



# Regulatory Oversight Report for Uranium Mines, Mills, Historic, and Decommissioned Sites in Canada: 2020



CNSC Staff Presentation

Commission Meeting  
December 15-16, 2021  
CMD 21-M34.A



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# Errata

- Various minor errors are listed in Annex A of this presentation
- Inaccuracies are administrative in nature and do not impact CNSCs staff's conclusions on safety performance at the sites
- Presentation reflects corrected information




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# Presentation Outline

- Overview
- CNSC regulated facilities
  - Operating uranium mine and mill facilities
  - Historic and decommissioned sites
- CNSC regulatory efforts
- CNSC staff assessments
- Indigenous engagement and consultation
- Other matters of regulatory interest
- Interventions
- Conclusions

 Canadian Nuclear Safety Commission / Commission canadienne de sûreté nucléaire	
UNPROTECTED/NON PROTÉGÉ ORIGINAL/ORIGINAL CMD: 21-M34 Date signed/Signé le : 10 SEPTEMBER 2021 Reference CMD(s)/CMD(s) de référence : 18-M48	
Annual Program Report	Rapport annuel sur les programmes
<b>Regulatory Oversight Report for Uranium Mines, Mills, Historic, and Decommissioned Sites in Canada: 2020</b>	<b>Rapport de surveillance réglementaire des mines et usines de concentration d'uranium et des sites historiques et déclassés au Canada : 2020</b>
Public Meeting	Réunion publique
Scheduled for: December 15 to 16, 2021	Prévue pour : les 15 et 16 décembre 2021
Submitted by: CNSC Staff	Soumise par : Le personnel de la CCSN
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# CNSC Regulatory Oversight Reports - 2020

## November 23 and 25, 2021:

- Canadian Nuclear Laboratories Sites
- Use of Nuclear Substances in Canada

## December 15 and 16, 2021:

- Nuclear Power Generating Sites in Canada
- Uranium Mines, Mills, Historic, and Decommissioned Sites in Canada
- Uranium and Nuclear Substance Processing Facilities and Research Reactors in Canada



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# OVERVIEW



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# CNSC Regulatory Oversight

- Includes licensing, compliance, and reporting to the Commission
- Compliance is completed through:
  - Inspection/verification activities
  - Review of operational activities and documents
  - Review of licensee reports and events
- Effort is commensurate with risk

Risk-informed and performance-based approach



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# Indigenous Engagement and Consultation

- CNSC staff acknowledge the sites covered in this ROR fall within the traditional and treaty territories of many Indigenous Nations and communities
- CNSC staff:
  - continue to engage and identify opportunities to discuss and address topics of interest
  - have actively informed Indigenous Nations and communities of this ROR and of the opportunity to participate in this Commission proceeding
  - are responsive to Indigenous perspectives on the ROR

CNSC staff remain committed to building long-term positive relationships with Indigenous Nations and communities



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# Improvements and Status of Previous Actions

## The Commission:

- Directed CNSC staff to continue working with licensees to increase transparency and make relevant Preliminary Decommissioning Plans (PDPs) information available to the public
  - Licensees posted summaries of PDPs for all active mine/mill sites
- Requested CNSC staff intensify efforts to finalize agreements with the Saskatchewan Ministry of Environment (SMOE)
  - CNSC staff continue to collaborate with SMOE; will begin renewal of relevant Memoranda of Understanding in 2022





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# 2020 Regulating Under COVID-19 Restrictions

## **CNSC staff continued:**

- Inspections - by using a combination of remote and onsite methods
- Desktop reviews of licensee reports and submissions
- Remote engagement with applicants and licensees
- Remote engagement with Indigenous Nations and communities

## **Licensees continue to utilize:**

- Protective barriers around workspaces
- Enhanced hygiene practices
- Screening protocols
- Physical distancing requirements



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# OPERATING URANIUM MINE AND MILL FACILITIES



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# Mine and Mill Facilities

## Cameco Corporation

- Cigar Lake Operation – **Mine** \*
- McArthur River Operation – Mine \*\*
- Rabbit Lake Operation – Mine/Mill \*\*
- Key Lake Operation – Mill \*\*

