Canadian Nuclear Safety Commission | Commission canadienne de sûreté nucléaire

CMD 20-H2.1A

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Supplementary Information

Renseignements supplémentaires

Presentation from BWXT Nuclear Energy Canada Inc.

Présentation de BWXT Nuclear Energy Canada Inc.

In the Matter of the

À l'égard de

BWXT Nuclear Energy Canada Inc., Toronto and Peterborough Facilities

BWXT Nuclear Energy Canada Inc., installations de Toronto et Peterborough

Application for the renewal of the licence for Toronto and Peterborough facilities

Demande de renouvellement du permis pour les installations de Toronto et Peterborough

Commission Public Hearing

Audience publique de la Commission

March 2 to 6, 2020

Du 2 au 6 mars 2020

Canada

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Nuclear Energy Canada Inc.

Licence Renewal Presentation

Renewal of Operating Licence FFOL-3620.01/2020

Presenter: John MacQuarrie, President, BWXT Nuclear Energy Canada Inc.

March 2, 2020 (Toronto) & March 4, 2020 (Peterborough)

BWX Technologies, Inc.

6,250
highly skilled employees

$1.8 billion USD
in 2018 revenues

12
major manufacturing facilities totaling 3.8 million square feet

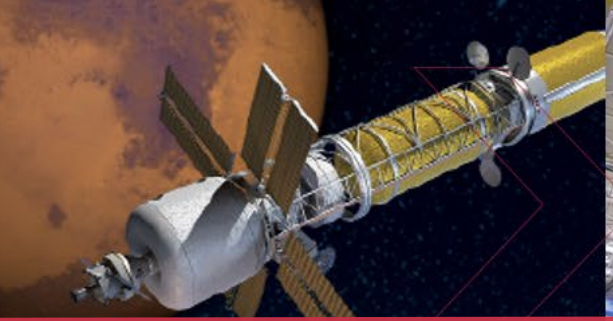
60+
years manufacturing naval nuclear components and reactors

300+
commercial nuclear steam generators manufactured

1.5 million+
Canada Deuterium Uranium (CANDU) fuel bundles provided

14
U.S. Department of Energy laboratories, environmental cleanup projects and NASA sites

8,000+
fuel elements delivered to U.S. national laboratories, universities and international customers



Divisions of BWX Technologies, Inc.

Three reporting segments help define who BWX Technologies, Inc. is as a company.

NUCLEAR OPERATIONS
- Naval nuclear reactors
- Research reactor fuel

NUCLEAR POWER
- Products and services for power plants
- Medical isotopes

NUCLEAR SERVICES
- Operation of government nuclear sites
- Advanced technology development



Nuclear Power Generation

BWXT Canada Ltd.

- Headquartered in Cambridge, Ontario
- Nuclear component design, engineering and manufacturing
- Field services

BWXT Nuclear Energy Canada Inc.

- Headquartered in Peterborough, Ontario
- Facilities in Peterborough, Toronto and Arnprior, Ontario
- Provides fuel, fuel handling systems and engineering services

BWXT ITG Canada, Inc.

- Headquartered in Ottawa, Ontario
- Medical isotope production – research, diagnostic and therapeutic uses
- Contract radiochemical manufacturing



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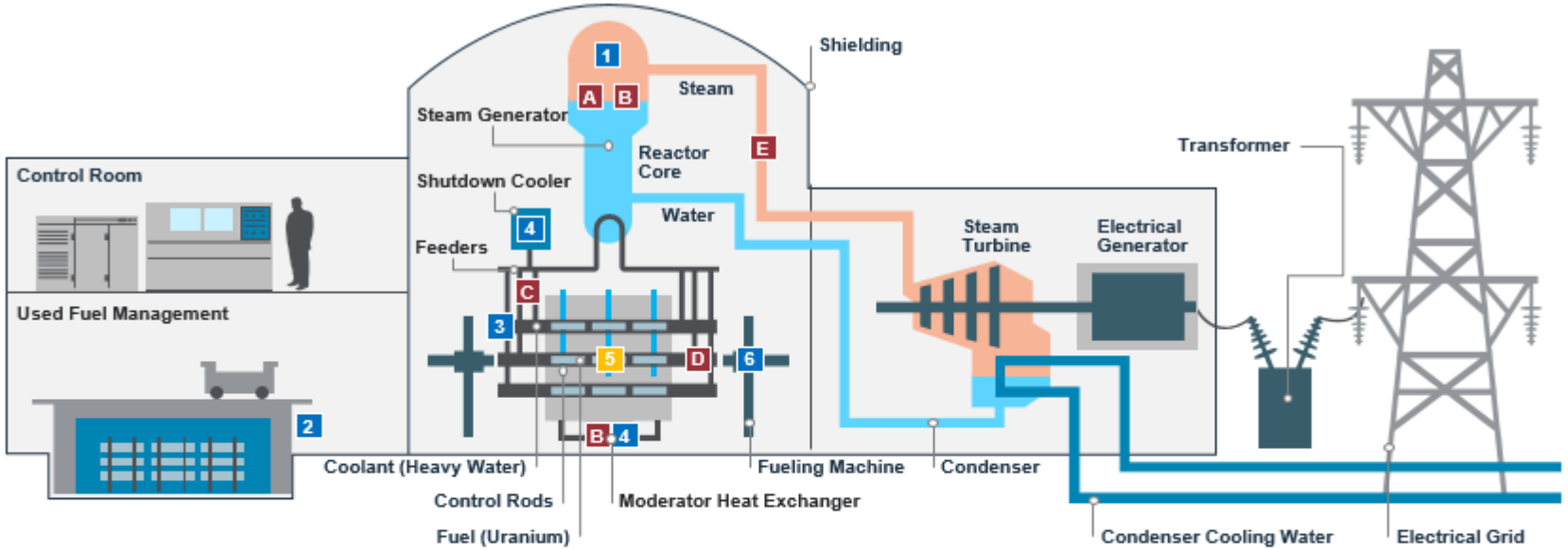
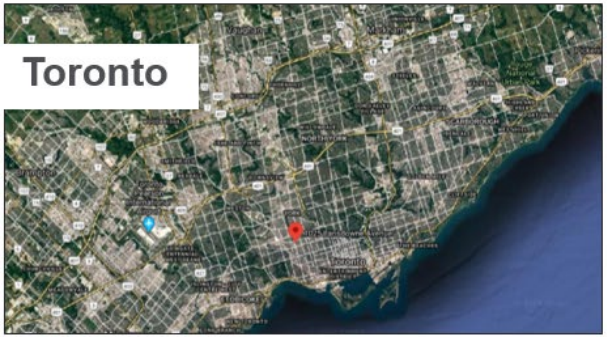
BWXT Products and Services for the CANDU Industry



