



The Canadian National Dose Registry and Its Contribution to Occupational Radiation Protection

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Prepared for the International Conference on Occupational Radiation Protection:
Enhancing the Protection of Workers – Gaps, Challenges and Developments



- National Dose Registry (NDR) Background information
- The history of the NDR
- Data Collection
- Snapshot of current NDR operations
- Discussion
- Conclusion



Background Information on National Dose Registry

Health Canada (HC) - Federal department responsible for helping Canadians maintain and improve their health

Radiation Protection Bureau (RPB) - Promotes and protects the health of Canadians by assessing and managing risks posed by radiation exposure in living, working and recreational environments

The Canadian NDR operates within the RPB to support the mandate of HC and Regulatory Authorities to protect workers exposed to occupational radiation

Key Functions

- Maintain individual and cumulative dose records for workers
- Provide dose histories to workers, employers for work planning, and to Workers Compensation Board(s) across Canada for compensation and litigation cases
- Assist Regulatory Authorities by notifying them of overexposures within their jurisdiction
- Contribute to health research and to the scientific knowledge of risks from occupational exposure to ionizing radiation



Historical Highlights of the National Dose Registry

- **1951** - HC's National Dosimetry Service (NDS) began to monitor workers exposed to ionizing radiation. At that time there were two other organisations performing dosimetry services in Canada.
- **mid-1970s** – NDR is created within NDS and begins to collect dose records in a database, from NDS and other dosimetry providers
- **mid-1980s** - all existing Canadian nuclear power stations, Atomic Energy Canada Limited (AECL), and Canadian uranium mines were submitting records to the NDR
- **mid-1990s** - the first commercial DSP (Landauer) began submitting records to the NDR
- **2000** – the *Radiation Protection Regulations* came into effect and submitting dose records to the NDR became a requirement for licensed DSPs
- **2009** - the NDR dissociated from the NDS



The NDR operates independently from DSPs and Authorities who regulate occupational exposure to ionizing radiation

In Canada occupational exposure to ionizing radiation is regulated

- at the federal level for Nuclear Energy Workers (NEWs) or non-NEWs when the employer is the federal government
- by the provinces and territories (13) in all other cases

To support harmonization of practices for dose reporting and management of different exposure limits, the NDR is

- a regular participant in the Federal Provincial Territorial Radiation Protection Committee (FPTRPC), which includes regulatory authorities from all jurisdictions
- an active member of the associated Radiation Dosimetry Working Group



Data Collection (continued)

