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October 27, 2020

Mr. Pierre Tanguay Senior Project Officer, Nuclear Processing Facilities Division Canadian Nuclear Safety Commission 280 Slater Street PO Box 1046, Station B Ottawa, Ontario KIP 5S9

FILE DOSSIER REFERRED TO REFERE A

ADMIN 2020NOV021132



Re: Application for the Licence to Abandon the Saskatchewan Research Council SLOWPOKE-2 Facility (SRCSF).

The Saskatchewan Research Council SLOWPOKE-2 Facility (SRCSF) has a Non-Power Reactor Operating Licence, NPROL-19.01/2023 which is valid until June 30, 2023. The Canadian Nuclear Safety Commission (CNSC) held a hearing September 26, 2019 to consider an application from the Saskatchewan Research Council (SRC) to amend its Non-Power Reactor Operating Licence for its SLOWPOKE-2 non-power reactor and associated facilities. Following the deliberations and decision of the Commission on this matter, the Commission issued a licence amendment to allow for the decommissioning of the SRCSF.

The Decommissioning of SRCSF is now complete. This letter requests that a licence to Abandon the SRCSF be issued and that the NPROL-19.01/2023 in place at that time be revoked on the date the Licence to Abandon the SRCSF becomes effective. The proposed start date for the Licence to Abandon is March 1, 2021. This Application for a Licence to Abandon the SRCSF includes the following attachments:

- a) Attachment 1, which shows how each of the requirements of the Nuclear Safety and Control Act and Regulations are addressed in the Application and in the licensing support documents referenced in the Application; and
- b) Attachment 2, which, together with the licensing support documents referenced in it, provides the detailed information to address the requirements identified in Attachment 1.

The Decommissioning - End State Report will be submitted to the CNSC by November 6, 2020. If you have any comments or questions with regard to our requests or to the attached documents please do not hesitate to contact us.

Yours sincerely,

Mike Crabtree, President & CEO

SCAN

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Attachments:

- 1. Application for the Licence to Abandon SRCSF Attachment 1.
- 2. Application for the Licence to Abandon SRCSF-Attachment 2.

Saskatchewan Research Council Application for the Licence to Abandon SRCSF – Attachment 1

CNSC Document and associated Requirements	Section of the Application (Attachment 2) addressing the requirement	SRCSF Decommissioning Project Support Document (Note: If edition, date or revision number is not specifically mentioned below, the documents applicable to the SRCSF decommissioning project will at the latest revision issued as "approved for use".)
General Nuclear Safety and Control Regulations		
3. (1) An application for a licence shall contain the following information:		
(a) the applicant's name and business address;	A.1	- N/A
(b) the activity to be licensed and its purpose;	С	- N/A
(c) the name, maximum quantity and form of any nuclear substance to be encompassed by the licence;	В.3	- No nuclear substances beyond exemption levels will be present within the boundaries of the SRCSF as will be confirmed by the results of the final radiological survey presented in Section 7 of the End State Report, 147-01600-ESDR-002.
(d) a description of any nuclear facility, prescribed equipment or prescribed information to be encompassed by the licence;	B.2	- No nuclear facility, prescribed equipment or prescribed information will be present within the boundaries of SRCSF as will be confirmed by the Section 2 of End State Report, 147-01600-ESDR-002 which will provide the facility description including the identification of the materials, equipment and premises released/cleared from regulatory control

CNSC Document and associated Requirements	Section of the Application (Attachment 2) addressing the requirement	SRCSF Decommissioning Project Support Document (Note: If edition, date or revision number is not specifically mentioned below, the documents applicable to the SRCSF decommissioning project will at the latest revision issued as "approved for use".)
(e) the proposed measures to ensure compliance with the <i>Radiation Protection Regulations</i> , the <i>Nuclear Security Regulations and the Packaging and Transport of Nuclear Substances Regulations</i> , 2015;	E.1 F	- No measures to ensure compliance with Radiation Protection Regulations or Nuclear Security Regulations are required for the purpose of the Licence to Abandon the SRCSF. The radiological condition of the facility will be presented in Section 7 of the End State Report, 147-01600-ESDR-002.
(f) any proposed action level for the purpose of section 6 of the <i>Radiation Protection</i> <i>Regulations</i> ;	E.1	- None
(g) the proposed measures to control access to the site of the activity to be licensed and the nuclear substance, prescribed equipment or prescribed information;	F	- None
(h) the proposed measures to prevent loss or illegal use, possession or removal of the nuclear substance, prescribed equipment or prescribed information;	F	- None
(i) a description and the results of any test, analysis or calculation performed to substantiate the information included in the application;	G	 Environmental Impact Statement- Saskatchewan Research Council SLOWPOKE-2 Reactor Decommissioning, Version 3.0, Matrix Solutions document, April 2019. End-State Decommissioning Report, Candu Energy Document 147-01600-ESDR-002

