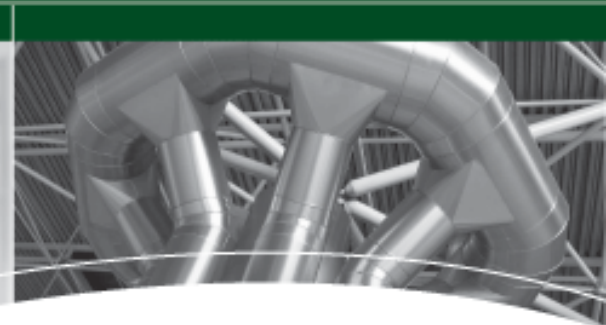


# Workplace Safety and Prevention Services

October 3, 2014



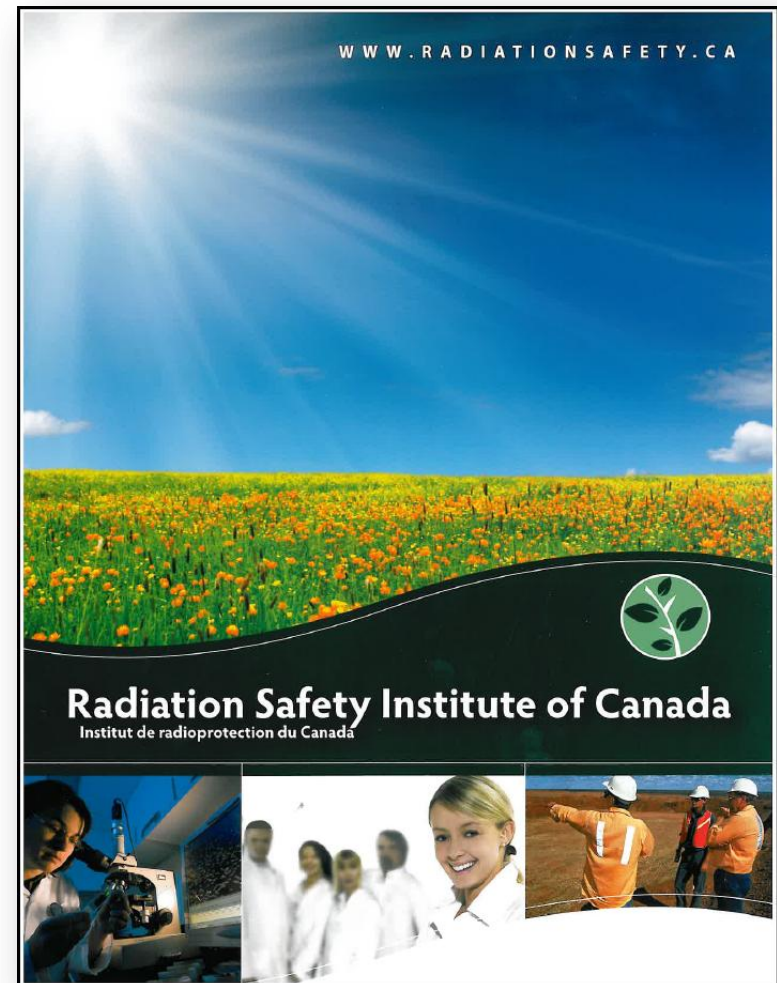
**Radiation Safety  
Institute of Canada**  
Institut de radioprotection du Canada



**Good Science in Plain Language®**

- RSIC and WSPS signed an MoU in December 2013 and a formal partnership in April 2014, to foster
  - Co-operation
  - Knowledge sharing
  - Revenue growth
- Together, to make Ontario a safer place for all workers and employers

- Radiation Safety Institute of Canada
  - Independent
  - National
  - Not-for-profit
  - Sole concern is **radiation safety**
  - “Good Science in Plain Language”®



- Radiation Safety Institute of Canada
  - 1980 founded as national, independent, not-for-profit corporation
    - Founders troubled by suffering of Elliot Lake miners who developed lung cancer from high radon exposure underground – resolved never again in Canada
  - 1986 approved as registered charity
  - Motto: Good Science in Plain Language®
- IAEA:
  - The RSIC is the only independent institute of its kind in any country



Mining Monument and Memorial Park  
Elliot Lake, Ontario

- RSIC will complement the extensive expertise that WSPS has in occupational health and safety, and provide, where needed, specialized training and consulting services in radiation and x-ray safety, to WSPS clients that work with radiation sources