## Orano Canada Inc.

- McClean Lake Operation – **Mine/Mill** \*

\* Active

\*\* Care and maintenance





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# Cigar Lake Mine

UML-MINE-CIGAR.00/2031

- Licence amendment
  - Updated Financial Guarantee
- No LCH changes
- Licence renewed - June 2021
- Ongoing ore production and shipment of ore to Orano's McClean Lake mill
- 4 inspections conducted
  - 1 onsite and 3 remote
- 1 action level exceedance



Cigar Lake Operation - located approximately 660 km north of Saskatoon, Saskatchewan. (Source: Shaw Global)



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# McArthur River Mine

UML-MINE-MCARTHUR.01/2023

- No licensing or LCH changes
- Indefinitely suspended operations in 2018
- Care and maintenance activities in place to ensure safety of workers, the public and protection of the environment
- 3 remote inspections conducted



McArthur River Operation - located approximately 620 km north of Saskatoon, Saskatchewan. (Source: Cameco)



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# Rabbit Lake Mine/Mill

UML-MINEMILL-RABBIT.01/2023

- No licensing or LCH changes
- Indefinitely suspended operations in 2016
- Reclamation activities continue
- Care and maintenance activities in place to ensure safety of workers, the public and protection of the environment
- 1 remote inspection conducted



Rabbit Lake Operation - located approximately 750 km north of Saskatoon, Saskatchewan. (Source: CNSC)



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# Key Lake Mill

UML-MILL-KEY.01/2023

- Licence amendment
  - Updated Financial Guarantee
- Indefinitely suspended operations in 2018
- Care and maintenance activities in place to ensure safety of workers, the public and protection of the environment
- 4 inspections conducted
  - 1 onsite and 3 remote
- 2 reportable events



Key Lake Operation - located approximately 570 km north of Saskatoon, Saskatchewan. (Source: Cameco)



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# McClean Lake Mine/Mill

UMOL-MINEMILL-MCCLEAN.01/2027

- No licensing or LCH changes in 2020
  - Licence amendment hearing for the JEB TMF held on October 4, 2021
- Continued processing of uranium ore slurry received from Cameco's Cigar Lake mine
- 4 inspections conducted
  - 1 onsite and 3 remote
- 6 reportable events



McClean Lake Operation - located approximately 750 km north of Saskatoon, Saskatchewan. (Source: Orano)





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# HISTORIC AND DECOMMISSIONED SITES



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# Historic and Decommissioned Sites

## Historic (Remediating) sites:

- Gunnar
- Madawaska\*

## Decommissioned sites:

- Lorado\*
- Beaverlodge
- Cluff Lake
- Rayrock\*
- Port Radium\*
- Agnew Lake\*
- Bicroft\*
- Dyno\*
- Elliot Lake
- Denison and Stanrock
- Deloro



\* CNSC licences authorized by a Designated Officer



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## Historic and Decommissioned Uranium Mines and Mills Gunnar Legacy Uranium Mine and Former Lorado Mill

- Gunnar remediation activities included:
  - Improvement of main and central tailings surfaces
  - Construction of Landfills A and B
  - Delay of Langley Bay remediation, due to high water levels in Lake Athabasca
- Lorado licence amendment
  - Facilitate eventual transfer to Saskatchewan's Institutional Control Program (ICP)



Aerial view of Gunnar mine site. Located approximately 600 km north of Saskatoon, Saskatchewan. (Source: CNSC)



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## Decommissioned Uranium Mines and Mills Madawaska and Dyno Closed Mine Sites

- Licence renewals for both sites
- Madawaska - ongoing rehabilitation work on tailings management areas
- Both sites to remain under long-term monitoring and maintenance for foreseeable future



Madawaska Closed Mine Site - Vegetative cover on tailings management area 1. (Source: CNSC)



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## Decommissioned Uranium Mines and Mills Beaverlodge Mine Site

- Site consists of 45 properties
- December 19, 2019 - 20 properties released from licensing by the Commission
  - 19 properties transferred to Saskatchewan's ICP
  - 1 property released from all government programs and monitoring
- Conducted 3 onsite inspections
- March 2022 - Commission hearing scheduled for release of additional 18 properties