CNSC Document and associated Requirements	Section of the Application (Attachment 2) addressing the requirement	SRCSF Decommissioning Project Support Document (Note: If edition, date or revision number is not specifically mentioned below, the documents applicable to the SRCSF decommissioning project will at the latest revision issued as "approved for use".) - All nuclear and hazardous waste has been disposed of, and no waste is stored within the boundaries of SRCSF at this time or at the time of Abandonment. This will be presented in the Section 9 of the End State Report, 147-01600-ESDR-002.		
(j) the name, quantity, form, origin and volume of any radioactive waste or hazardous waste that may result from the activity to be licenced, including waste that may be stored, managed, processed or disposed of at the site of the activity to be licenced, and the proposed method for managing and disposing of that waste;	B.4			
(k) the applicant's organizational management structure insofar as it may bear on the applicant's compliance with the Act and the regulations made under the Act, including the internal allocation of functions, responsibilities and authority;	A.2	- None		
(1) a description of any proposed financial guarantee relating to the activity to be licenced	Н	- None		

CNSC Document and associated Requirements	Section of the Application (Attachment 2) addressing the requirement	SRCSF Decommissioning Project Support Document (Note: If edition, date or revision number is not specifically mentioned below, the documents applicable to the SRCSF decommissioning project will at the latest revision issued as "approved for use".)		
(m)any other information required by the Act or the regulations made under the Act for the activity to be licenced and the nuclear substance, nuclear facility, prescribed equipment or prescribed information to be encompassed by the licence; and	None	- None		
(n) – Repealed by SOR/2008-119, s.2 (1.1) The Commission or a designated officer authorized under paragraph 37(2)(c) of the act may require any other information that is necessary to enable the Commission or the designated officer to determine whether the applicant (i) is qualified to carry on the activity to be licenced, or (ii) will, in carrying on that activity, make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national	N/A	- N/A		

Attachment 1 to the Letter to xxx, October 2020

CNSC Document and associated Requirements	Section of the Application (Attachment 2) addressing the requirement	SRCSF Decommissioning Project Support Document (Note: If edition, date or revision number is not specifically mentioned below, the documents applicable to the SRCSF decommissioning project will at the latest revision issued as "approved for use".)
security and measures required to implement international obligations to which Canada has agreed.		
(2) Subsection (1) does not apply in respect of an application for a licence to import or export for which the information requirements are prescribed by the <i>Nuclear Non-Proliferation Import and Export Control Regulations</i> , or in respect of an application for a licence to transport while in transit for which the information requirements are prescribed by the <i>Packaging and Transport of Nuclear Substances Regulations</i> , 2015. SOR/2008-119, s. 2; SOR/2015-145, s. 43.		

CNSC Document and associated Requirements	Section of the Application (Attachment 2) addressing the requirement	SRCSF Decommissioning Project Support Document (Note: If edition, date or revision number is not specifically mentioned below, the documents applicable to the SRCSF decommissioning project will at the latest revision issued as "approved for use".)
Application for Licence to Abandon		
4 An application for a licence to abandon a nuclear substance, a nuclear facility, prescribed equipment or prescribed information shall contain the following information in addition to the information required by section 3:		
(a) the name and location of the land, buildings, structures, components and equipment that are to be abandoned;	B.1	- End-State Decommissioning Report, Candu Energy Document 147-01600-ESDR-002, Section 2.
(b) the proposed time and location of the abandonment;	B.5	- N/A
(c) the proposed method of and procedure for abandonment; and	С	- N/A
(d) the effects on the environment and the health and safety of persons that may result from the abandonment, and the measures that will be taken to prevent or mitigate those effects.	environment and of persons that may onment, and the taken to prevent or E.2 - End-State Decommissioning Report, Candu E Document 147-01600-ESDR-002, Section 7.	

Attachment 1 to the Letter to xxx, October 2020

CNSC Document and associated Requirements	Section of the Application (Attachment 2) addressing the requirement	SRCSF Decommissioning Project Support Document (Note: If edition, date or revision number is not specifically mentioned below, the documents applicable to the SRCSF decommissioning project will at the latest revision issued as "approved for use".)
Class 1 Nuclear Facility Regulations		
8 An application for a licence to abandon a Class I nuclear facility shall contain the following information in addition to the information required by sections 3 and 4 of the <i>General Nuclear Safety and Control Regulations</i> :		
(a) the results of the decommissioning; and	D	- End-State Decommissioning Report, Candu Energy Document 147-01600-ESDR-002, Sections 3, 5, 7, 9 and 10.
(b) the results of the environmental monitoring programs.	E.3	The radiological condition of the facility will be presented in the Section 7 of the End-State Decommissioning Report, Candu Energy Document 147-01600-ESDR-002. No environmental monitoring activities are necessary for the purposes of Licence to Abandon SRCSF.

Attachment 2 to the Letter to x^{th} October 2020 RE: Application for the Licence to Abandon SRCSF

SASKATCHEWAN RESEARCH COUNCIL APPLICATION FOR THE LICENCE TO ABANDON THE SASKATCHEWAN RESEARCH COUNCIL SLOWPOKE-2 FACILITY (SRCSF) – ATTACHMENT 2

OCTOBER 2020

TABLE OF CONTENTS

A.	Data About the Applicant	3
	1 Applicant's Name and Business Address	3
Α	2 Applicant's Organizational Structure	4
В.	Data about the facility, nuclear substances, nuclear and hazardous waste, prescribed	
equi	pment, and prescribed information to be abandoned	5
В	.1 Location of Land, Buildings and Structures	5
В	.2 Description of Facility, Components and Equipment	5
В	.3 Nuclear Substances, Prescribed Equipment and Prescribed Information	6
В	.4 Nuclear and Hazardous Waste	
В	.5 Proposed Time and Location of Abandonment	7
C.	Activities to be licenced	
D.	Decommissioning Results	12
E.	Radiation protection and results of environmental monitoring programs	13
E	.1 Radiation Protection Plan and Action Levels	13
E	.2 Effects on Environment	13
E	.3 Results of the Environmental Monitoring Program	14
F.	Physical Protection/Security	15
G.	Analysis reports/technical reports	16
H.	Financial Guarantee	17
I	References	18