Components & Equipment

Services

BWXT NEC – Toronto

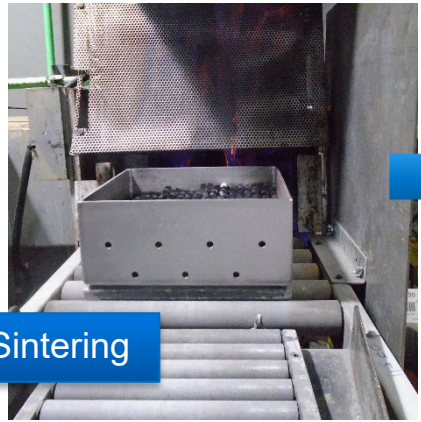


Toronto Pellet Production Process


Receiving


Blending

Compacting/Pressing


Sintering

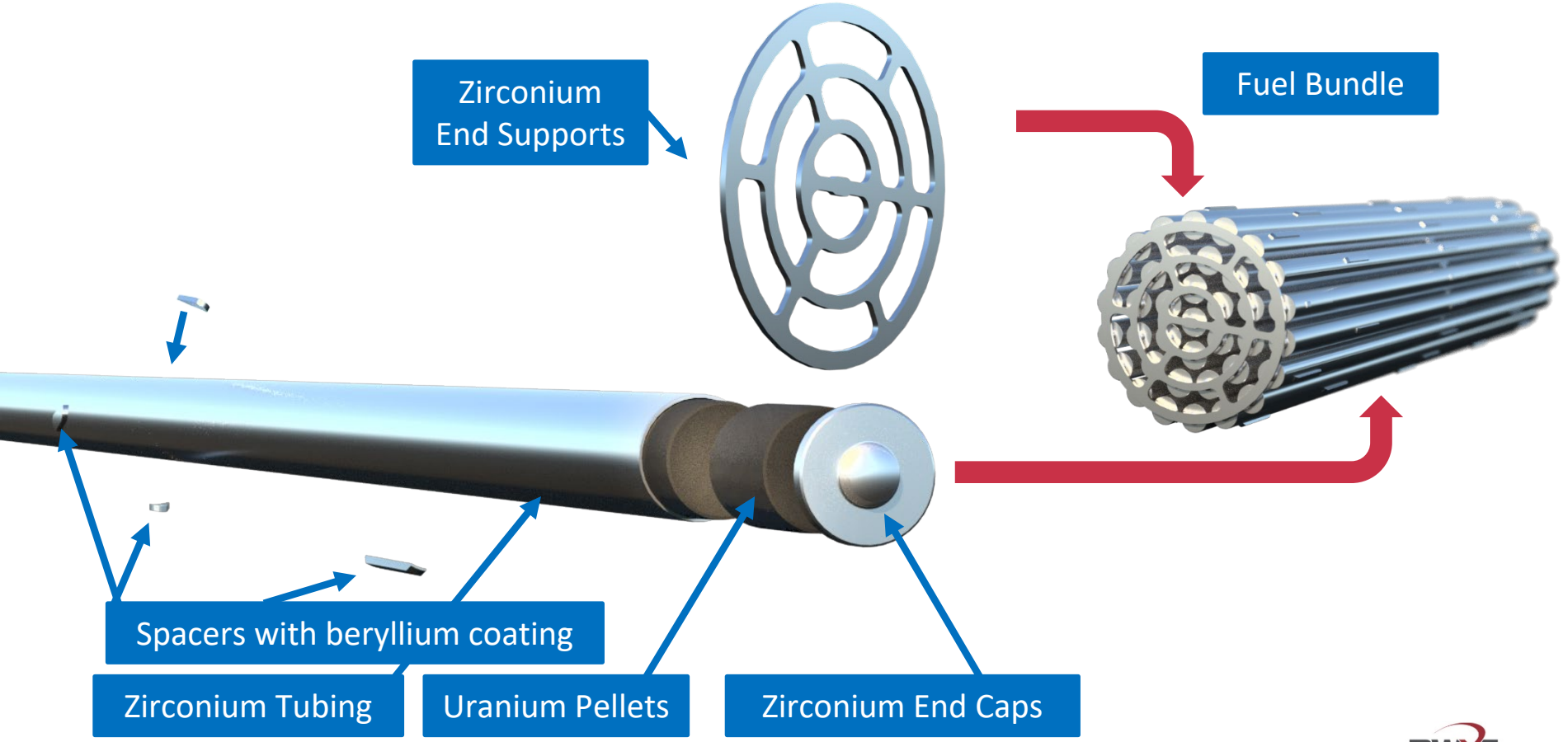

Grinding


Inspection


Shipping

BWXT NEC – Peterborough

Peterborough Fuel Bundle Production Process



Our Current Licence

- Granted Jan. 1, 2011 and expires Dec. 31, 2020

- Authorizes BWXT NEC to:
  - Produce natural and depleted uranium pellets in Toronto
  - Produce fuel bundles in Peterborough
  - Process up to 150 Mg of uranium at each facility in any calendar month
  - Possess up to 1500 Mg in Peterborough and 700 Mg in Toronto
  - Receive, repair, modify and return contaminated equipment in Peterborough

Our Licence Renewal Application

- Submitted application seeking a 10-year licence renewal in Nov. 2018
- No change to possession or processing limits
- Request for 10-year licence
- Request for authorization to produce pellets in Peterborough

Our Licence Renewal Application

Why is a 10-year licence important?

- Provides longer-term regulatory certainty
  - Significant investments have longer-term payback
  - Stabilizes our operations and provides comfort to customers

Why is authorization to produce fuel pellets in Peterborough important?

- To allow us to adapt to changes in our business
- Could be important to maintain viability

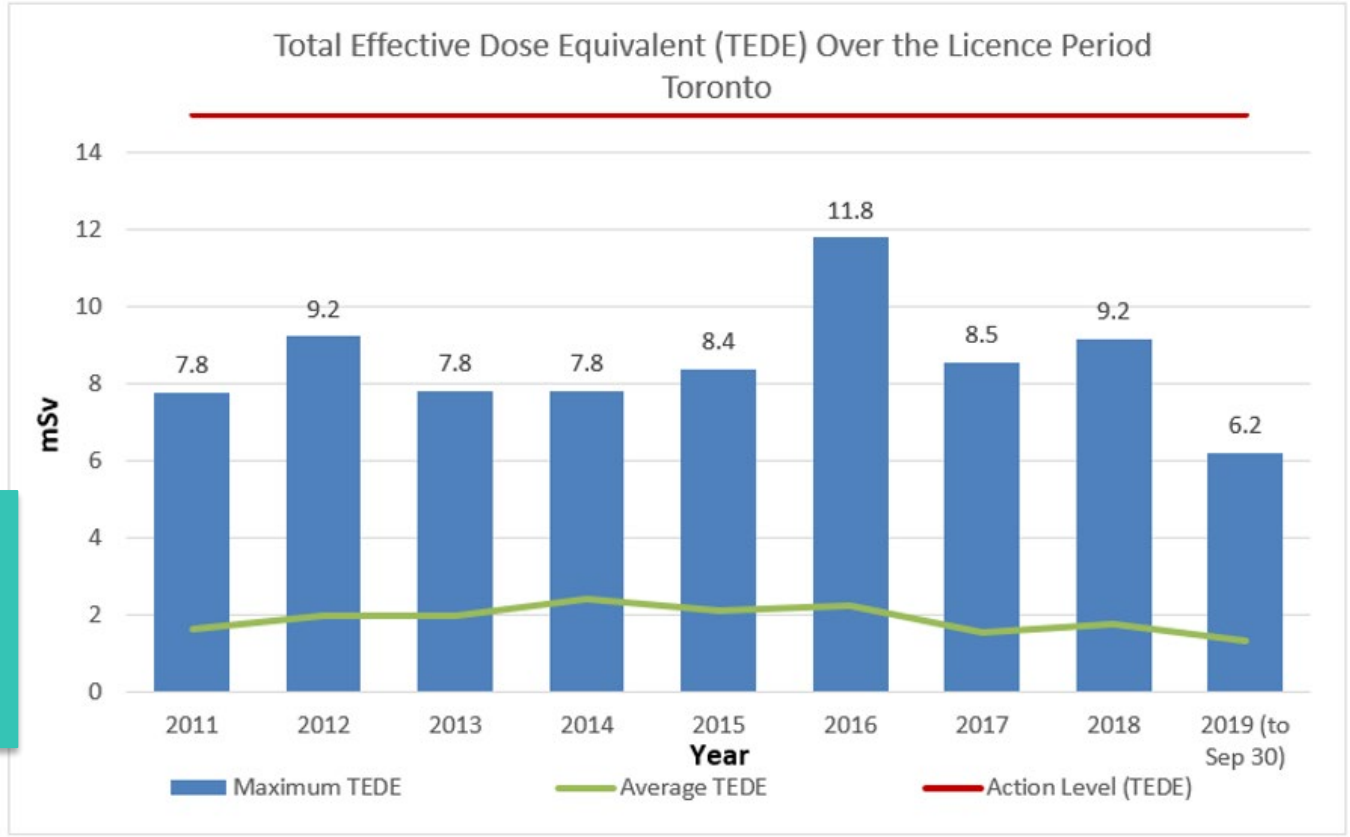
Safety Control Areas

- Our management system fully addresses all 14 safety control areas (SCAs)
- We have consistently been rated satisfactory across all SCAs
- We have successfully adapted to changes in regulatory requirements

Radiation Protection – Workers (Toronto)

X3

Annual Limit for Nuclear Energy Worker = 50 mSv



Radiation Protection – Workers (Peterborough)