Beaverlodge Mine Site - Fookes tailings cover.  
(Source: CNSC)



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Decommissioned Uranium Mines and Mills

## Cluff Lake Uranium Mine and Mill

- July 2019 - licence renewed by the Commission
- February 2020 - application submitted to transfer responsibility to Saskatchewan's ICP
  - CNSC staff review of application ongoing
- Conducted 1 onsite inspection



Cluff Lake tailings management facility and tailings dam. (Source: CNSC)



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Decommissioned Uranium Mines and Mills

# Rayrock and Port Radium Idle Mine Sites

- Licensing and LCH updates
- Licensee legal name change
- Application submitted to amend licence to perform remediation work
- Finalizing Rayrock Remedial Action Plan
- Revised Port Radium Long-Term Monitoring Plan



Aerial view of Rayrock Idle Mine Site. Located approximately 150 km northwest of Yellowknife.  
(Source: CNSC)



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## Decommissioned Uranium Mines and Mills Agnew Lake Tailings Management Facility

- November 2018 - application submitted for licence renewal
- July 2020 - licence renewed by Designated Officer
- Licence valid until July 31, 2025
- Site expected to remain under long-term monitoring and maintenance



Agnew Lake - Radiation warning sign.  
(Source: NDMNRG)





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Decommissioned Uranium Mines and Mills

## Bicroft Tailings Storage Facility

- September 2020 - application submitted for licence renewal
- Licence valid until February 29, 2036
- Maintenance work on dams performed
- Expected to remain under long-term monitoring and maintenance



Bicroft – Spillway of Pond A at the TMF.  
(Source: CNSC)



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## Decommissioned Uranium Mines and Mills

# Elliot Lake Historic Sites

- Indefinite licence
- Licensee continues site monitoring
- Effluent treatment improved in response to 12(2) information request issued in January 2018 regarding radium-226 levels in treated effluent
  - Monitoring increased, physical barriers installed



Elliot Lake – Spillway at Quirke mine site.

(Source: CNSC)



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## Decommissioned Uranium Mines and Mills

# Deloro Mine

- April 2019 - application submitted to revoke licence
  - Granted in August 2019 by Designated Officer
- Due to elevated levels of arsenic, Deloro will continue to be managed under the Ontario Provincial Regulatory regime



Deloro – Young's Creek Area.  
(Source: MECP)

CNSC staff will no longer report on the Deloro Mine in future RORs



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## Decommissioned Uranium Mines and Mills Denison/Stanrock Closed Mines

- No licensing changes
- Remains in stable condition
- Remains in long-term care and maintenance



Denison Closed Mine - Dam 9.  
(Source: CNSC)



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# CNSC REGULATORY EFFORTS



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# CNSC Regulatory Efforts Operating Uranium Mine and Mill Facilities, 2020

Site	Person days for compliance	Person days for licensing	Number of inspections	Inspection non-compliances
Cigar Lake	234	303	4	1
McArthur River	138	5	3	4
Rabbit Lake	55	35	1	0
Key Lake	133	20	4	4
McClellan Lake	299	77	4	5
<b>Total*</b>	<b>859</b>	<b>439</b>	<b>16</b>	<b>14</b>

\* Person day numbers have been rounded. Highlight indicates corrected information (see Annex A).

No 12(2)s, Orders, or AMPs issued; all non-compliances closed



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# CNSC Regulatory Efforts Historic and Decommissioned Facilities, 2018 to 2020

Site	Person days for compliance	Person days for licensing	Number of inspections	Inspection non-compliances
Gunnar	177	82	2	4
Madawaska	28	11	2	0
Lorado	36	46	1	0
Beaverlodge	128	120	3	1
Cluff Lake	275	276	1	0
Rayrock	40	56	1	1
Port Radium	5	3	0	0
Agnew Lake	2	83	0	0
Bicroft	25	11	1	0
Dyno	23	11	1	1
Elliot Lake	157	5	3	0
Denison and Stanrock	48	5	2	0
Deloro	18	14	1	0
<b>Totals</b>	<b>966</b>	<b>724</b>	<b>18</b>	<b>7</b>

No Orders, or AMPs issued; all non-compliances closed

\* Person day numbers have been rounded. Highlight indicates corrected information (see Annex A).