Attachment 2 to the Letter to x^{th} October 2020

RE: Application for the Licence to Abandon SRCSF

A. DATA ABOUT THE APPLICANT

A.1 Applicant's Name and Business Address

Applicant's Full Name: The Saskatchewan Research Council

Head Office Address:

125-15 Innovation Boulevard Saskatoon, Saskatchewan S7N 2X8

Business Address:

125-15 Innovation Boulevard Saskatoon, Saskatchewan S7N 2X8

Saskatchewan Research Council (SRC) SLOWPOKE-2 Physical Location:

SRC Environmental Analytical Laboratories

Address:

102 - 422 Downey Road, Saskatoon, Saskatchewan S7N 4N1

SRC Facility Manager's Address:

Philip Rees

CSO & Facilities Manager Saskatchewan Research Council 125 - 15 Innovation Boulevard Saskatoon, SK, Canada S7N 2X8 Voice: +1.306.385.4024 Philip.Rees@src.sk.ca

A.2 Applicant's Organizational Structure

The end state objective of decommissioning activities is to achieve conditions that will allow the return of areas occupied by the **Saskatchewan Research Council SLOWPOKE-2 Facility** (SRCSF) to unrestricted use, as will be presented in Section 3 of the End State Report (Reference [1]).

At the completion of the decommissioning activities the reactor core and the radioactive hazardous waste have been removed from the SRCSF and no prescribed equipment, prescribed information or nuclear substances beyond clearance levels (Reference [1]) are present within the boundaries of the SRCSF. SRC plans to terminate the long-term lease agreement and return the building possession to SPM (Saskatchewan Property Management) after the completion of the decommissioning work and issuance of the Licence to Abandon by the CNSC, allowing unrestricted use of the space occupied by the facility. There was no change in the foot print of the building during the decommissioning work. The SRC President and CEO, has the responsibility for the oversight of administration of the space occupied by SRCSF.

B. DATA ABOUT THE FACILITY, NUCLEAR SUBSTANCES, NUCLEAR AND HAZARDOUS WASTE, PRESCRIBED EQUIPMENT, AND PRESCRIBED INFORMATION TO BE ABANDONED

B.1 Location of Land, Buildings and Structures

The SRCSF is located in the Innovation Place Research Park in Saskatoon and the building that houses the facility was one of the first buildings constructed in the Research Park in 1980. The Research Park is home to a number of applied research facilities engaged in the development of industrial and agricultural products and processes.

The South Saskatchewan River runs on the west side 0.7km. The Yellow Head Highway (Hwy 16) runs approximately 0.7km on the east and 1.0km on the north side. College Drive (local Hwy 5) runs 1.1km on the south side. There is no residential area within this envelope. The closest residential area is 0.8km on the east side beyond the Hwy 16. The map of the local area is presented in Figure B-1.

The SRC SLOWPOKE-2 reactor resides in the SRC Environmental Analytical Laboratories which is located on 422 Downey Road in the Innovation Place Research Park in Saskatoon, SK. The land at the Innovation Place Research Park is owned by the University of Saskatchewan, it has been leased on long term basis to SOCO (Saskatchewan Opportunities Corporation) and SPM in order to establish a Research Park. The building that houses SRCSF (422 Downey Road) is owned, operated and maintained by SPM and SRC is under a long term leased agreement. The layout of SRC buildings is shown in Figure B-2. The floor plan of the Analytical Laboratories in presented in Figure B-3 which also shows the space occupied by the SRCSF.

B.2 Description of Facility, Components and Equipment

The SRCSF consists of 4 rooms as shown in Figure B-4. The description, room numbers and sizes are:

- 1. Room143, uranium analysis laboratory (5.85m x 5.85m)
- 2. Room 144, gamma spectroscopy laboratory (5.85m x 5.85m)
- 3. Room 145, radioactive storage room (2.25m x 5.85m)
- 4. Room 146, reactor room (9.6m x 5.85m)

The only entrance to the SRCSF is through the double doors leading from the Radiochemistry Laboratory (Room 139) see Figure B-3, into the Room 143. The entrance to the reactor room (Room 146), in only through the Room 143. All walls of the Room 146 (reactor room) are a minimum of 20 cm masonry construction. The floor is an on-grade concrete slab with no crawl space below. The roof over the Room 146 (reactor room) is a heavy gauge steel. The radioactive samples were stored in the Room 145 and the gamma spectroscopy was performed in the Room 144. The total floor area of SRCSF is 137.5m² and the Room 146 (reactor room) occupies 55.7m². The ceiling height of Room 146 (reactor room) is 3.4m. There is an additional space between the ceiling tiles and the hard ceiling is an additional 0.6m for a total of 4.0m. The concrete floors are covered with linoleum tiles throughout the facility.