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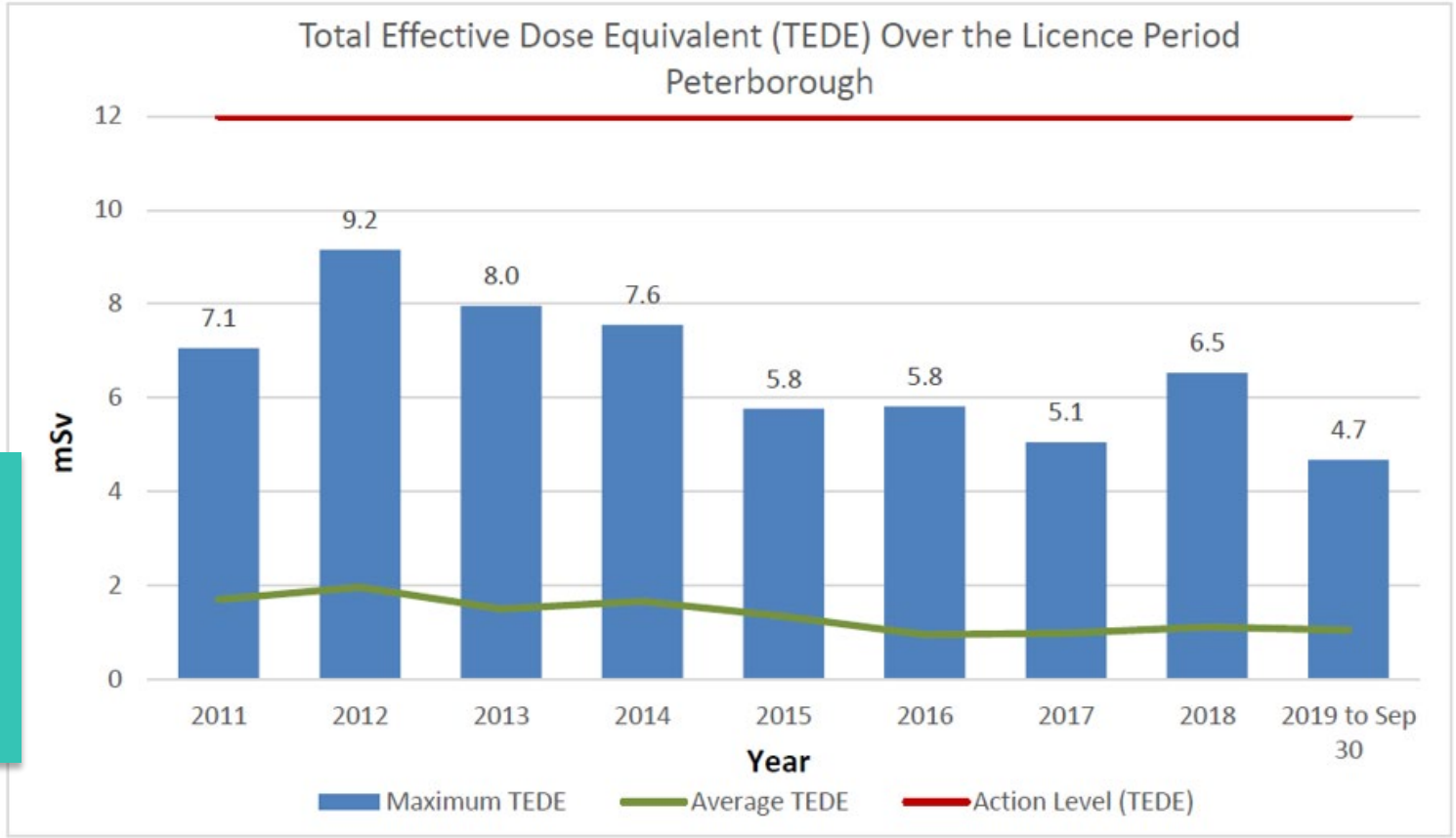
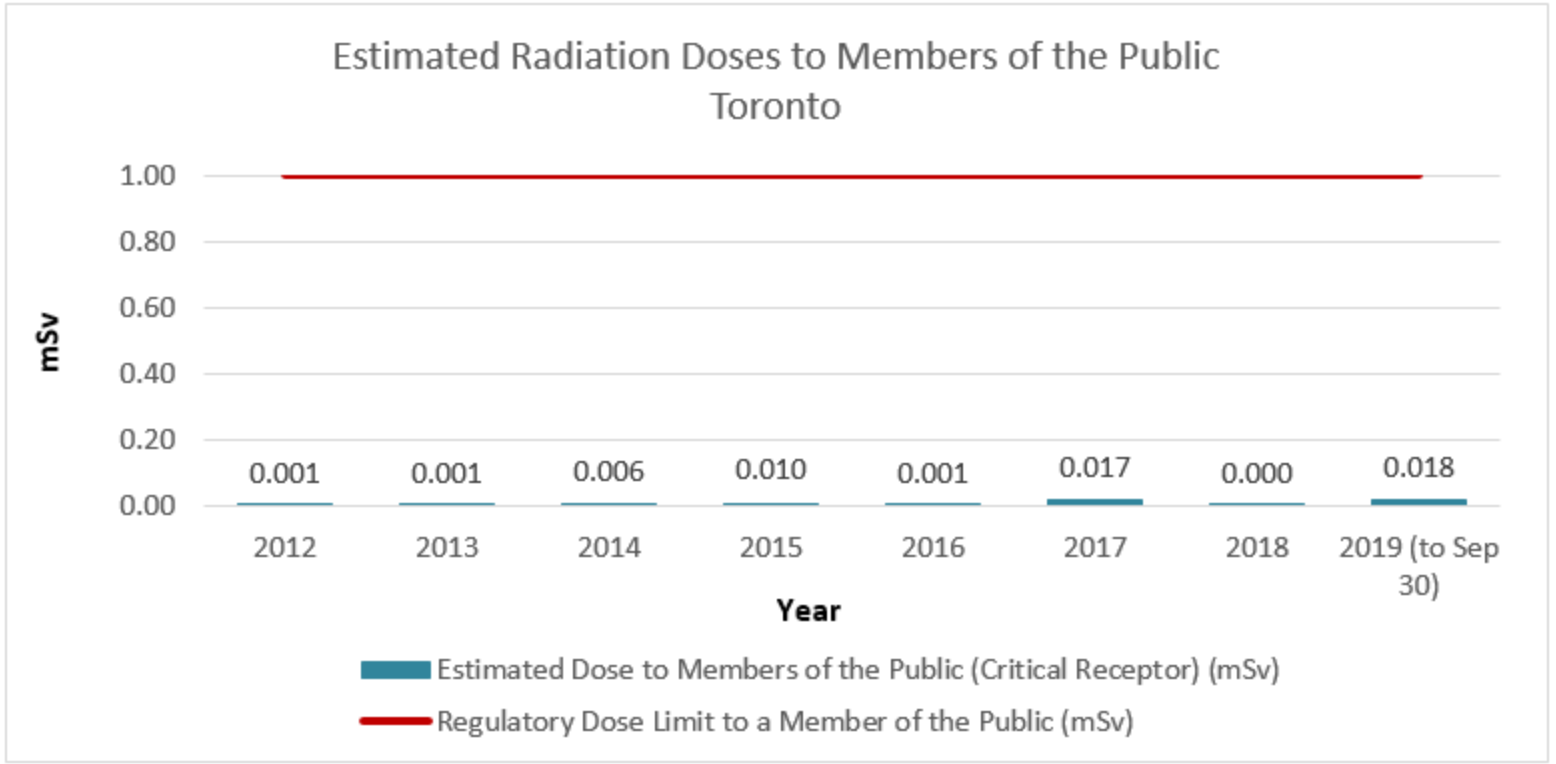
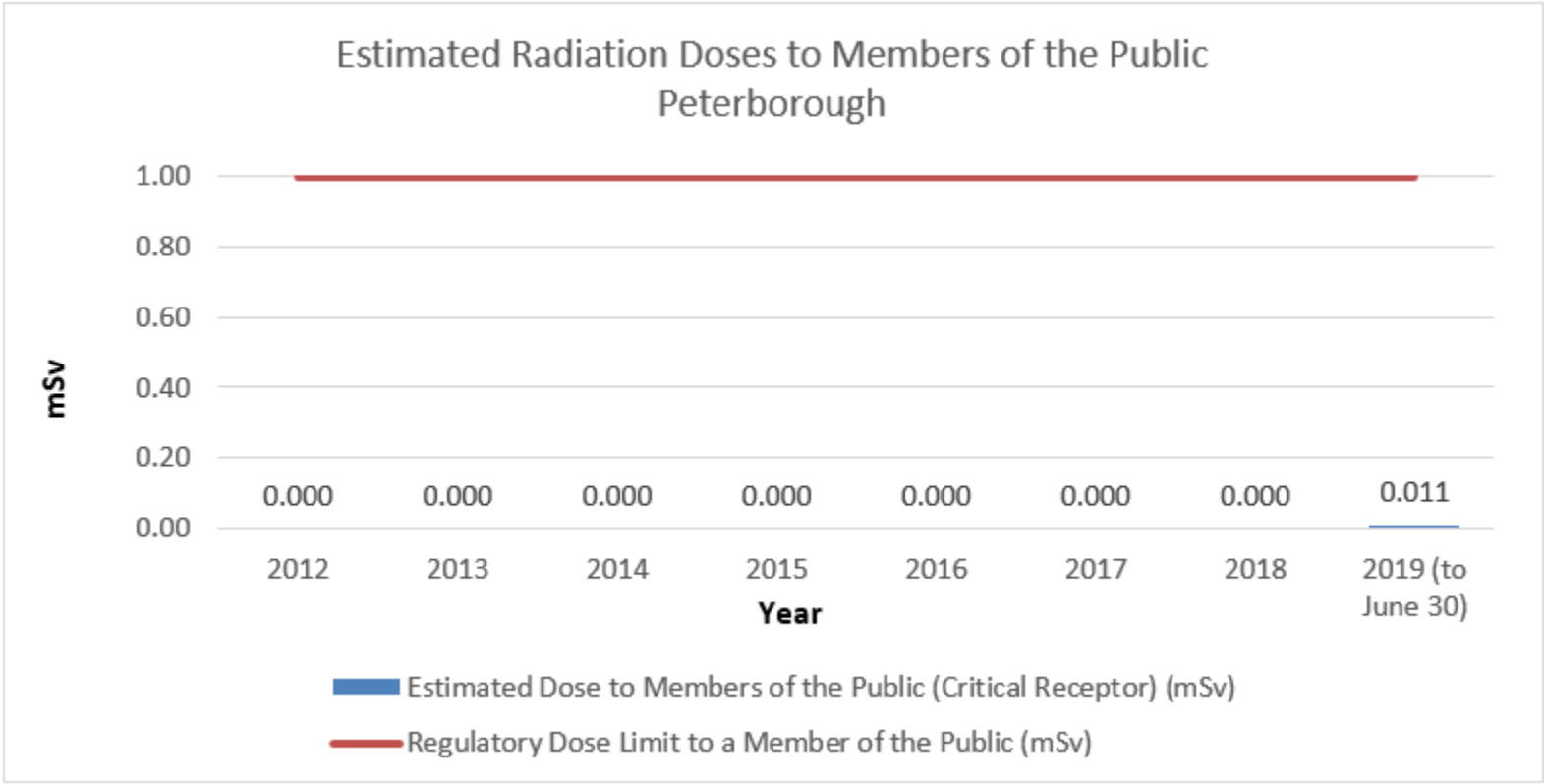