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# CNSC STAFF ASSESSMENTS





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# Safety and Control Area Performance

- CNSC staff use expert judgement and rate performance based on multiple inputs, including:
  - Key performance indicators
  - Results of compliance activities
  - Evaluation of the effectiveness of licensee actions
- Ratings represent a holistic summary of each safety and control area



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## Safety and Control Area Ratings

# Operating Uranium Mine and Mill Facilities



Safety and Control Areas	Cigar Lake	McArthur River	Rabbit Lake	Key Lake	McClellan Lake
Management system	SA	SA	SA	SA	SA
Human performance management	SA	SA	SA	SA	SA
Operating performance	SA	SA	SA	SA	SA
Safety analysis	SA	SA	SA	SA	SA
Physical design	SA	SA	SA	SA	SA
Fitness for service	SA	SA	SA	SA	SA
Radiation protection	SA	SA	SA	SA	SA
Conventional health and safety	SA	SA	SA	SA	SA
Environmental protection	SA	SA	SA	SA	SA
Emergency management and fire protection	SA	SA	SA	SA	SA
Waste management	SA	SA	SA	SA	SA
Security	SA	SA	SA	SA	SA
Safeguards and non-proliferation	SA	SA	SA	SA	SA
Packaging and transport	SA	SA	SA	SA	SA

CNSC staff's review of key performance indicators resulted in a rating of **“satisfactory”** for all operating mines and mills



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# Safety and Control Area Ratings Historic and Decommissioned Facilities



Safety and Control Areas	Radiation protection	Conventional health and safety	Environmental protection
Gunnar	SA	SA	SA
Madawaska	SA	SA	SA
Lorado	SA	SA	SA
Beaverlodge	SA	SA	SA
Cluff Lake	SA	SA	SA
Rayrock	SA	SA	SA
Port Radium	SA	SA	SA
Agnew Lake	SA	SA	SA
Bicroft	SA	SA	SA
Dyno	SA	SA	SA
Elliot Lake	SA	SA	SA
Denison and Stanrock	SA	SA	SA
Deloro	SA	SA	SA

CNSC staff's review of key performance indicators resulted in a rating of **“satisfactory”** for all historic and decommissioned sites



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# Radiation Protection Performance

- Licensees' radiation programs and practices were effective in controlling radiological hazards
- As low as reasonably achievable (ALARA) initiatives provided enhanced radiation protection
- Action levels ensured detection of potential problems
- Radiation doses received by workers and the public were well below regulatory limits