Attachment 2 to the Letter to x^{th} October 2020

RE: Application for the Licence to Abandon SRCSF

The SRC Analytical building that houses the SRCSF was occupied by 70 staff. The space has been vacated with the relocation of the Environmental Analytical Laboratory. There was one building technician on site in this space during the regular work days. Rooms 140, 141, 142.1 and 142.2 (Figure B-3) have also been vacated.

In an adjoining, but completely separate section of SRC Analytical building, the Potash Corporation of Saskatchewan has a pilot plant operation. It is located on the (west of Rooms 122, 123 and 124, see Figure B-3). North of SRC Analytical (Figure B-2), there is a parking lot and the Innovation Place Atrium building that houses offices and research laboratories for several tenants of the Research Park including some SRC facilities. Immediately south of the building is a roadway (Downey Road). There is a parking lot across the roadway and a building that houses offices and laboratories for tenants of the Research Park.

A detailed description of the SRCSF at the completion of decommissioning activities will be provided in Section 2 of Reference [1].

B.3 Nuclear Substances, Prescribed Equipment and Prescribed Information

No prescribed equipment, prescribed information or nuclear substances beyond clearance levels will be present in the SRCSF at the time of abandonment.

The reactor core and other radioactive and hazardous waste have been removed and sent to other licensed facilities.

The SRCSF will be confirmed to be free of contamination, below the allowable IAEA clearance levels as will be presented in Section 4 of the End State Report (Reference [1]).

A systematic final status survey was performed in the reactor pool, in the exhaust ventilation system, and in the facility rooms affected by decommissioning work to verify that no residual contamination, beyond the clearance levels, is present following the decommissioning activities. The surveys were performed to verify that decommissioning activities have not resulted in radioactive contamination being spread to other areas of the facility, and to ensure that those areas which had originally contained radiological materials were within the accepted release limits. The absence of any contamination within the facility confirmed that the measures taken to decontaminate and survey all items leaving the facility were fully effective in eliminating the spread of radioactive contamination. The results of both surveys will be included in Section 7 of the End State Report (Reference [1]). The results will demonstrate that all the structures, equipment and components remaining within the boundaries of the SRCSF meet the clearance level criteria and that the SRCSF is in a state to be released for unrestricted use.

B.4 Nuclear and Hazardous Waste

The name, quantity, form, origin and the volume of the waste resulting from the decommissioning process, including the final destinations will be presented in Section 9 of the End State Report (Reference [1]).

Attachment 2 to the Letter to x^{th} October 2020

RE: Application for the Licence to Abandon SRCSF

All waste has been disposed of, and no waste will be stored within the boundaries of the SRCSF at the time of abandonment. Therefore no waste management process is required for the scope of this Licence.

B.5 Proposed Time and Location of Abandonment

The proposed time for the abandonment of the SRCSF and the release of the rooms Room143, Room 144, Room 145, Room 146 in building that houses SRCSF (422 Downey Road) in the SRC Environmental Analytical Laboratories for use of the landlord SPM is March, 2021, subject to CNSC's issuance of the Licence to Abandon.



Figure B-1 Aerial View of the SRC Environmental Analytical Laboratories



- 1. National Hydrology Research Centre 11 Innovation Soulevard
- 2. Canadian Space Agency 305 Resources Row 3. SED Systems Inc.

Figure B-2 Location of Reactor and SRC Building in

the

Innovation

- 18 innovation Boulevard The Galleria
- 15 Innovation Boulevard Boffins Club 106 - 111 Research Drive
- The Atrium 111 Research Drive

- SRC Analytical Laboratories 422 Downey Road
- Dr. Jack McFault Building 421 Downey Road
- 9. 411 Downey Road
- 10. Dr Burton Craig Building 407 Downey Road
- 11. L.F. Kristjanson Biotechnology Complex West - 410 Downey Road East - 106 Research Drive
- 12. Blo Processing Centre 107 Research Drive

- 13. 108 Research Drive
- 14. 110 Research Drive
- 15. 112 Research Drive
- 16 The Concourse 116 Research Drive
- 17. 121 Research Drive
- 18. Maintenance / Energy Centre
- 1 North Access Road 19. 3 North Access Road