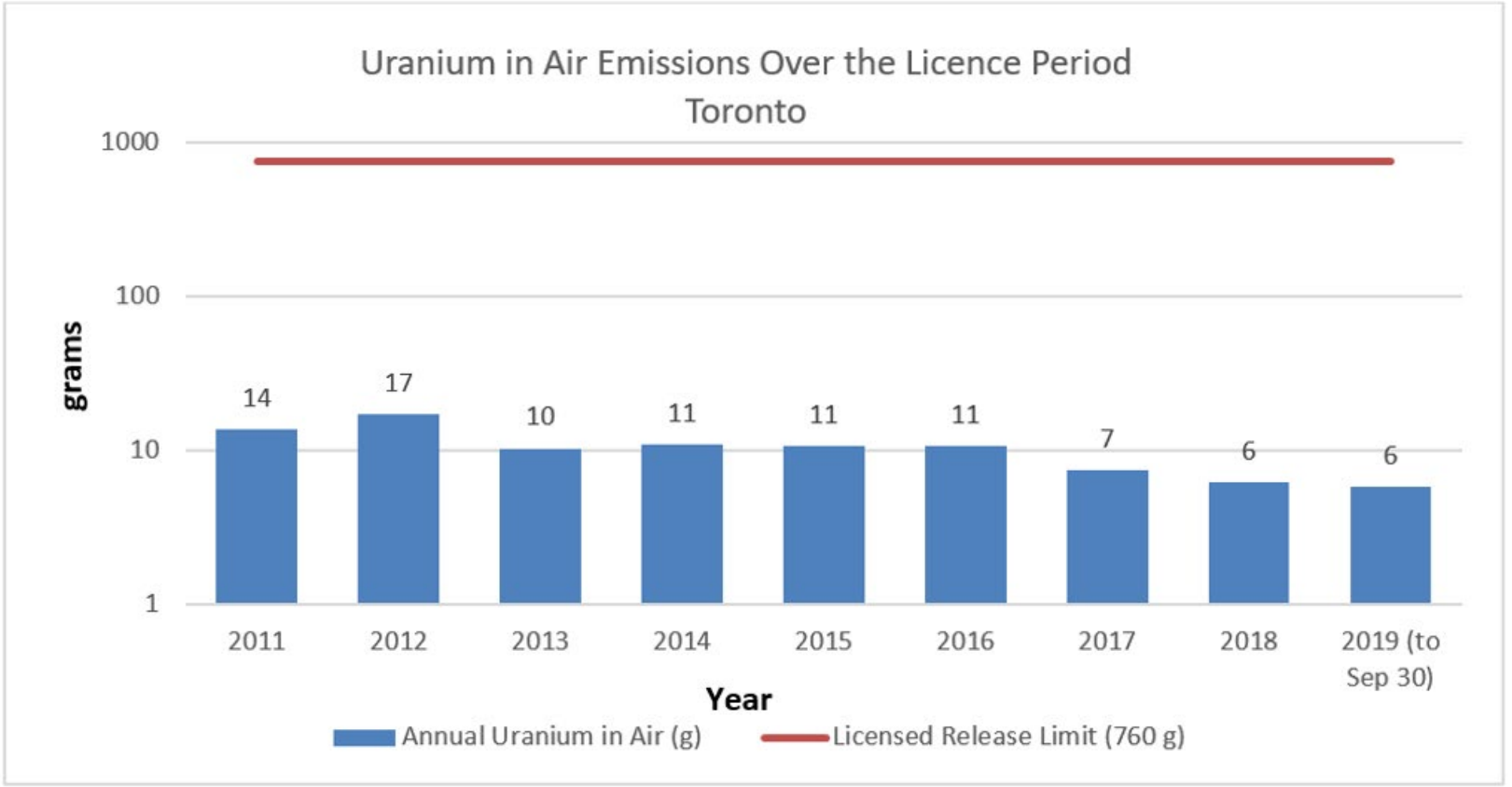
Radiation Protection – Public (Toronto)



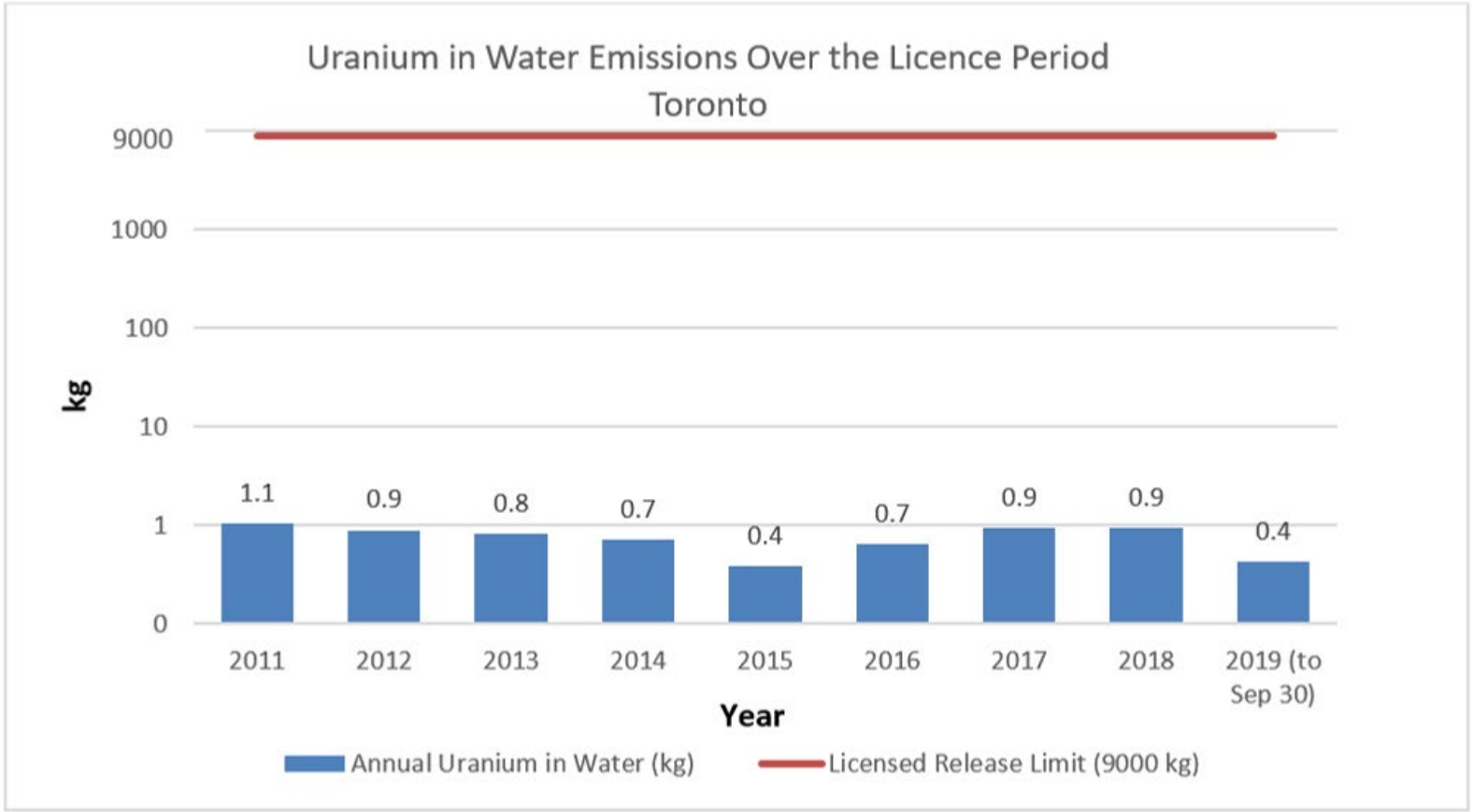
Radiation Protection – Public (Peterborough)