CNSC staff's compliance activities verified radiation doses were kept ALARA

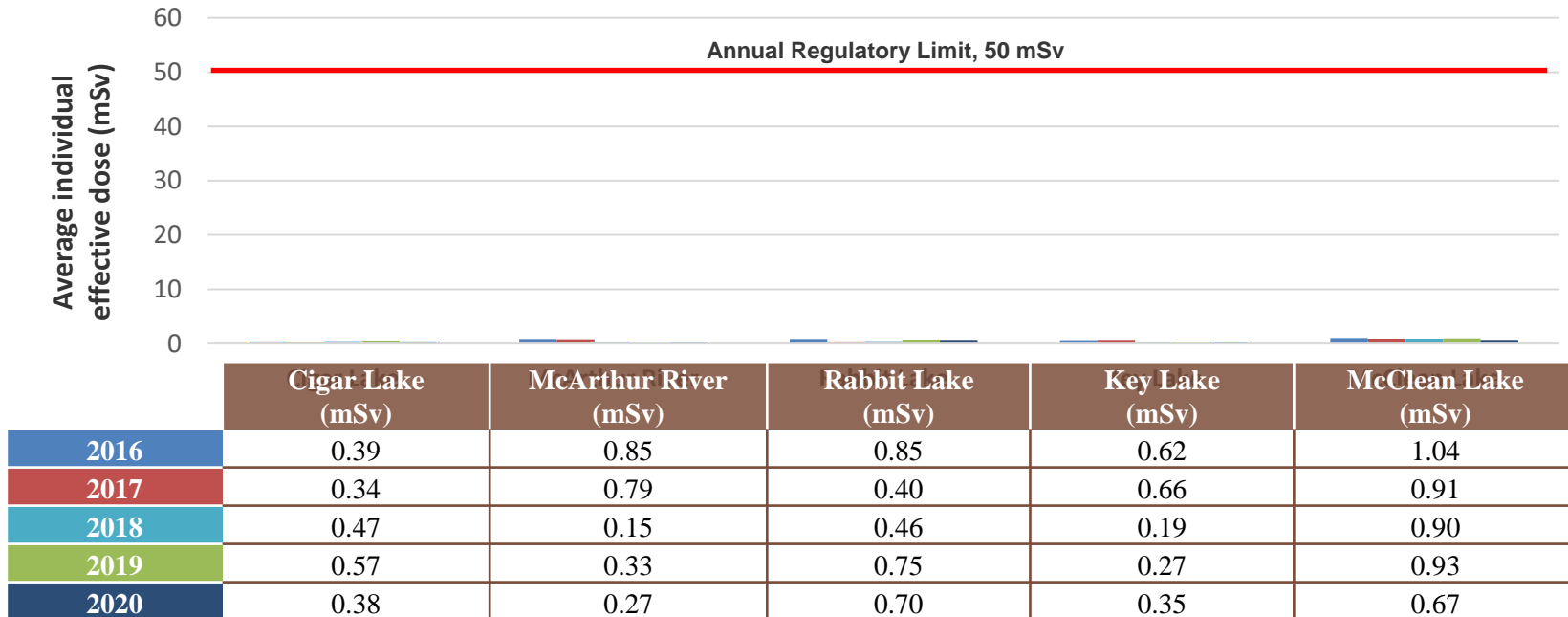


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# Radiation Protection Performance