## Good Science in Plain Language®



**Radiation Safety  
Institute of Canada**  
Institut de radioprotection du Canada



### Education

- Professional Certificate Courses in Radiation Safety
- Worker and Awareness Education
- Tailor-made Courses



### Consulting

- Radiation Safety Workplace Audits
- CNSC Licence Support
- EMF Surveys and X-Ray Equipment Inspections



### Laboratory

- Radon testing
- Personal Alpha Dosimetry
- Instrument Calibration
- Leak Testing



### Awareness

- Free Information Service in Radiation Safety
- Public Education
- Public Policy

### Free of charge information service in radiation safety:

Toll free line: 1-800-263-5803

Website: [www.radiationsafety.ca](http://www.radiationsafety.ca)

Email: [info@radiationsafety.ca](mailto:info@radiationsafety.ca)

- Not just the Nuclear Industry!
- Nearly everywhere in modern workplaces
  - Almost every industry
  - Radiation is used by or encountered by thousands of Canadians at work every day
  - Man-made radiation
  - Naturally Occurring Radioactive Material (NORM)

- Radioactive sources and “Nuclear” Energy
  - Federal jurisdiction
  - Governed by the Canadian Nuclear Safety Commission (CNSC)
- X-Ray and NORM
  - Provincial jurisdiction
  - Exceptions
    - Federal jurisdiction applies to: Uranium mines, high-power x-ray, x-rays in federally regulated workplaces such as Airport security



- Workplaces with X-ray or Nuclear sources must have
  - Properly trained staff
  - Established specialized procedures
- RSIC provides
  - X-Ray and Radiation Safety Training
  - Radiation Safety Consulting Services
    - Development of radiation safety manuals
    - Development of licence applications
    - Support X-ray machine surveys and registration with MOL
    - EMF workplace surveys

- Manufacturing Operations
  - X-Ray Systems
    - Quality control, Automatic fill controls, non-destructive testing of manufactured parts (e.g., cast and machined automotive parts)
  - Nuclear Gauges
    - Material density measurements, Automatic fill controls
  - Lasers
    - Process Control, High Tech manufacturing
  - Electron Beam Welding
  - Used in Ontario by such companies as:
    - General Motors of Canada, Honeywell Aerospace, Honda of Canada, Blackberry Canada, Bombardier Inc., etc

- Industrial Construction
  - X-ray Systems
    - Non-destructive testing
  - Nuclear Gauges
    - Density measurements
  - Used in Ontario by such companies as:
    - Babcock & Wilcox Canada Ltd., Canadian Institute for NDE, Graff Company Ltd, etc.

- Agriculture & Food Manufacturing
  - Radiation source
    - Sterilization (e.g., agricultural seeds for storage)
  - X-ray Systems
    - Test packing materials
    - Pre-filled containers quality control
    - Food finished product quality control
    - Auto-check levels during bottle filling
  - Nuclear Gauges
    - Auto-check levels during bottle filling
  - Used in Ontario by such companies as:
    - Kellogg Canada Inc., Maple Leaf Foods Inc., Mars Canada Inc., Parmalat, Coca Cola Bottling Company, etc.

- Pharmaceutical Manufacturing and Universities
  - Radiation sources
    - Research and development
    - Education and training
  - Used in Ontario by such companies as:
    - Apotex Inc., GE Healthcare, University of Toronto, University of Ottawa, etc.

- Service Sector – Companies with Security
  - X-ray systems
    - Baggage screening
  - Used in Ontario by such companies as:
    - CATSA, correction facilities, Royal Canadian Mint, etc.