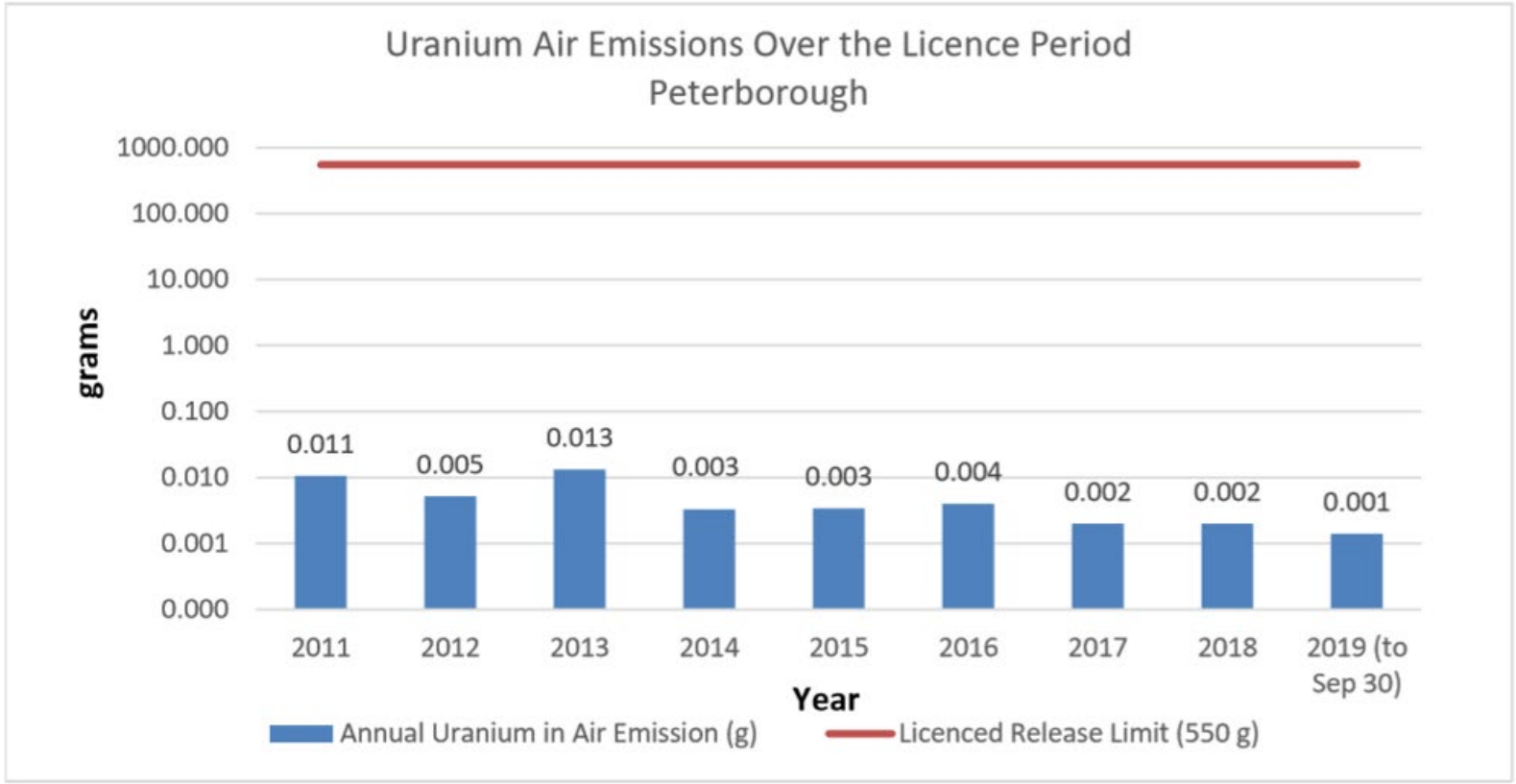
Environmental Protection – Toronto (Uranium to Air)



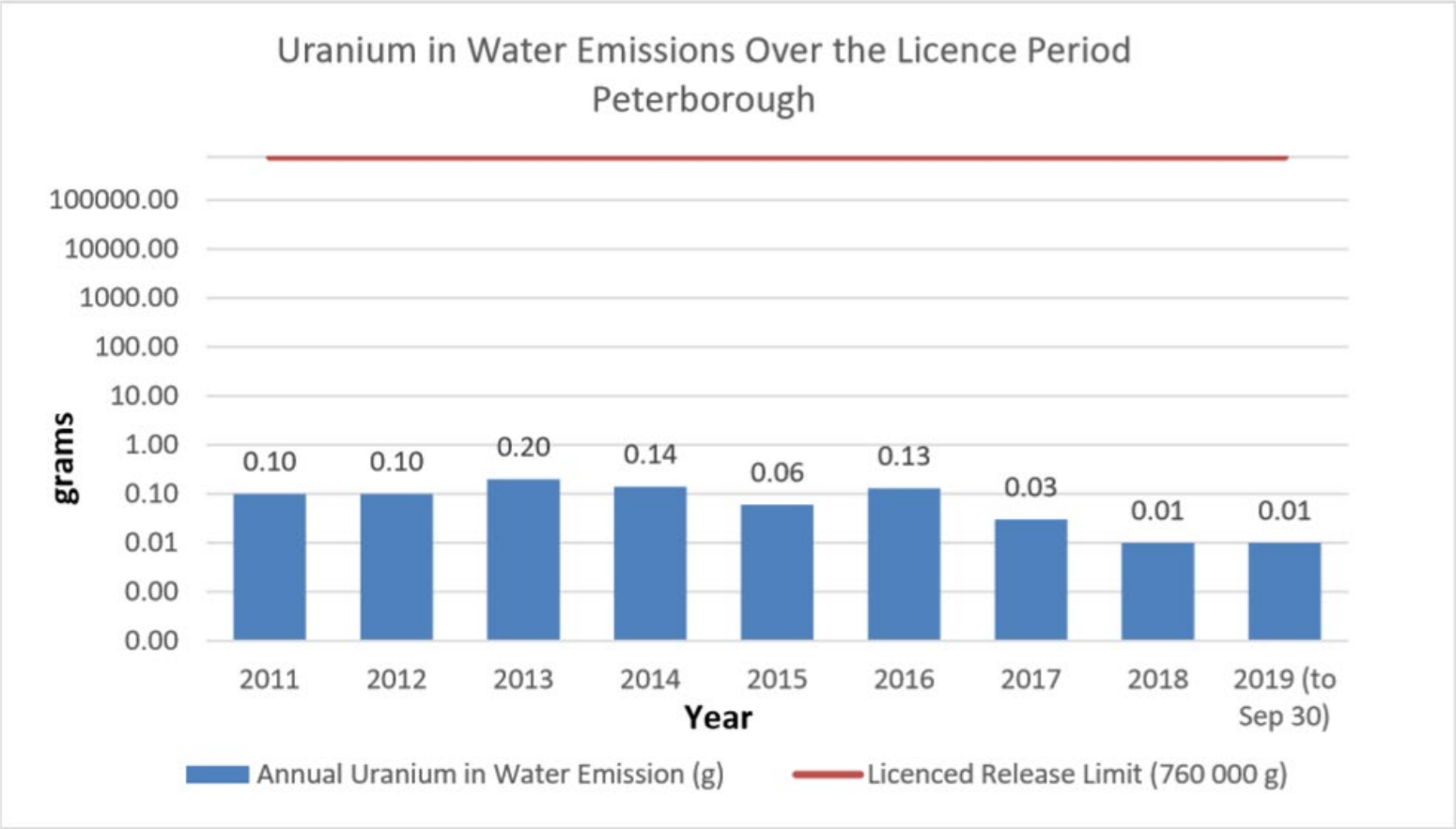
Environmental Protection – Toronto (Uranium to Water)