Canadian Occupational Radiation Exposure – Dose information reporting to NDR

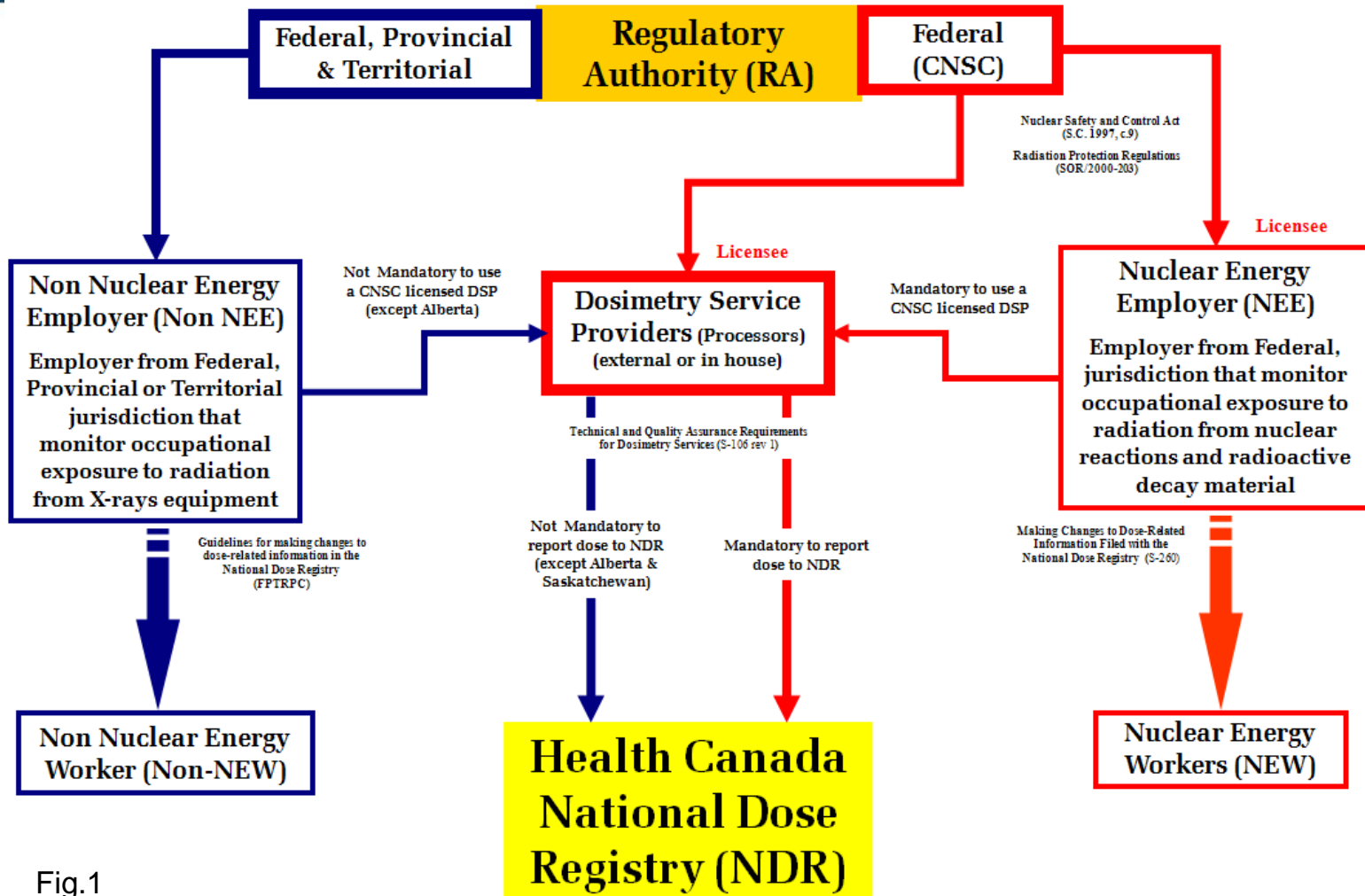
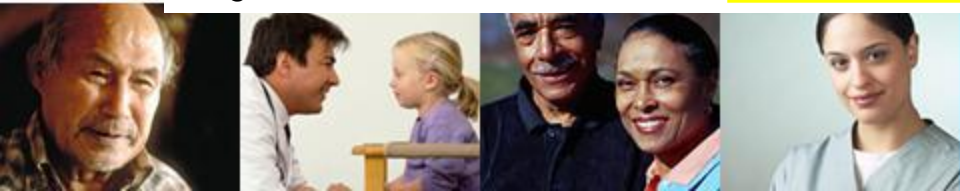


Fig.1



Data Collection (continued)

Legislation requires DSPs to submit data to NDR in a compatible format

For quality assurance, the NDR facilitates the incorporation of records in the database by providing the DSPs with

- documentation, including the Input File Specification that explains exactly how data should be submitted
- hands-on training to help reduce the number of rejects
- constant support while processing the records

Dose records in the NDR are associated with a worker according to a unique employee profile, including the Social Insurance Number (a unique nine digit Code required to work in Canada), name, gender, date of birth and birth place

Dose Records Information includes type of dose, dose quantities, dosimeter number, monitoring period, job class, and process date, among other details



Job classifications in the NDR

Table of Job Classification Codes

Code	Information
1	Administrator
2	Office Staff
3	Safety Officer
4	Other (Administration)
10	Chiropractor
11	Dentist
12	Gynecologist
13	Laboratory Technician (Medical)
14	Medical Physicist
15	Nurse
16	Physician
17	Radiological Technologist
18	Radiation Therapist/Nurse
19	Radiologist (Diagnostic)
20	Radiologist (Therapeutic)
21	Veterinarian
22	Ward Air/Orderly
23	Other (Medical)
24	Nuclear Medicine Technologist
25	Dental Hygienist
26	Dental Assistant
27	Dental Therapist/Nurse
28	Speech-language Pathologist
40	Dial Painter
41	Instructor (Non-Medical)
42	Instrument Technician
43	Laboratory Technician (Industrial)
44	Well Logger
45	Industrial Radiographer
46	Scientist/Engineer (Field)
47	Scientist/Engineer (Laboratory)
48	Other (Industrial)
49	Fuel Processor
50	Fuel Processor - Production
51	Fuel Processor - Maintenance
52	Fuel Processor - Technical support
53	Fuel Processor - Administration
70	Janitorial Staff
71	Salesperson
72	Student
73	Visitor
74	Other (Miscellaneous)
75	Inspector