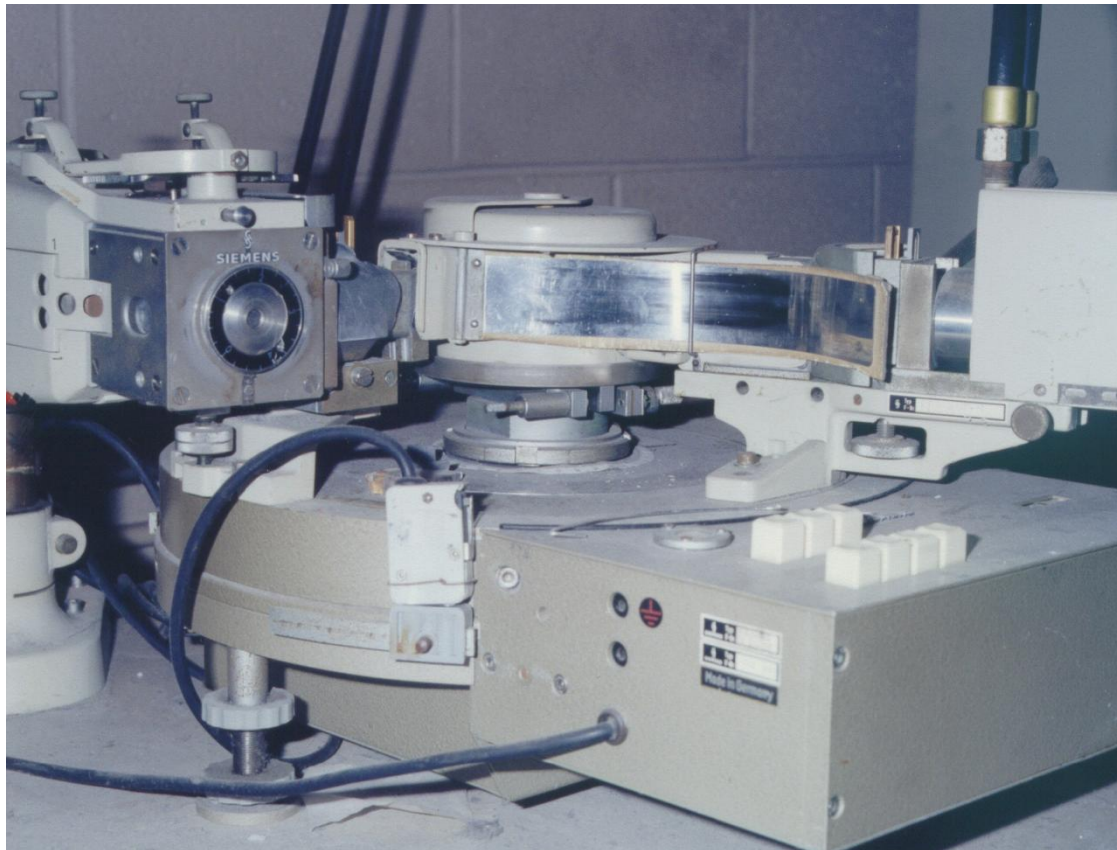
- Healthcare and Dental Operations
  - X-ray Facilities
    - Diagnostic purposes, treatment processes
  - Radioactive Sources
    - Diagnostic Nuclear Medicine procedures
    - Treatment methods (e.g., cancer treatment)
  - Used in Ontario by such companies as:
    - Most dental offices, all major hospitals e.g., Princess Margaret, the Ottawa Hospital, Hospital for Sick Children

## 1. Machines that emit radiation

- X-ray machines, lasers, etc.
- Found in diverse industries
  - Services sectors
  - Manufacturing
  - Educational Institutions
  - Healthcare
- Primarily the regulatory responsibility of provincial government