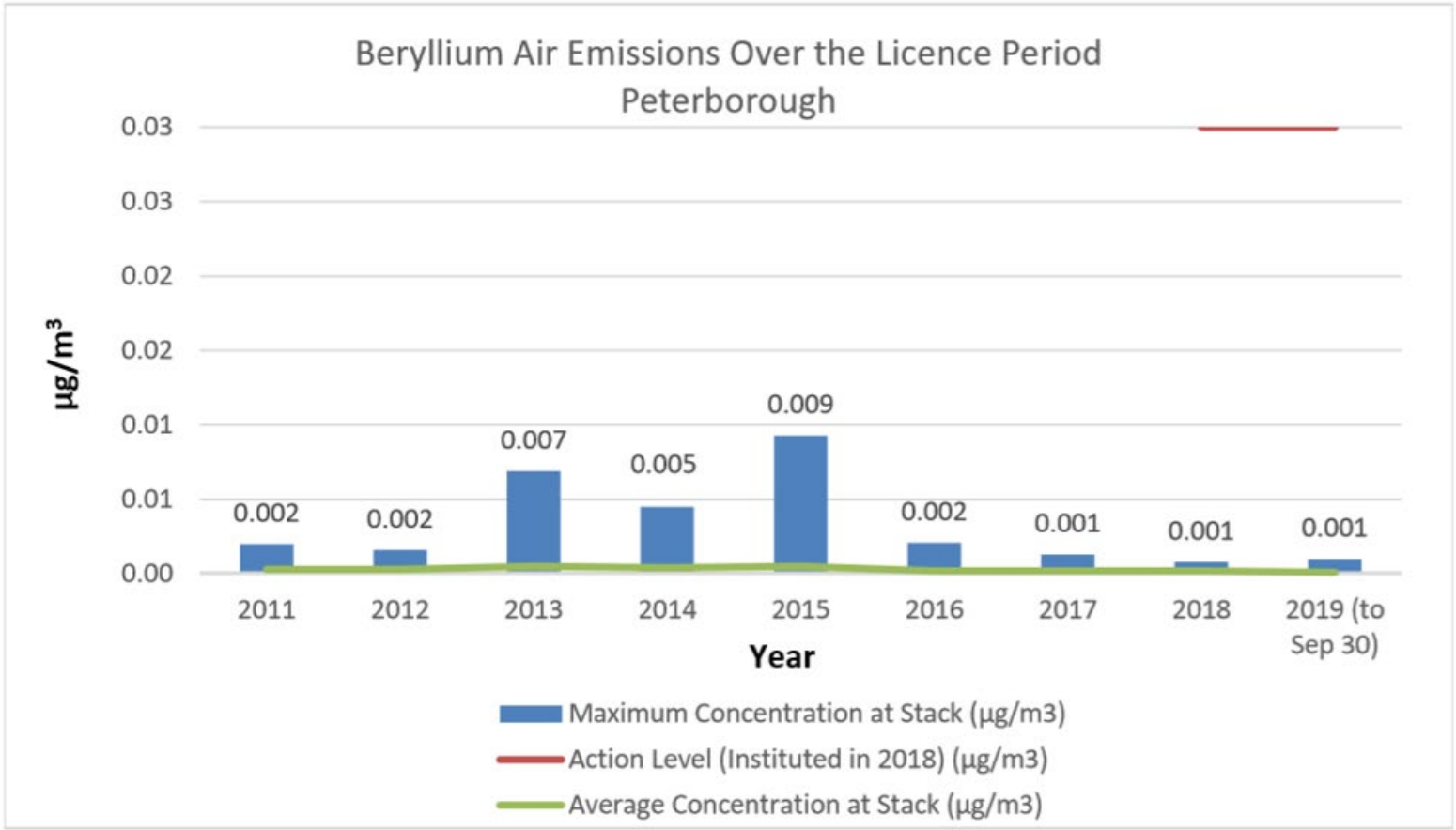
Environmental Protection – Peterborough (Uranium to Air)



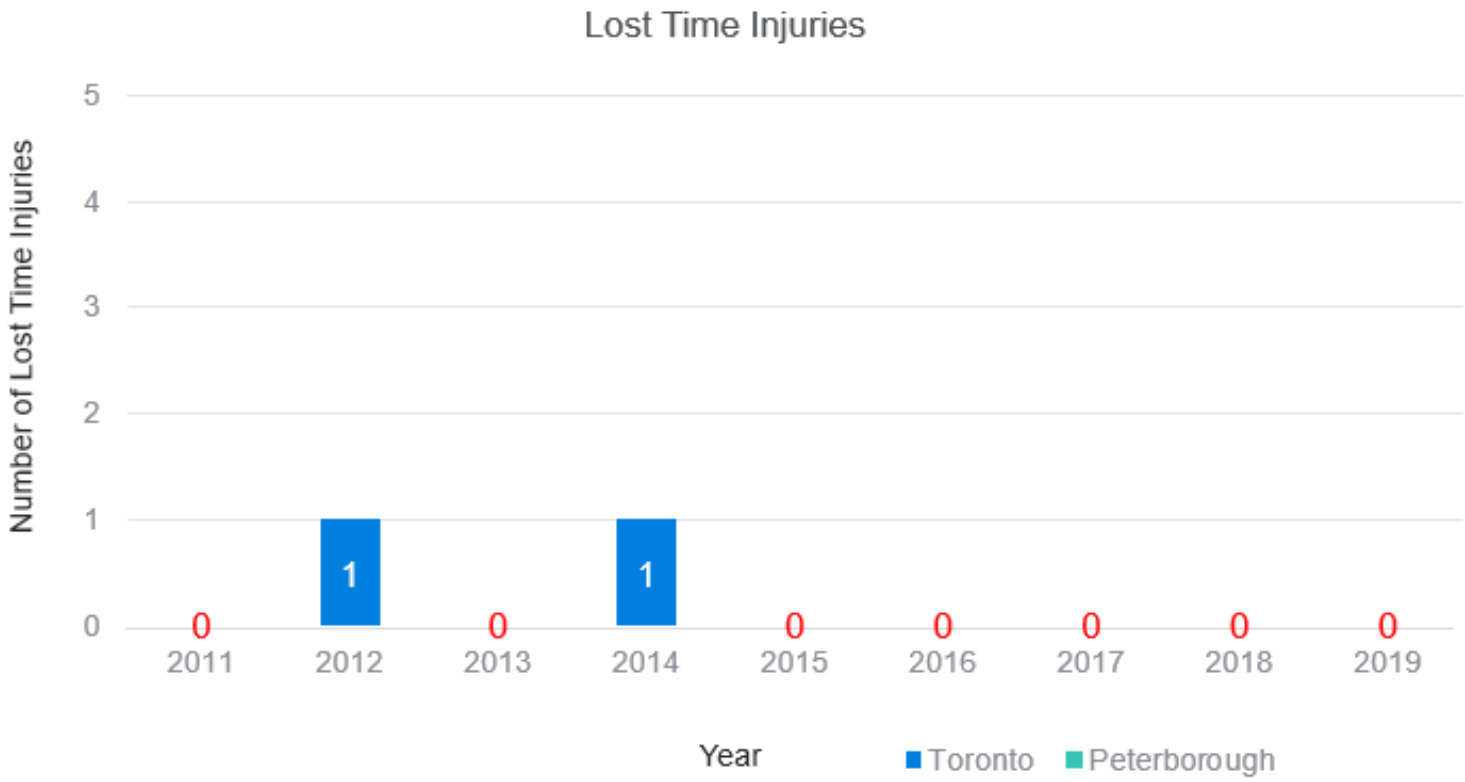
Environmental Protection – Peterborough (Uranium to Water)