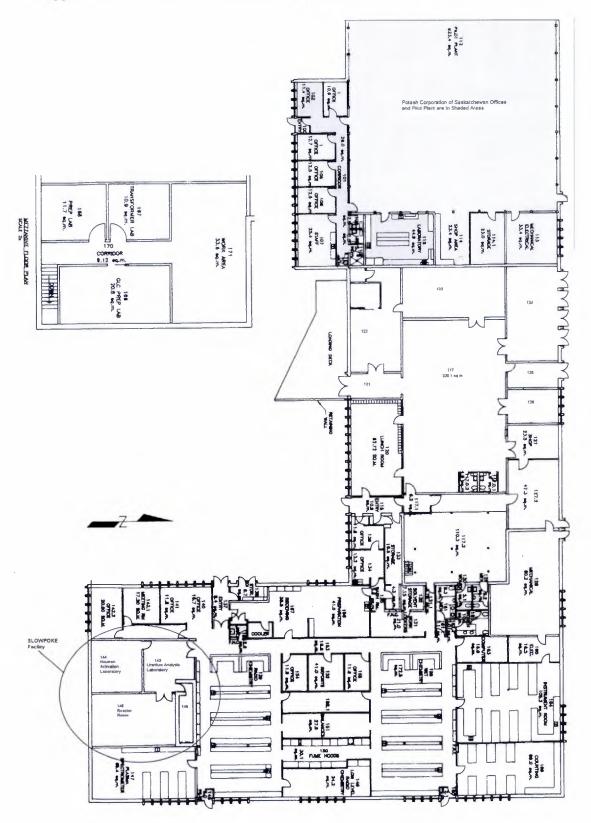


Figure B-3 SRC Analytical Floor Plan

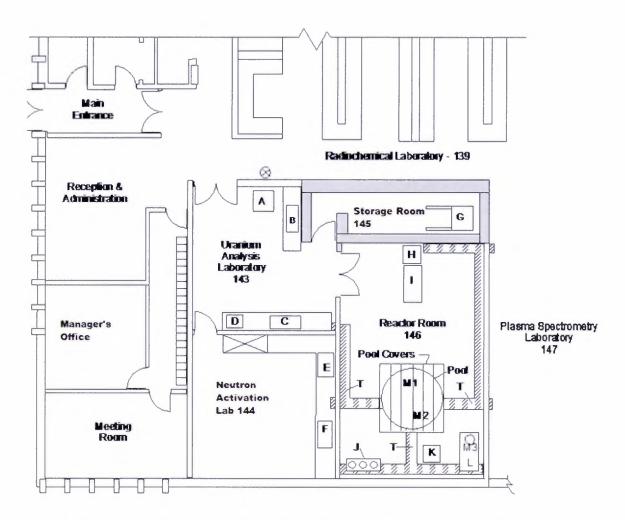


Figure B-4 Layout of SRCSF Reactor Room and Associated Labs

Attachment 2 to the Letter to x^{th} October 2020

RE: Application for the Licence to Abandon SRCSF

C. ACTIVITIES TO BE LICENCED

This application is for the Licence to Abandon the SRCSF as described in Section 0. At this time the reactor core and the radioactive and the hazardous waste have been removed from the SRCSF and the reactor rooms and the reactor pool has been cleaned and surveyed to ensure that no radioactive products are present above the clearance levels, as will be documented in Section 7 of the End State Report. No licensed activities will be conducted under the license to Abandon the SRCSF.

The proposed effective date for the Licence to Abandon the SRCSF is March 1, 2021.

D. DECOMMISSIONING RESULTS

The results of the decommissioning activities will be presented in the End State Report (Reference [1]), which will be structured as follows:

- Section 1 will provide an introduction/overview of the report;
- Section 2 will provide the facility description including the identification of the materials, equipment and premises released/cleared from regulatory control
- Section 3 will provide the description of the objectives of the decommissioning and
 the extent to which this objective will have been reached at the completion of the
 decommissioning activities;
- Section 4 will provide the radiological criteria used as the basis for the release of equipment, buildings or structures or areas from regulatory control;
- Section 5 will provide brief descriptions of the major decommissioning activities;
- Section 6 will identify the institutional controls to remain in place at the facility, if applicable;
- Section 7 will provide a summary of the final radiological condition of any remaining equipment, structures, or areas, with reference to the final radiological survey report;
- Section 8 will provide the list of structures, areas, and equipment designated for restricted use, if any, including any requirements for further monitoring, if applicable;
- Section 9 will provide descriptions of waste quantities and disposition methods;
- Section 10 will provide a summary of the radiological doses received by workers during the decommissioning activities, including a comparison of the actual doses received with the initial estimates;
- Section 11 will provide a summary of any abnormal events or incidents occurred during the decommissioning process, as applicable; and
- Section 12 will provide a discussion of the lessons learned during the decommissioning process.

E. RADIATION PROTECTION AND RESULTS OF ENVIRONMENTAL MONITORING PROGRAMS

E.1 Radiation Protection Plan and Action Levels

At this time and at the time of abandonment the reactor core and the radioactive hazardous waste have been removed from the SRCSF and have been sent to other licensed facilities. The reactor rooms and the reactor pool have been cleaned and surveyed as will be documented in the Section 7 of the End State Report (Reference [1]). The radiological doses received by the workers during execution of the decommissioning activities will be reported in the Section 10 of the End State Report.

No other measures to ensure compliance with the *Radiation Protection Regulations* or the *Nuclear Security Regulations* are needed and no action levels, as defined in Section 6 of the *Radiation Protection Regulations*, are required for the purpose of the Licence to Abandon the SRCSF.

E.2 Effects on Environment

An Environment Impact statement (EIS) was produced for the SRCSF Decommissioning (Reference [2]). The following conclusions were made in the Environmental Impact Statement:

- This is a low risk project, as this project drew on experiences gained from other similar projects like University of Alberta and Dalhousie University.
- SRCSF decommissioning, uses the same methodology (as used in University of Alberta and Dalhousie University) for the same type of SLOWPOKE facility.
- This project uses experienced personnel with prior experience decommissioning a similar type of reactor.
- Potential of releases of contaminants to the environment low and no residual adverse effects are expected.
- The decommissioning process has very little impact on surrounding natural and social environment.
- There is no need to modify the surrounding building during decommissioning and no need to change the surrounding natural environment
- Reactor components can be easily removed from the building and directly shipped for disposal.
- The only substantive impact on the environment would be from accidental release of radioactive material during transportation. The risk and impact of such an accident will be reduced by using the appropriate packaging and adhering to applicable transport and security regulations.