- X-Ray Diffraction Machine



Courtesy Department of Metallurgy and Materials Science, University of Toronto

- Veterinary and Dental X-Ray Equipment



Courtesy of Innovet



- Baggage X-Ray Systems, cabinet X-ray systems



- Cabinet CT system



Courtesy of Direct Industry

- Laser Engraving System



Courtesy of rmlaseruk.com

- Laser Alignment System
- Bar Code Scanner

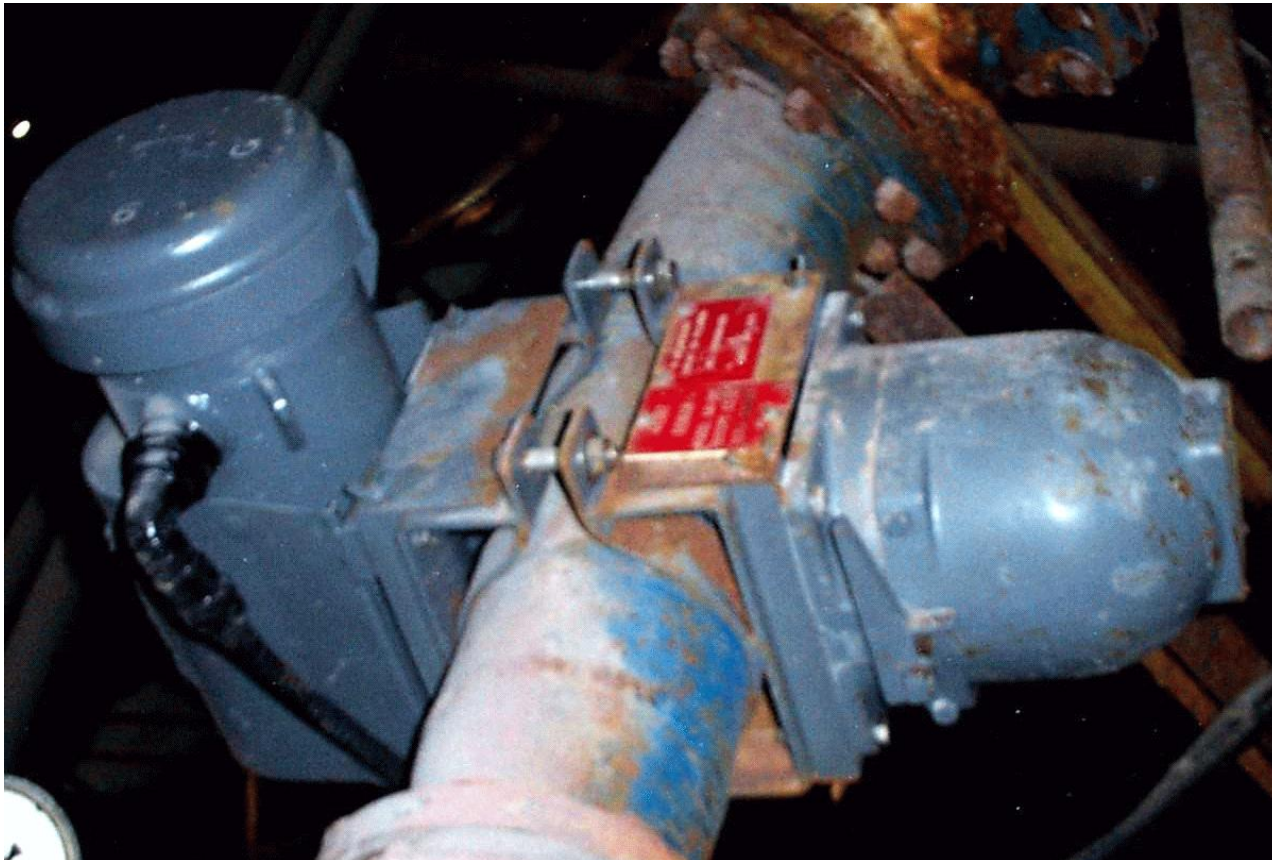


Courtesy of Direct Industry

## 2. Radioactive Materials

- Found in diverse industries
  - Manufacturing
  - Education
  - Healthcare
  - Veterinary
- Licensed by Canadian Nuclear Safety Commission (CNSC) – federal regulations
- Can be solids, liquids, and gases

- Fixed Nuclear (Density) Gauge



Courtesy of Mosaic



- Fixed Nuclear (Density) Gauge



Courtesy of Mosaic

- Gamma Exposure Device



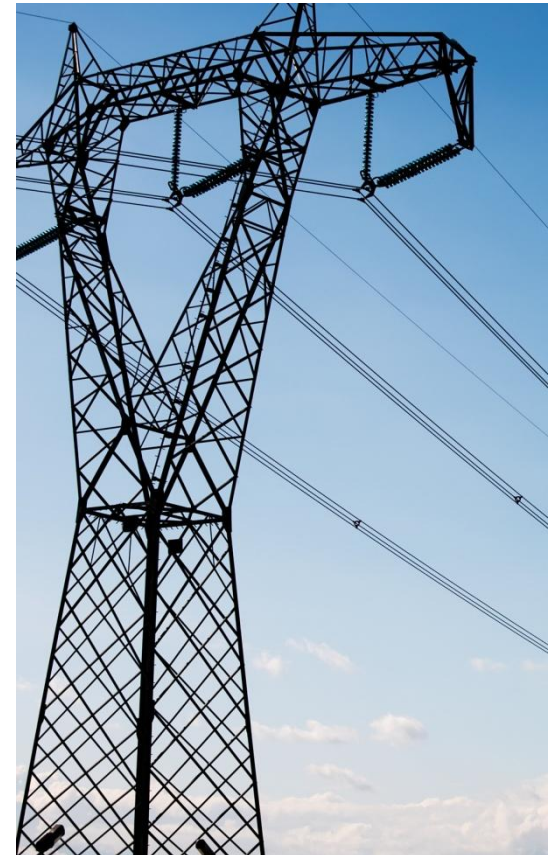
- Typical Radiation Warning Symbol / Sign