## Average Individual Effective Dose



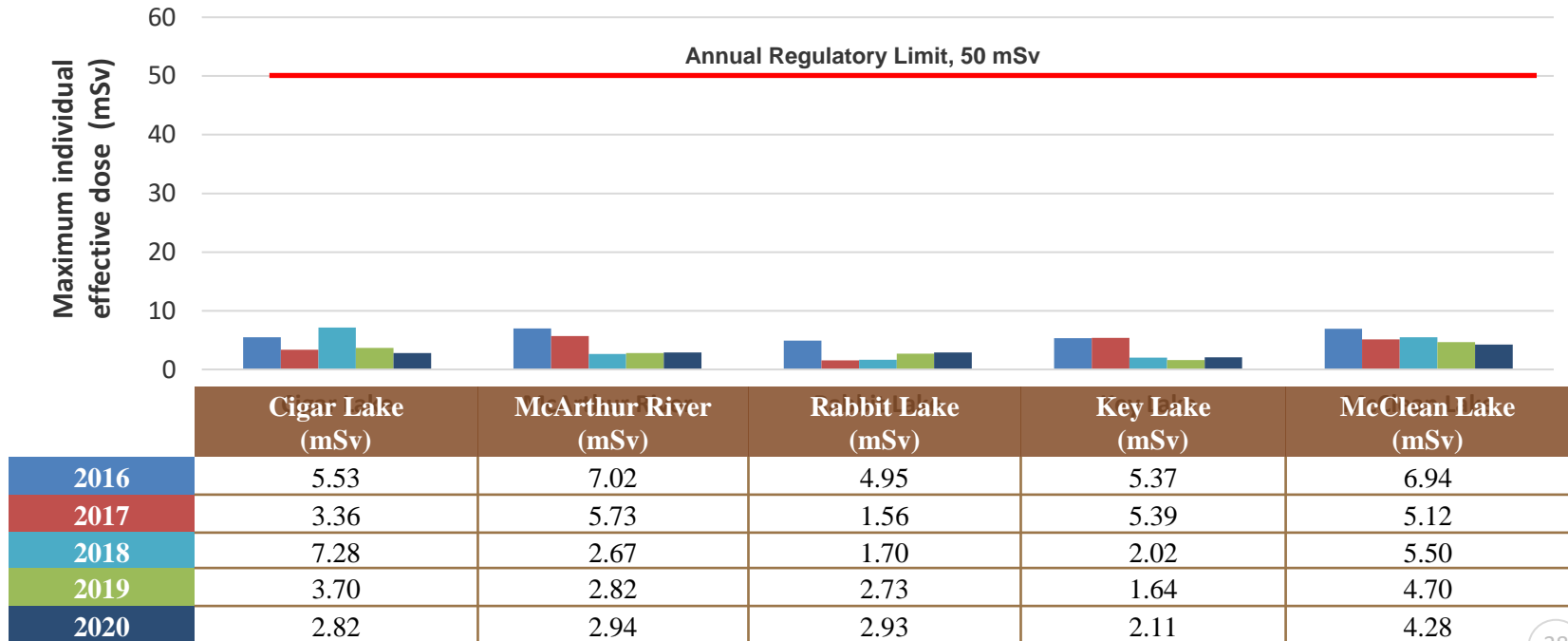


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# Radiation Protection Performance

## Maximum Individual Effective Dose





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## Radiation Protection Performance Exceedances

### Two weekly action level exceedances in 2020:

- One each at Cameco's Cigar Lake and Orano's McClean Lake
- In each case, a worker exceeded 1 mSv
- Cameco and Orano identified acceptable corrective actions
- Cigar Lake exceedance discussed in CMD 21-H2.A

Appropriate action taken and workers remain protected



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# Environmental Protection Performance

- Licensees' environmental protection programs and practices were effective in protecting the environment
- All effluent discharge concentrations were below *Metal and Diamond Mining Effluent Regulations*, and licence discharge limits
- 6 spills at operating sites; all of low safety significance
- Continued follow-up on 2017 Elliot Lake licence limit exceedance

CNSC staff's compliance activities verified the environment continues to remain protected





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## Environmental Protection Performance Exceedances

One action level exceedance at McClean Lake in 2020:

- Selenium in treated effluent
  - Selenium concentrations in the JEB water treatment plants' effluent exceeded the action level in March 2020
  - Orano submitted an updated Selenium Adaptive Management Plan

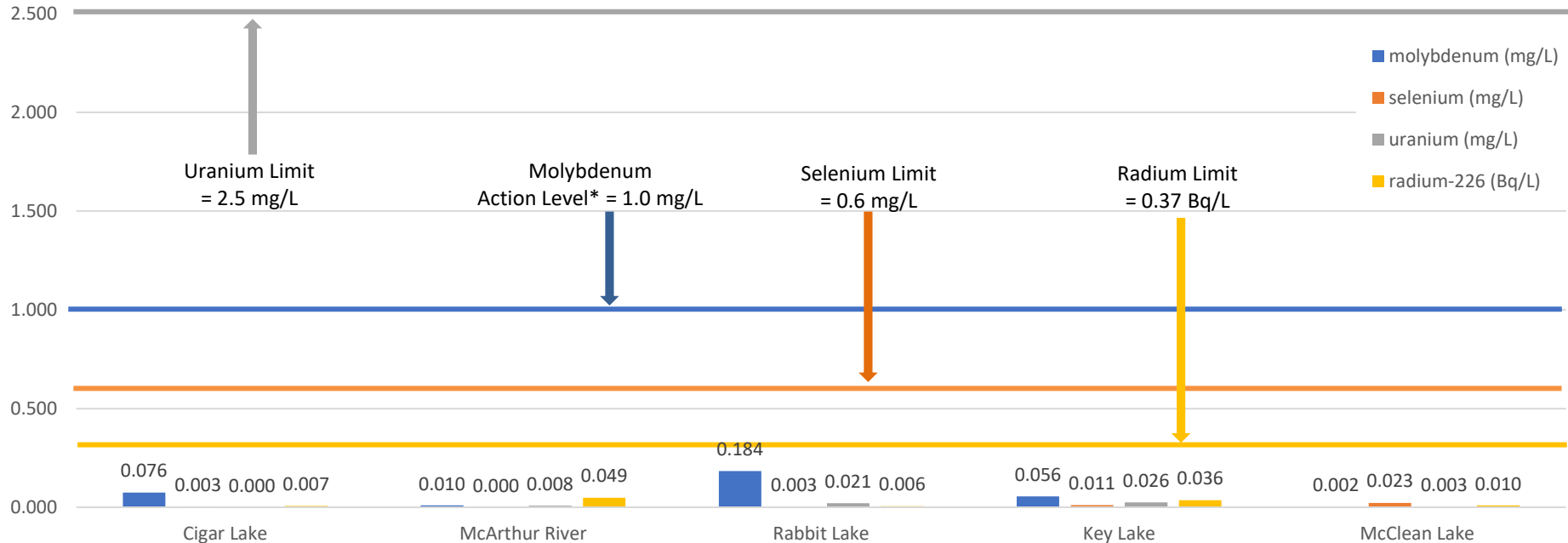
Appropriate action was taken; the environment remains protected