76	Podiatrist
101	Chiropractor Assistant
211	Veterinary Technician
300	Tradesman
310	Ground Transportation
320	Security
410	Aircrew
420	Astronaut
500	Reactor - Scientific/Professional
510	Reactor - Administration
520	Reactor - Health Physics
530	Reactor - Chemical and Radiation Control
540	Reactor - Electrical Maintenance
543	Reactor - Industrial Radiographer
550	Reactor - Mechanical Maintenance
560	Reactor - General Maintenance
570	Reactor - Fuel Handling
580	Reactor - Operations
590	Reactor - Control Technicians
591	Reactor - Contractor
596	Reactor - Summer Student
597	Reactor - Training
598	Reactor - Construction
599	Reactor - Visitor
601	Uranium Mine Underground Personnel
602	Uranium Mine Surface Personnel
603	Uranium Mine Visitors
604	Uranium Mine Office Staff
610	Uranium Mine Underground Miner
613	Uranium Mine Nurses
620	Uranium Mine Support Workers
630	Uranium Mine Underground Maintenance
640	Uranium Mine Electrician
650	Uranium Mine Surface Miner
660	Uranium Mine Surface Support Workers
670	Uranium Mine Surface Maintenance
680	Uranium Mine Mill Maintenance
690	Uranium Mine Mill Workers
700	Part. Accel. - Scientific/Professional
701	Part. Accel. - Administration
702	Part. Accel. - Health Physics
703	Part. Accel. - Chemical & Radiation Control
704	Part. Accel. - Electrical Maintenance
705	Part. Accel. - Mechanical Maintenance
706	Part. Accel. - General Maintenance



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Table of Job Classification Codes (continued)

707	Part. Accel. - Operations
708	Part. Accel. - Control Technicians
709	Part. Accel. - Electrical Technicians
710	Part. Accel. - Mechanical Technicians
711	Part. Accel. - Designers
712	Part. Accel. - Machinists
713	Part. Accel. - Contractor
714	Part. Accel. - Student
715	Part. Accel. - Training
716	Part. Accel. - Construction
717	Part. Accel. - Visitor
801	Non Uranium Mine Underground Personnel
802	Non Uranium Mine Surface Personnel

803	Non Uranium Mine Visitors
804	Non Uranium Mine Office Staff
810	Non Uranium Mine Underground Miner
815	Non Uranium Mine Nurses
820	Non Uranium Mine Support Workers
830	Non Uranium Mine Underground Maintenance
840	Non Uranium Mine Electrician
850	Non Uranium Mine Surface Miner
860	Non Uranium Mine Surface Support Workers
870	Non Uranium Mine Surface Maintenance
880	Non Uranium Mine Mill Maintenance
890	Non Uranium Mine Mill Workers

NDR has a total of 112 job classes in 21 job categories as presented in Fig.2

Job class is a particularly important field for extracting and compiling data for research

Podiatrist is the latest job class created in the registry, in 2014.



Snapshot of current NDR operations

The NDR contains information on 869,735 workers and 35,232 employers, with approximately 160,000 workers monitored in 2013

Each year, 1.25 million dose records are processed and incorporated into the database via an average of 900 batches per year

Close to 7,000 Dose History Summaries are processed annually by NDR

Every time a new record is entered for an individual worker, their accumulated dose for the current regulatory period is calculated and compared against the appropriate limit

- if it exceeds the limit, a High Exposure Notification is automatically generated and immediately transmitted to the appropriate Regulatory Authority for follow-up
- on average fewer than 20 High Exposure Notifications are triggered every year



Snapshot of current NDR operations (continued)