Note: As on date of writing this application, the radioactive material have been transported to their final destination safely, without incidents and adhering to the applicable transport and security regulations.

Adequate provision is being made for protection of workers, the public, and for the
protection of the environment. The potential risk to workers, the public, and the
environment is assessed taking into consideration normal operating conditions,
malfunctions, and the potential for accidents.

Furthermore, as part of CNSC review and Commissions hearing on September 29, 2019 regarding decommissioning of SRCSF the following conclusions were made:

- SRC's environmental protection programs and compliance verification activities (e.g., inspections) continue to meet CNSC regulatory requirements.
- CNSC reviewed the Detailed Decommissioning Plan (DDP) and EIS prepared for the decommissioning of the SRC's SLOWPOKE-2 reactor project and found them to be satisfactory to meet CNSC requirements.
- SRC has and will continue to make adequate provision for the protection of the environment and the health of persons.
- The Commission examined SRC's environmental protection programs at the SRCSF, it concluded that the "The Commission is satisfied that the SRCSF environmental protection programs continue to meet the specifications of REGDOC-2.9.1".

At the completion of the SRCSF decommissioning, the contaminated equipment and other nuclear and non-nuclear components have been removed from the SRCSF. The End State (Reference [1]) of SRCSF will be documented. No nuclear substances beyond the clearance levels as defined in the IAEA safety guide, *Application of the Concepts of Exclusion, Exemption and Clearance*, RS-G-1.7 and the unconditional clearance levels as specified in the Schedule 2 of the CNSC's *Nuclear Substances and Radiation Devices Regulations* are present within the boundaries of SRCSF.

No effects on the environment and on the health and safety of persons are anticipated in regard to the abandonment of the SRCSF. Therefore, no measures need to be taken after the abandonment of the SRCSF.

E.3 Results of the Environmental Monitoring Program

Measurements of indoor air quality and water quality were conducted during the decommissioning. The water released from the SRCSF met the release criteria accepted by the CNSC and the City of Saskatoon, as will be documented in the End Sate Report. The results of the monitoring activities will be provided in Section 7 of the End State Report. No environmental monitoring is required for the purpose of the Licence to Abandon SRCSF.

Attachment 2 to the Letter to x^{th} October 2020

RE: Application for the Licence to Abandon SRCSF

F. PHYSICAL PROTECTION/SECURITY

For the purposes of the decommissioning activities a site security plan was submitted to the CNSC. After the completion of decommissioning activities, the reactor core and the radioactive and the hazardous waste have been removed from SRCSF. No prescribed equipment, prescribed information or nuclear substances beyond clearance levels are present within the boundaries of SRCSF.

No specific measures to control the access to the site or to prevent the loss or illegal use, possession or removal of nuclear substances, prescribed equipment or prescribed information will be required for the abandonment of SRCSF.

G. ANALYSIS REPORTS/TECHNICAL REPORTS

The technical documents that provide the evaluations and the results of the decommissioning activities and the supporting information regarding the abandonment and the return to unrestricted use of SRCSF:

- Environmental Impact Statement- Saskatchewan Research Council SLOWPOKE-2 Reactor Decommissioning, Version 3.0, Matrix Solutions document, April 2019.
- End-State Decommissioning Report, Candu Energy Document 147-01600-ESDR-002 (to be issued)

The results and conclusions of these technical documents are presented in various sections of this application. References to the relevant sections of these technical reports are made to identify the source of information provided throughout this application.

Attachment 2 to the Letter to x^{th} October 2020

RE: Application for the Licence to Abandon SRCSF

H. FINANCIAL GUARANTEE

No expenses are anticipated with regard to the abandonment of SRCSF and no financial guarantee is required for the Licence to Abandon the SRCSF.

Attachment 2 to the Letter to x^{th} October 2020

RE: Application for the Licence to Abandon SRCSF

I. REFERENCES

- [1] End-State Decommissioning Report, Candu Energy Document #147-01600-ESDR-002 (to be issued).
- [2] Environmental Impact Statement- Saskatchewan Research Council SLOWPOKE-2 Reactor Decommissioning, Version 3.0, Matrix Solutions document, April 2019.



	Document Number	Revision
	147-01600-ESDR-002	0
Nuclear Project Number	Contract Number	Page
655352	255905	1
Customer Document Number	Customer Name SASKATCHEWAN RESEAF (SRC)	RCH COUNCIL

Project:

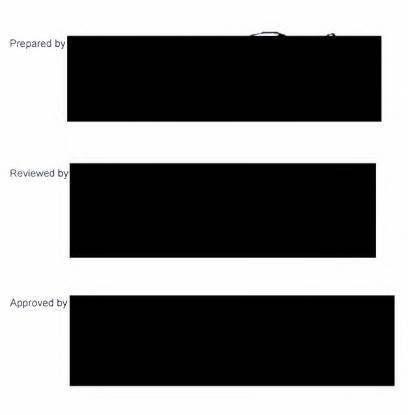
CANDU Services

655352	255905		APPROVED FOR USE	2020/10/28
FINANCIAL PROJECT NO	CONTRACT	CHANGE ORDER	DESCRIPTION	RELEASE DATE



	Document Number	Revision
	147-01600-ESDR-002	0
Nuclear Project Number	Contract Number	Page
655352	255905	2
Customer Document Number	Customer Name SASKATCHEWAN RESEAF (SRC)	RCH COUNCIL

