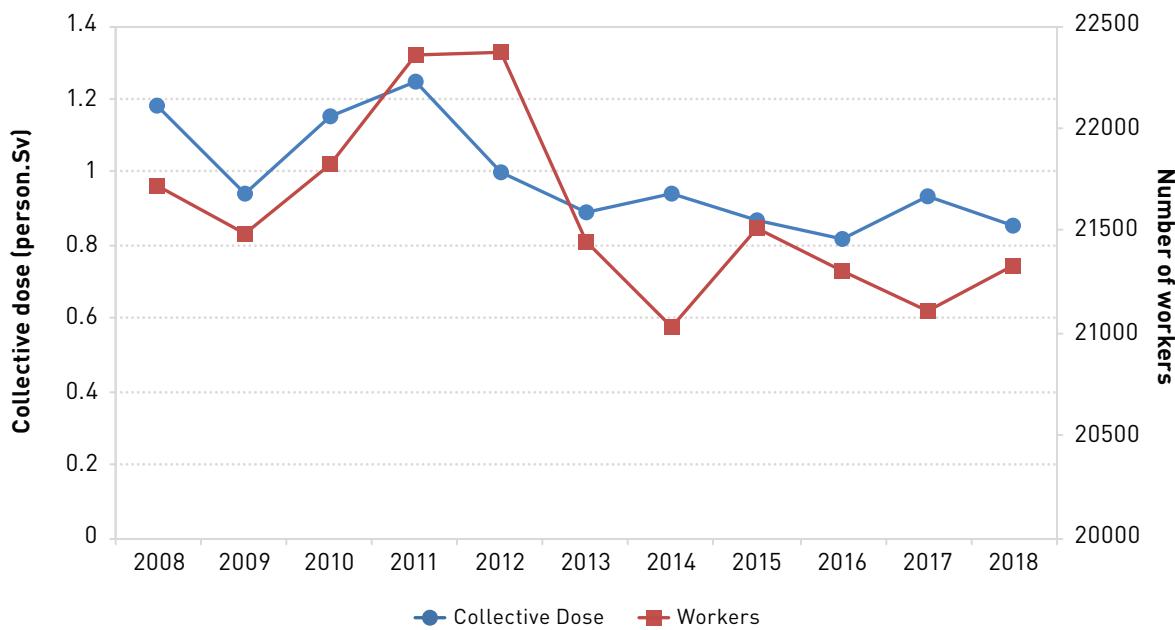


e) Nuclear





f) Shared



g) Total (all sectors combined)