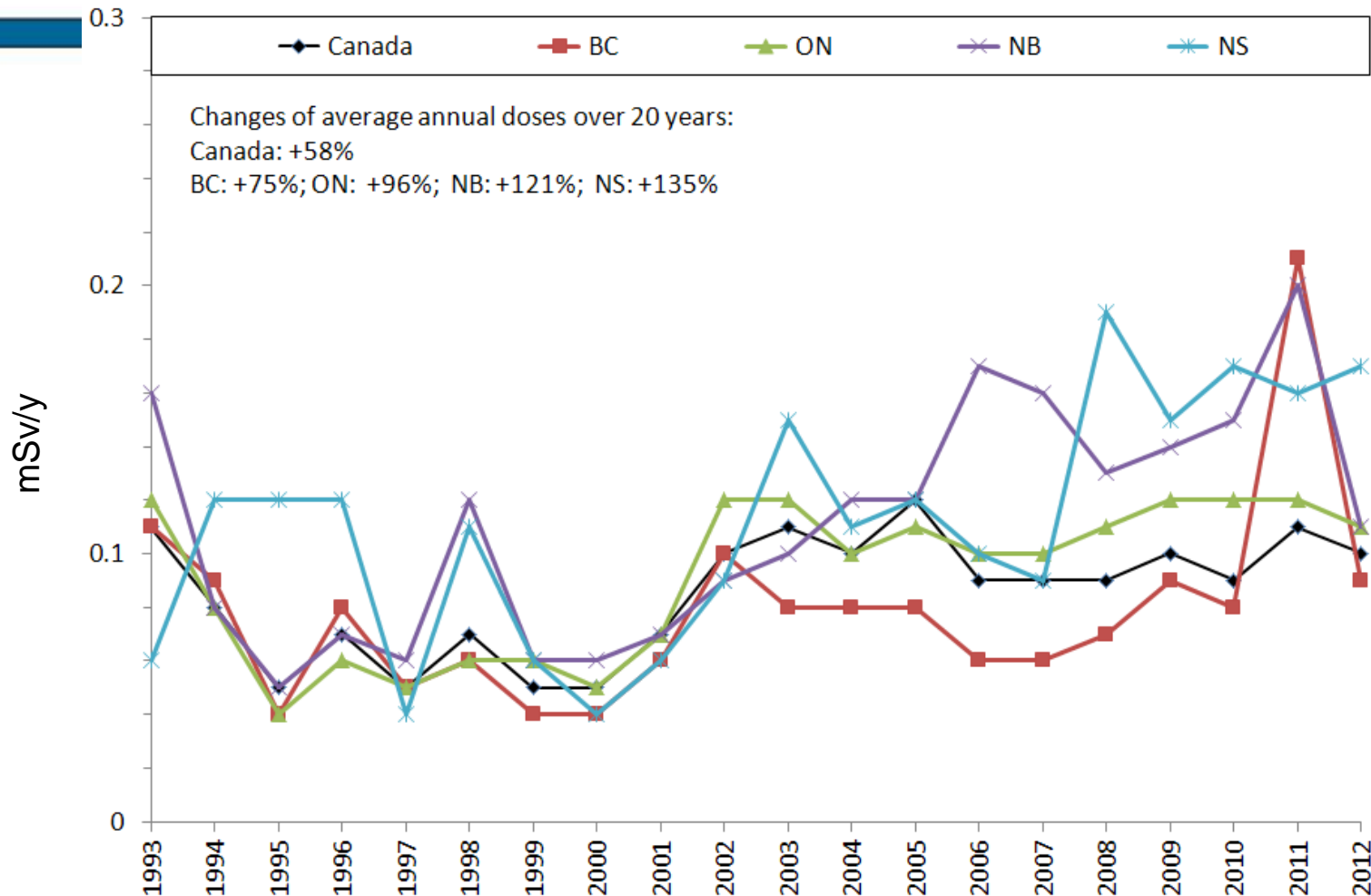
NDR data is also used for research by internal and external clients

The database structure and required fields enables researchers to quickly compile data sets to evaluate dose trends over a variety of parameters, including specified workplace(s) and/or job categories

For example, the analysis of average annual doses among Canadian radiological technologists for the past two decades, based on data from the National Dose Registry of Canada, is shown on the next slide



Snapshot of current NDR operations (continued)



Average annual effective dose for job class: radiological technologist



Current situation

- Over past years HC has modernized the NDR in order to adopt new technologies and remain current with legislative requirements and client demands
- NDR System Upgrade v 3.0 was released at the end of August 2014 and the registry is supporting the DSPs during transition
- Effort has gone into ensuring that personal information in the NDR is protected and secure, and that protocols conform to relevant Canadian privacy legislation
- Work is underway to develop and implement secure mechanisms to allow access to DSPs (to upload data) and Regulatory Authorities (to query the database)
- Agreements have been formalized and safeguards put in place to ensure that disclosure of information is in conformance with privacy regulations
- NDR recently leveraged the FPTRPC to successfully negotiate a protocol for submitting dose change requests that has been adopted by all jurisdictions



Challenges

- Access to the database is restricted to NDR staff due to constraints imposed by privacy requirements
 - NDR staff are required to monitor and upload batches on behalf of DSPs, and to provide reports back to DSPs
- Requirements for dose monitoring are more prescriptive for Nuclear Energy Workers (NEW) who could receive an effective dose greater than 5 mSv/year than for other workers
- Historical records, where key information is missing, can be difficult to import into the database
- Collecting data and reporting on High Exposure Notifications, given that practices for reporting doses and maximum exposure limits can differ between jurisdictions



Plans for the future

- Develop protocols for registering new types of radiation exposures, including doses received by Canadians outside of Canada and doses received by emergency workers responding during a nuclear emergency
- Investigate if low-or zero-doses are under-reported in some job classes
- Improve the ability to address research questions by identifying and updating the registry with emerging job titles/classes, new occupations and new applications for radioactive materials in the workplace
- Modernise NDR reporting to the public (annual or bi-annual reports)



The Canadian National Dose Registry operates within the Radiation Protection Bureau to support Health Canada and the Regulatory Authorities in their mandate to protect workers exposed to occupational radiation

The registry continues to evolve in response to technological, legislative and operational challenges, and to play an essential role in protecting the health and safety of Canadian workers

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The National Dose Registry (NDR) contains the dose records of individuals who are monitored for occupational exposures to ionizing radiation. The NDR started collecting data from 1951 and now has records for over half a million workers, including well over