Project: CANDU Services





Nuclear Project#: 655352 Contract#: 255095 Page: 3 of 201

Customer Doc#: Customer: Saskatchewan Research Council (SRC)

Title: END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2 FACILITY

Revision History

Ref. Procedure NU-907020-PRO-001

Revis	ion History				
Revision		Details of Rev.	Prepared By	Reviewed By	Approved By
No	Date (yyyy/mm/dd)				
D 1	2020/10/13	Issued for Internal "Review and Comment"			1
D2	2020/10/19	Issued for External "Review and Comment"			
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				Y	

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Doc#: 147-01600-ESDR-002

Rev: 0

Nuclear Project#: 655352 Contract#: 255095 Page: 4 of 201

Customer Doc#: Customer: Saskatchewan Research Council (SRC)

Title:

END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2

FACILITY

TERMS AND ABBREVIATIONS

BV Labs Bureau Veritas Laboratories

Candu Energy Inc.

Canadian Nuclear Laboratories CNL **CNSC** Canadian Nuclear Safety Commission Canadian Standards Association CSA DDP Detailed Decommissioning Plan DΙ **Decommissioning Instructions DWP** Decommissioning Work Package **ESDR** End State Decommissioning Report High Efficiency Particulate Air **HEPA**

HEU High Enriched Uranium

HVAC Heating Ventilation and Air Conditioning
IAEA International Atomic Energy Agency
ICAM Integrated Continuous Air Monitor

ISO The International Organization for Standardization

LLD Lessons Learned Document LRC Lower Reactor Container NAA Neutron Activation Analysis NEW Nuclear Energy Worker

NPROL Non-Power Reactor Operating Licence
NORM Naturally Occurring Radioactive Material

PPE Personal Protective Equipment

QAP Quality Assurance Plan
RAM Radioactive Material
RMC Royal Military College

SLOWPOKE Safe Low Power Kritical Experiment SPM Saskatchewan Property Management

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TABLE OF CONTENTS

SECTION		PAGE
COVER PAGES		1
REVISION HISTOR	RY	3
TERMS AND ABBI	REVIATIONS	4
1. 2.	INTRODUCTION FACILITY DESCRIPTION	8 9
2.1 2.2 2.3 2.4 2.5	Name and Address of the Facility Site Description, Location and Boundaries of the Facility Type of Facility Buildings and Areas Affected by Decommissioning Materials, Equipment and Premises Released from Regulatory Control	9 9 14 15 16
3.	DECOMMISSIONING OBJECTIVES	17
3.1	Objectives	17
3.1.1 3.1.2 3.1.3 3.1.4	Objectives of Room 146 (Reactor Room) Objectives of Room 145 Objectives of Room 144 Objectives of Room 143	18 19 20 21
3.2	Decommissioning Strategy	21
4.	RELEASE CRITERIA	23
4.1 4.2	Non-Radiological Contaminants Radiological Contaminants	23 23
4.2.1 4.2.2	Liquids Solids	23 23
4.2.2.1 4.2.2.2	Solids Removed Solids Retained	24 24
4.2.3	Airborne Contaminants	24
5.	DECOMMISSIONING ACTIVITIES	25
5.1	Major Decommissioning Activities	25
5.1.1 5.1.2 5.1.3 5.1.4 5.1.5 5.1.6 5.1.7	Defueling Preparations – DWP #1 Core Removal – DWP #2 Reactor Components Removal – DWP #3 Auxiliary Components Removal – DWP #4 Pool Cleanup – DWP #5 Final Survey – DWP #6 Civil Work and Restoration – DWP #7	25 25 26 27 27 27 27
5.2	Decommissioning Schedule	28
5.36.7.	Budgeted versus Actual Decommissioning Cost REMAINING ENTITIES AND INSTITUTIONAL CONTROLS FINAL RADIOLOGICAL STATUS	28 29 30

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TABLE OF CONTENTS

SECTION		PAGE
7.1 7.2	Final Radiological Condition Areas Remaining Above the Release Criteria	30 30
8. 9.	STATE RELEASE WASTE QUANTITIES AND DISPOSITION	31 32
9.1 9.2 9.3 9.4 9.5	Planned versus Actual Quantities Radioactive Waste, Cleared Materials and Other Special Wastes Disposition to Storage Sites Material Buried on the Site Airborne or Liquid Waste Emissions	32 32 32 32 32
10. 11. 12. 13.	PERSONNEL DOSES ABNORMAL OCCURRENCES AND INCIDENTS LESSONS LEARNED REFERENCES	33 34 35 36
TABLES		
No Tables.		
FIGURES		
Figure 1 Figure 2 Figure 3 Figure 4 Figure 5	Map of SRC & University of Saskatchewan Located in Saskatoon Innovation Place Layout SRC Environmental Analytical Laboratory Layout SRCSF and associated rooms Floor Plan Potash Corp and SRC Analytical	10 11 13 13 14
APPENDICES		
Appendix B THE AM Appendix C SUMMA Appendix D SUMMA Appendix E RADIOA Appendix F IRRADIA Appendix G POOL V Appendix H REACT Appendix I IRRADIA	CORDS OF DECISION FOR ISSUING THE NON-POWER REACTOR LICENCE AMENDMENT MENDED NON-POWER REACTOR OPERATING LICENCE ARY OF BASELINE RADIOLOGICAL SURVEYS ARY OF END STATE RADIOLOGICAL SURVEYS ACTIVE WASTE DATA SHEETS ATED FUEL BILL OF LADING AND RECEIPT OF DELIVERY WATER SAMPLE DATA & APPROVALS OR POOL SAMPLING PLAN ATED CONCRETE IN DRUMS — GAMMA SPEC DITIONAL RELEASED ITEMS CT SCHEDULE	37 63 70 77 94 124 128 167 168 175
Appendix K PROJE Appendix L tCAM R		19 19