## 3. Electromagnetic Fields (EMF)

- Exposure to non-ionizing electrical fields due to proximity to electrical equipment, transformers, and power lines

- Power lines, electrical equipment



## 4. Radiation From the Environment

- Enclosed and confined spaces
  - Radon and thoron gasses from soil accumulate
  - Warehouses
  - Underground vaults and tunnels
  - Underground mines
- Airline travel
  - Cosmic radiation from space to airline crew and frequent flyers
- Outdoors
  - Solar radiation

## 5. Naturally Occurring Radioactive Material (NORM)

- Industry can move the material to the worker's environment, and can concentrate it beyond natural levels
- Industry
  - Agriculture (fertilizer industry)
  - Oil and gas
  - Conventional mining

## 6. Radioactive wastes from Federally Licensed Radioactive Materials

- Universities and colleges
- Hospitals
- Pharmaceutical industry and other health-related services
- Nuclear Industry
- ... and more



- Dedicated Radioactive Waste Disposal



- So what can the Radiation Safety Institute of Canada do to help companies in these industries?
  - Independent Knowledge Base in Radiation Safety
  - Education Services
    - Certificate courses, Awareness courses, Specialized client-specific or population-specific courses
  - Consulting Services
  - Workplace Enquiries and Information Services
  - Mediator in radiation-safety related disputes
  - Assist in raising radon awareness

- Professional Certificate Courses
  - Designed to meet regulatory training requirements (e.g., Canadian Nuclear Safety Commission (CNSC))
  - Approved for professional registration exam eligibility by Canadian Radiation Protection Association (CRPA)
- Courses:
  - Radiation Safety Officer 1 (initial, 5 day)
  - Radiation Safety Officer 2 (refresher, 2 day)
  - X-Ray Safety Officer (initial, 3 day)
  - Root Cause Analysis (5 days)

- Radiation Safety Awareness Education
  - For all employees involved or near radiation
  - Few hours
  - Basic understanding of issues surrounding the use of job-related radiation sources
- Courses
  - Radiation Safety Awareness
  - X-Ray Safety Awareness
  - ALARA (As Low As Reasonably Achievable)

- Employee Radiation Safety Training
  - Half to full day
  - Provide employees with the fundamental knowledge required to work safely in vicinity of radiation sources (open and closed) or X-Rays
- Courses
  - All about Radiation Safety
  - All About X-Ray Safety
  - Radiation Safety for Nuclear Gauge Users

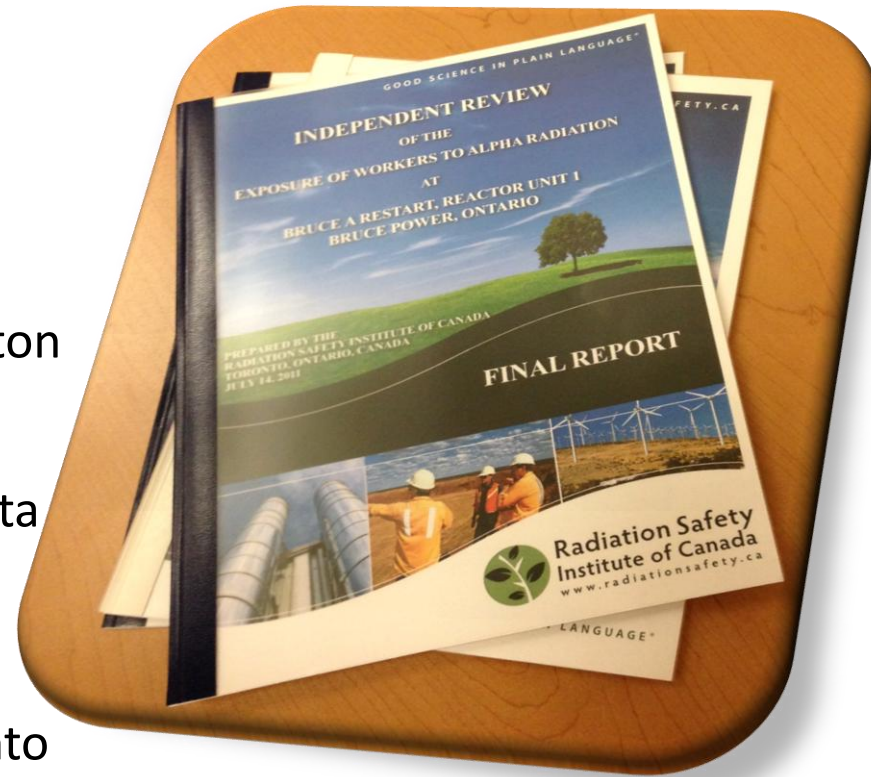
- E-Learning
    - Various basic courses on radiation safety
      - Employee Radiation Safety
      - X-Ray Safety for Baggage Systems (federal & provincial)
      - X-Ray Safety for Veterinary Systems (various provinces)
      - X-Ray Safety for Non-Medical Systems
      - Laser Safety (coming soon)
- RSIC E-Learning Portal: <http://learning.radiationsafety.ca/>
- Tailor Made
    - Courses can be created for clients or populations of concern, as required