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# Environmental Protection Performance Average Effluent Discharge Values, 2020



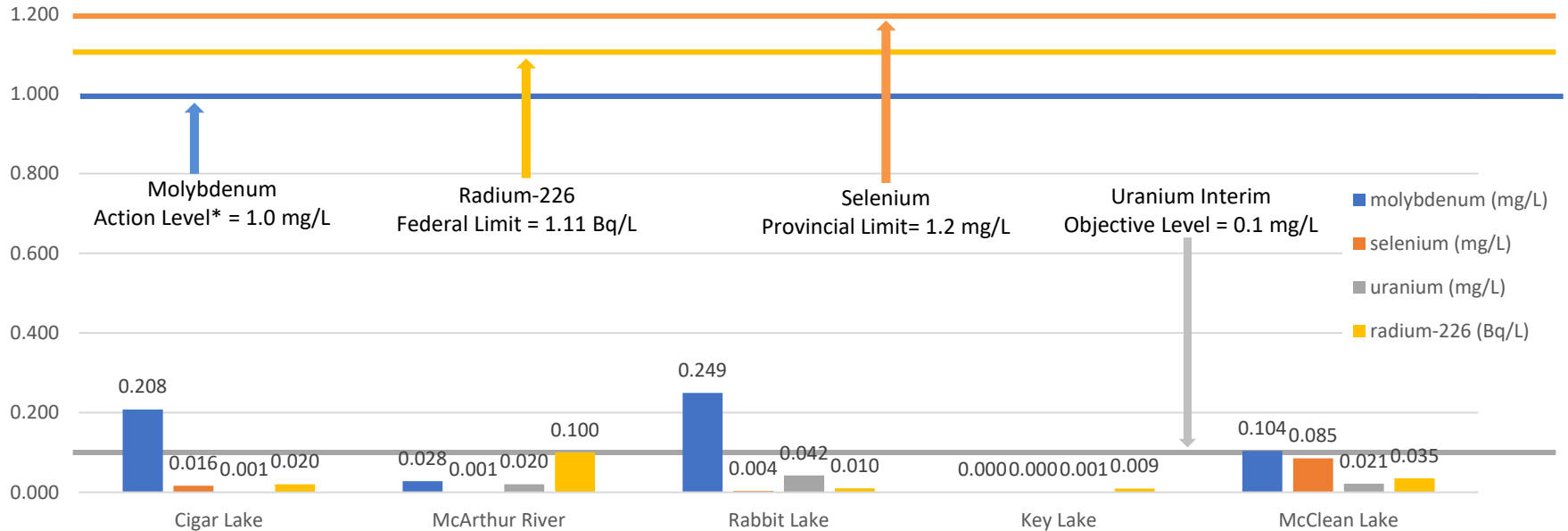
\* Key Lake values used for reference



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# Environmental Protection Performance Maximum Effluent Discharge Values, 2020



\* Key Lake values used for reference



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# INDIGENOUS ENGAGEMENT AND CONSULTATION



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# Indigenous Engagement and Consultation (1/2)

- Following public health recommendations, majority of engagement conducted remotely
- CNSC staff held dedicated information session on technical aspects of the ROR
- Continued engagement with Indigenous communities with an interest in the historic and decommissioned sites between 2018 and 2020
- Licensees continued to meet requirements of REGDOC-3.2.1, *Public Information and Disclosure*
- No Northern Saskatchewan Environmental Quality Committee activity due to COVID