Environmental Protection – Peterborough (Beryllium to Air)

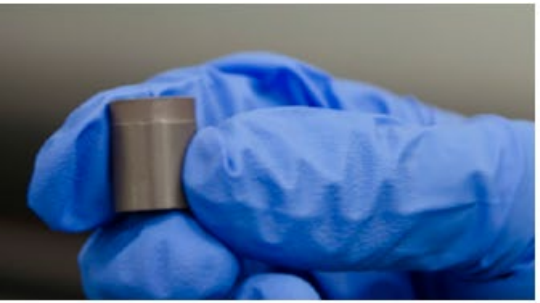


Industrial Health & Safety



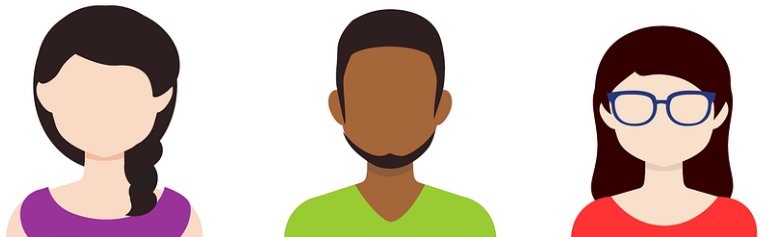
Improvements Made Over Licence Period

- Two major updates to the facility safety analyses
- Updated Preliminary Decommissioning Plans
- Environmental Risk Assessment for each facility was developed and maintained
- Enhanced Toronto facility emergency plan (Peterborough in progress)
- Fully implemented systematic approach to training program
- Made improvements to change management program
- Programs updated to newly introduced standards and regulatory documents




Community Concerns

- Transportation
- Decommissioning
- Insurance
- Emergency Preparedness
- Hydrogen Storage
- Uranium Emissions
- Pellet Production in Peterborough
- Beryllium Emissions (Peterborough)
- Public Information Program



Transportation

- What we transport:
  - Uranium dioxide powder 
  - Uranium dioxide pellets 
  - Transported by truck

Port Hope → Toronto

Toronto → Peterborough

- Public dose from transport is insignificant

- BWXT has Emergency Response Assistance Plan (ERAP) with Transport Canada
  - ERAP is used to assist emergency responders in effectively responding to accidents

- Worst case transport event would be a collision resulting in fire and spill
  - In 50 years, we have never experienced a serious transport accident
  - Would not result in health consequences for public or environment

Decommissioning

- Toronto and Peterborough facilities to be decommissioned when we cease operations
- Decommissioning involves removal of equipment and all hazardous materials
- Preliminary decommissioning plans prepared by 3rd party for each facility
- Fully funded and secured by financial instrument
- Objective is to bring properties back to unlicensed state for future use
- After decommissioning, facility control will return to the landlord

Insurance

- Due to nature of operations, not required to maintain nuclear liability insurance
- Large, financially stable and capable organization
- Operated successfully for over 175 years in Canada
- Over 50 years of significant event-free fuel manufacturing operations
- Maintains diversified portfolio of insurance
  - Appropriate for the scope of its operations
  - Includes public liability for offsite damages or injuries

Emergency Preparedness

- Well prepared for any emergency
- Safety Analysis Reports updated for both facilities
- Analyzed a wide variety of potential internal and external events
  - Severe weather, fire, airplane crash, train derailment
- Analyzed significant hazard sources
  - UO_2 powder and pellets, beryllium, hydrogen
- All hazards were analyzed and screened, with quantitative analysis performed
- Safety analysis concluded radiological facility risks are all low
- No scenarios require evacuation or sheltering of the public due to radiological risk

Emergency Preparedness – Toronto Hazard Scenarios

Hazard Scenario	Potential Frequency	Maximum Concentration of UO_2 at Offsite Location (mg/m^3)	Meet Criteria for Shelter or Evacuation
Catastrophic Fire	> 1,400 years	6.1	No
Structural Collapse Entire Facility	> 800 years	3.0	No

Emergency Preparedness – Peterborough Hazard Scenarios

Hazard Scenario	Potential Frequency	Maximum Concentration of UO_2 at Offsite Location (mg/m^3)	Meet Criteria for Shelter or Evacuation
Catastrophic Fire	3700 years	7.1	No
Structural Collapse Entire Facility	> 1000 years	1.2	No

Beryllium releases during emergency events were analyzed

- Due to small quantities available on site, off-site emissions are negligible

Hydrogen Storage

Hydrogen is used for pellet sintering

- Stored cryogenically as a liquid in a 9000 gallon tank
- Tank pressure is less than 150 psi
- Located in yard away from buildings and vehicles
- Meets all applicable safety regulations
- Owned and maintained by supplier

Consequence of credible accident scenarios

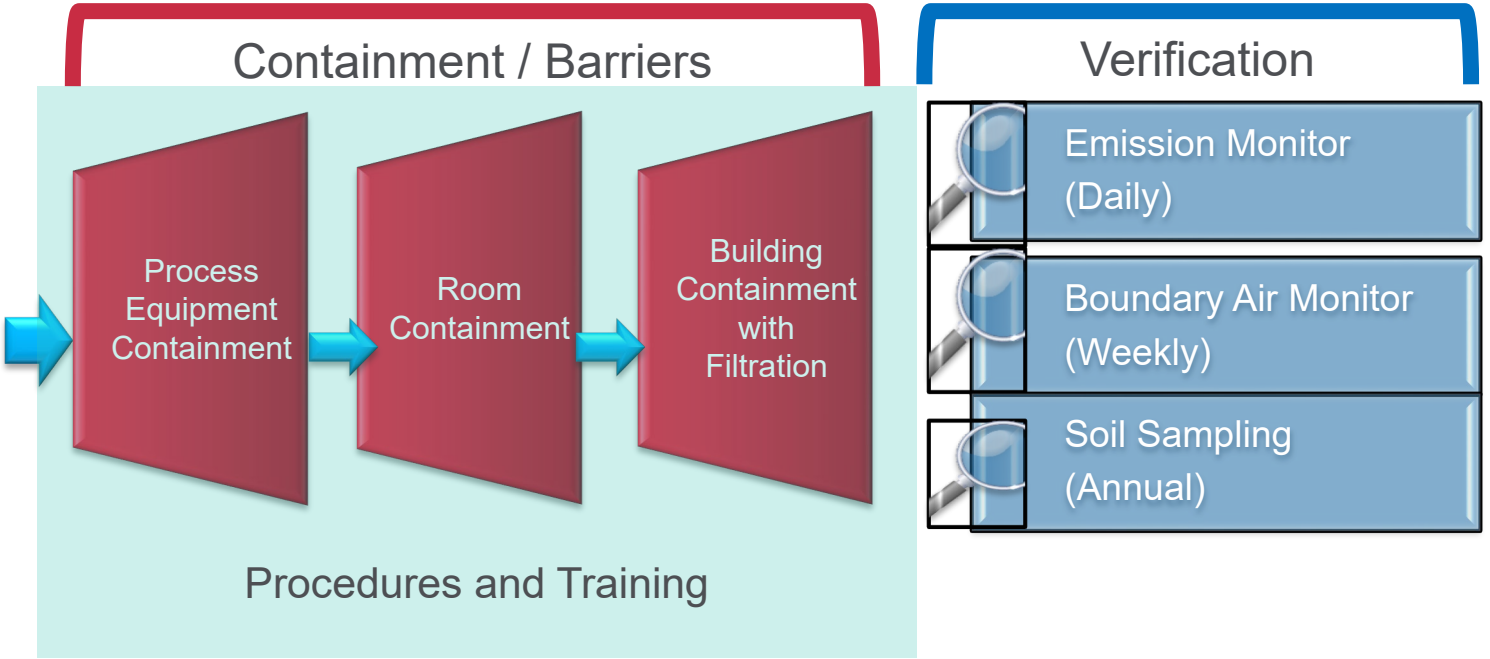
- No structural damage to buildings
- No release of uranium
- No injury to persons from a pressure wave
- Potential for broken windows
- Possible injury from exposure to heat