	Nuclear Substances Safety		X-Ray Safety	
Safety Officer	Radiation Safety Officer-1	5 day	X-Ray Safety Officer	3 day
	Radiation Safety Officer-2	2 day		
Radiation Worker	All About Radiation Safety	1 day	All About X-Ray Safety	1 day
	Nuclear Gauge Safety	1 day	X-Ray Awareness for Baggage X-Rays	½ day
Other Staff / Low Hazard Worker	Radiation Awareness	½ day	X-Ray Awareness	½ day
			X-Ray Awareness for Veterinary Staff	½ day
Management	ALARA (As Low As Reasonably Achievable)	1 day		
Supervisor			X-Ray Safety for Baggage X-Rays	1 day

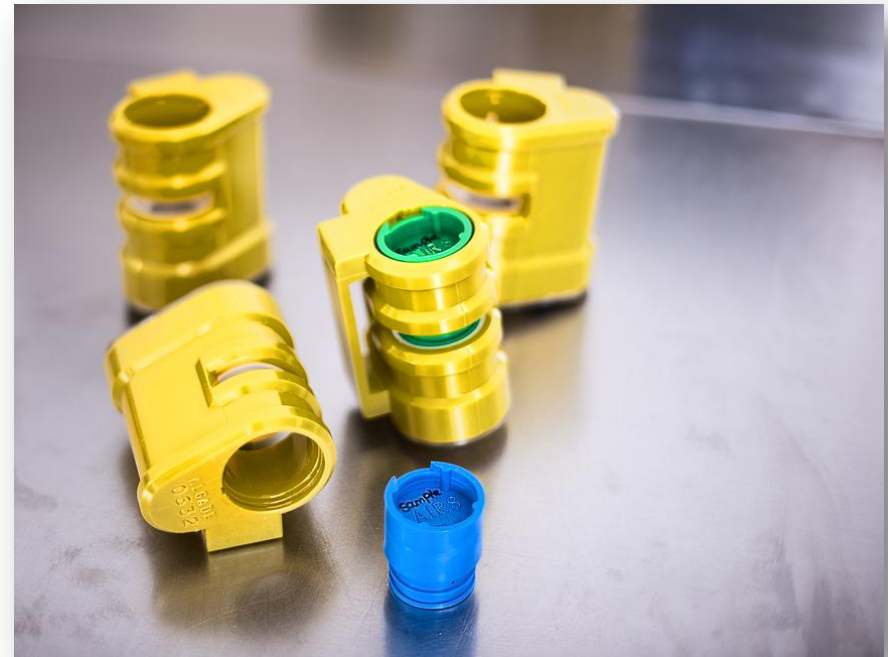
- Consulting
  - EMF Surveys
  - Radon Surveys
  - Radiation Protection Program Documentation
    - Radiation Safety Manuals
    - CNSC Licence Applications
  - Radiation Protection Program Reviews and Audits
- Mediation
  - Radiation-safety related workplace disputes



- Independent Reviews
  - Environmental
    - Bancroft, Port Hope
  - Workplace
    - Nuclear Power Plants
      - Bruce, Pickering, Darlington
    - Hospitals
      - Regina Qu'Appelle, Alberta Health Services
    - University Laboratories
      - Guelph, Memorial, Toronto



- Personal Alpha Dosimeters
  - Measure radon exposure in mines
  - Portable
  - Lightweight
  - Measures Individual Exposure
    - Radon Progeny
    - Thoron Progeny
    - LLRD



- Leak Testing of Sealed Sources
- Radiation Detection Instrument Calibration
- Home Radon Testing
  
- Coming soon: Radon Chamber

***“Good science in plain language”®***

Radiation Safety Institute of Canada