CNSC staff maintain an active program of  
Indigenous and public consultation



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# Indigenous Engagement and Consultation (2/2)

## CNSC staff:

- continue to meet and provide updates on upcoming regulatory activities
- continue to hold an annual engagement meeting on this ROR
  - Notice of the Participant Funding opportunity for this ROR was sent to Indigenous Nations and communities with potential interest
- continue to engage with interested Indigenous Nations and communities on the:
  - Independent Environmental Monitoring Program
  - Historic and decommissioned sites in Ontario and the NWT, on request
- attend in-person community tours with respect to the Gunnar and Lorado sites (2018, 2019 and 2020) and the Beaverlodge site (2018 and 2019)



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# OTHER MATTERS OF REGULATORY INTEREST



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## Other Matters of Regulatory Interest

# Financial Guarantees

- Established to ensure sufficient funds are available to decommission a facility in the event that a licensee is unable to carry out the decommissioning
  - For active mines and mills in Saskatchewan, financial instruments are held by the Province
- CNSC staff verify that financial guarantees are sufficient, valid and in effect
- Financial guarantees must be accepted by the Commission

All licensees covered by this ROR have valid financial guarantees in effect





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## Other Matters of Regulatory Interest

# Independent Environmental Monitoring Program

- The CNSC implements an Independent Environmental Monitoring Program (IEMP)
- Samples were collected in the areas around the Cigar Lake Operation in August of 2020
- Results available at <http://nuclearsafety.gc.ca/eng/resources/maps-of-nuclear-facilities/iemp/cigar-lake.cfm>



Lake trout samples, vicinity of Cigar Lake.  
(Source: Canada North Environmental Services)

Results indicate that the public and the environment are protected



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# INTERVENTIONS



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## Interventions

# Participant Funding Program (PFP) and Interventions

Total of 8 interventions received:

PFP Recipients	Other intervenors
Curve Lake First Nation	Kineepik Metis Local w/ support of Northern Village of Pinehouse
English River First Nation	Canadian Nuclear Workers Council
Ya'thi Néné Lands and Resources Office	Saskatchewan Mining Association
	Lac La Ronge Indian Band
	Athabasca Joint Engagement and Environmental Subcommittee



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## Interventions Key Themes

- Appreciation of CNSC staff's licensing, compliance and engagement work, and of the information in the ROR
- Representation of Indigenous Nations and communities
- Concern regarding the effects of emissions, effluent, contaminants
- Desire for increased involvement in compliance and oversight
- Impact of decommissioning: past, present and future



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# CONCLUSIONS



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# Conclusions

## **CNSC staff confirm that all operational, historic and decommissioned mines and mills had:**

- Satisfactory performance
- Comprehensive radiation protection programs that adequately control radiation exposures, keeping doses ALARA
- Environmental protection programs to protect the environment
- Comprehensive health and safety programs to protect workers



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# Annex A – Errata

- Page 8 - Table 1.2
  - Lists 17 total inspections, should be 16; Rabbit Lake inspection postponed
  - Lists 11 non-compliances for 2020; should be 14
- Page 8 - Table 1.3
  - Lists 9 inspections for 2018 and 8 for 2019, should be 10 and 7, respectively
  - Lists 1 non-compliance for 2018 and 0 for 2019, should be 5 and 2, respectively
- Page 35 - Figure 2.10
  - Indicates spills at McArthur River and Rabbit Lake; there were none
- Page 77 - Section 5.2, 1<sup>st</sup> paragraph
  - “DPM” should be defined as “Diesel Particulate Matter”, rather than “Disintegrations per Minute”
- Page 166 – Section 19, 2<sup>nd</sup> paragraph
  - List omits Nordic site and shows Spanish-American as 2 sites
- Pages 182 and 183 - Appendix B, Table B-2
  - Omits 4 inspections in 2018: 1 at Gunnar, 1 at Denison/Stanrock, 2 at Elliot Lake
- Page 199 - Appendix H, Table H-1
  - Indicates 0 radiological action level exceedances at McClean Lake; there was 1 (Section 7.2)