Uranium Emissions

- Naturally occurring element that is present at low levels in the environment
- Natural uranium is weakly radioactive and not known to be carcinogenic
- Primary concern is chemical toxicity to kidney (at high exposures)
- Peterborough emissions are less than 1% of regulatory limit
- Toronto emissions are approximately 1% of regulatory limit
- We control uranium using defence-in-depth approach

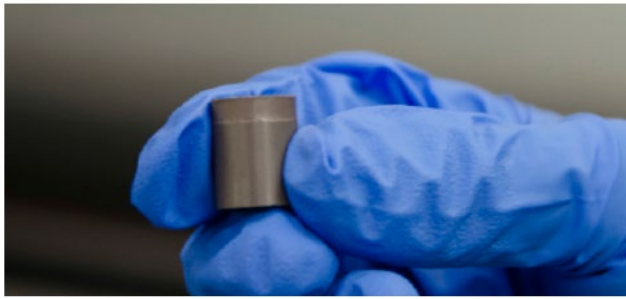
Uranium Emissions

- How we control uranium emissions – defence-in-depth



Pellet Production in Peterborough

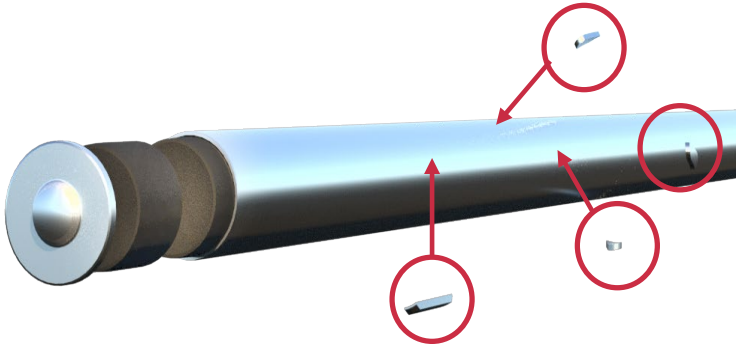
- If pelleting were to be conducted in Peterborough:
  - Production method would be same as current process
  - Well understood operations which are safely managed in Toronto today
  - Conducted within existing licensed space, existing buildings
  - Environmental Risk Assessment was conducted for consolidated operations
  - No adverse environmental or human health impact
  - Emissions would be similar to Toronto operations, which are ~1% of limit
  - Environmental monitoring would be same as Toronto



Beryllium Emissions

How we use it:

- Vapour deposited onto small sheets of zirconium
- Zirconium sheets are converted to appendages
- Appendages are brazed onto tubes
- Utilize about 20 kg of beryllium per year in Peterborough

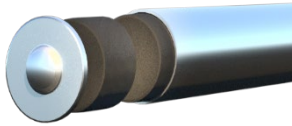


Appendages brazed to tube

Health concerns:

- Known to be carcinogenic
- Primary concern is inhalation
- Highest risk posed by vapour deposition process or small particles in air

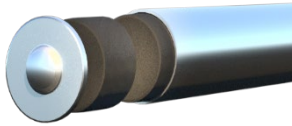
Beryllium Emissions



How We Control Beryllium

- Emissions carefully controlled by defence-in-depth approach
- Vapourized in a secure part of our facility (~500 square feet)
- Limited access to this area only by highly trained employees with respirators
- Facility has specialized ventilation
- Air inside our facility is frequently sampled
- Ventilation contains two stages of filtration
- Final stage is High Efficiency Particulate Air filter
- Capable of trapping 99.97% of particles
- Filtered exhausts monitored continuously
- Emissions from the facility are exceptionally low, approximately 15 mg to air/year
- Concentrations in stack are typically 50x lower than the MoECP limit at fence line

Beryllium Emissions



Environmental Monitoring

- CNSC conducted monitoring of air, water and soil in 2014, 2018, 2019
- Air results for all years were below laboratory detection limits
- No beryllium was detected in water
- Concentrations in soil are below acceptable guideline limit
- Measurements at Prince of Wales school increased - 1.27 to 2.34 mg/m^3 from 2018-2019
- These results are inconsistent with air monitoring and BWXT's roof samples
  - Confirmed system is operating as designed
- Emissions from our facility could not account for this apparent increase

Path Forward

- BWXT will conduct soil monitoring using independent third party starting in summer 2020
- Results will be published on BWXT's website

Public Information Program

- Committed to timely, transparent engagement with our communities
  - Dedicated website updated regularly and information rich, licence renewal page
  - Toll-free phone number and email address – monitored daily
  - Building relationships through communications, tours, events and dialogue
  - Regular e-updates to our elected officials, Indigenous communities and stakeholder groups
  - Newsletters mailed to ~4000 in each community three times a year, posted on website
  - Social media updates on: Facebook, LinkedIn and Twitter
  - Events in our communities: BBQs, Information Nights, sponsorships with booths
  - Regular and timely participation with media, submission of editorials
  - Working toward increased transparency with documentation

Website: nec.bwxt.com
Toll free: 1-855-696-9588
Email: questions@bwxt.com

Indigenous Relations

- Working to engage, build meaningful relationships with Indigenous communities
- Joined Canadian Council of Aboriginal Business (CCAB) in 2017
- Currently in Phase 3 of CCAB's Progressive Aboriginal Relations (PAR) program
- PAR committee meets every six weeks, underwent cultural awareness training
- BWXT leadership trained in Indigenous cultural awareness

Progressive Aboriginal RELATIONS COMMITTED

Canadian Council for Aboriginal Business

Community Volunteerism & Investment

- Employees volunteer time for local causes
- Company supports a range of community groups and initiatives:
  - Bursaries, scholarships to schools
  - Community event sponsorships
  - Volunteering staff to special causes

BWXT VOLUNTEER STRONG

Community Liaison Committees

- Toronto Community Liaison Committee (CLC) has existed since 2013
- Currently recruiting for Peterborough CLC
- Holds 3-4 meetings a year in each community
- A productive exchange of information between the community and company
- Members receive orientation and tour to familiarize them with operations
- New members recruited annually

Public Attitude Survey

- Survey undertaken in Peterborough and Toronto in Oct. - Nov. 2018
- Phone call and web survey to residents near our facilities
- 352 surveys completed: 149 in Toronto and 203 in Peterborough

- **Toronto: 30%** surveyed were knowledgeable about BWXT
  - 17% heard about BWXT through newsletter, flyer, event
  - Majority polled prefer information digitally or from information centres
  - 40% of those knowledgeable of BWXT had a excellent/very good/good impression

- **Peterborough: 40%** surveyed were knowledgeable about BWXT
  - 25% heard about BWXT through newsletter, flyer, event
  - Majority of those polled prefer information in newspaper
  - 50% of respondents knowledgeable of BWXT had an excellent/very good/good impression

Will re-survey in 2021

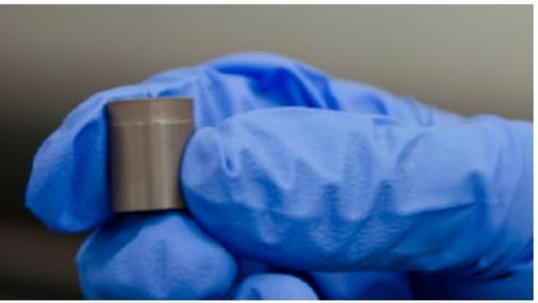
BWXT™

Nuclear Energy Canada Inc.

Conclusions

Demonstrated Safe Performance

- Strong safety record – Rated satisfactory across all Safety Control Areas
- Compliant with all regulations - CNSC, MoECP, ESDC
- Robust safety culture and human performance management
- Continuously improved health and safety of employees, public and environment
- Radiation exposures to workers have remained well below dose limits
- Emissions and public doses have remained fractions of regulatory limits
- No lost time injuries in last five years




Benefits of BWXT NEC and Nuclear Energy

- **Clean air**
  - Emissions-free power helps avoid 45 million tonnes of $C0_2$ annually
  - Equivalent of removing 10 million cars from Ontario roads

- **Low-cost, reliable and affordable electricity**
  - The fuel produced by BWXT helps power 25% of on Ontario
  - Nuclear is second most affordable source of electricity next to hydro

- **High-skilled, high-paying jobs that boost the economy**
  - BWXT in Peterborough, Arnprior and Toronto employ 400 workers
  - High-tech, manufacturing, engineering and administrative positions

- **Improving lives with nuclear medicine**
  - Leading supplier of medical isotopes
  - Working to supply North America with Technetium-99m