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 Nuclear Project#:
 655352
 Contract#:
 255095
 Page:
 7 of 201

 Customer Doc#:
 Customer:
 Saskatchewan Research Council (SRC)

 Title:
 END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2 FACILITY

TABLE OF CONTENTS

SECTION	PAGE
Appendix M DOSE REPORT	197
Appendix N PROJECT BUDGET UPDATE SRCSF	201

		Doc#:	147-01600-ESDF	R-002	Rev:	0
Nuclear Project#:	655352	Contract#:	255095	Page	8 of	201
Customer Doc#:	Customer. Saskatchewan Research Council (SRC))	
Title:	END STATE DI	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPOK	(E-2	

1. INTRODUCTION

This document is the End State Decommissioning Report (ESDR) for the decommissioning of the Saskatchewan Research Council SLOWPOKE-2 Facility (SRCSF) located in Saskaton, Saskatchewan.

This ESDR is provided as committed in the Quality Assurance Plan (QAP) [1] and Detailed Decommissioning Plan (DDP) [2], which were issued in support of the application for the amendment of the Operating Licence to allow the decommissioning of the SRCSF.

The Canadian Nuclear Safety Commission (CNSC) decommissioning planning document, CNSC Regulatory Guide G-219 Decommissioning Planning for Licensed Activities [3] provides guidelines for the content and structure of ESDRs that are to be submitted to the CNSC for acceptance following the completion of physical decommissioning activities. ESDR is structured to meet the requirements outlined in the CNSC guidelines and meet the requirements of the Canadian Standards Association (CSA) Standards CSA N286-12 [4] and CSA N294-09 [5]. The structure and content of the report are consistent with Annex D of CSA N294-09 [5].

Decommissioning activities have been completed in the SRCSF. Security and other requirements continue to be in place, as required per Security Plan [6].

The ESDR is a supporting document to the Saskatchewan Research Council's application in order to revoke the current Operating Licence and to obtain the License to Abandon the space that is occupied by SRCSF allowing for unrestricted access.

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		Doc#.	147-01600-ESD	₹-002	Rev.	U		
Nuclear Project#	655352	Contract#.	255095	Page	9 of	201		
Customer Doc#:		Customer: Saskatchewan Research Co				ouncil (SRC)		
Title:	END STATE DI FACILITY	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPOK	E-2			

2. FACILITY DESCRIPTION

2.1 Name and Address of the Facility

The name and address of the facility is:

Saskatchewan Research Council SLOWPOKE-2 Facility 422 Downey Road Saskatchewan Research Council, Saskatoon, SK S7N 4L8

The holder of Licence is:

M. Crabtree Saskatchewan Research Council 125-15 Innovation Boulevard, Saskatoon, SK S7N 2X8

2.2 Site Description, Location and Boundaries of the Facility

The SRCSF is located in the Innovation Place Research Park in Saskatoon and the building that houses the facility was one of the first buildings constructed in the Research Park in 1980. The Research Park is home to a number of applied research facilities engaged in the development of industrial and agricultural products and processes.

The South Saskatchewan River runs 0.7 km on the west side. The Yellow Head Highway (Hwy 16) runs approximately 0.7 km on the east and 1.0 km on the north side. College Drive (local Hwy 5) runs 1.1 km on the south side. There is no residential area within this envelope. The closest residential area is 0.8 km on the east side beyond the Hwy 16. The map of the local area is presented in Figure 1.

The SRC SLOWPOKE-2 reactor resides in the SRC Environmental Analytical Laboratories which is located on 422 Downey Road in the Innovation Place Research Park in Saskatoon, SK. The land at the Innovation Place Research Park is owned by the University of Saskatchewan, it has been leased on long term basis to SOCO (Saskatchewan Opportunities Corporation) and SPM (Saskatchewan Property Management) in order to establish a Research Park. The building that houses SRCSF (422 Downey Road) is owned, operated and maintained by SPM and SRC is under a long term leased agreement. The layout of SRC buildings is shown in Figure 2. The floor plan of the Analytical Laboratories in presented in Figure 3, which also shows the space occupied by the SRCSF.

The SRC plans to terminate the long term lease agreement and return the building possession to SPM after the completion of the decommissioning work and issuance of the Licence to Abandon by the CNSC, allowing unrestricted use of the space occupied by the facility. There were no changes made to the foot print of the building during the decommissioning work.

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		Doc#:	147-01600-ESDR	-002	Rev: U
Nuclear Project#:	655352	Contract#:	255095	Page:	10 of 20
Customer Doc#:		Customer	Saskatchewan R	esearch Coun	cil (SRC)
Title:	END STATE D	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPO	KE-2

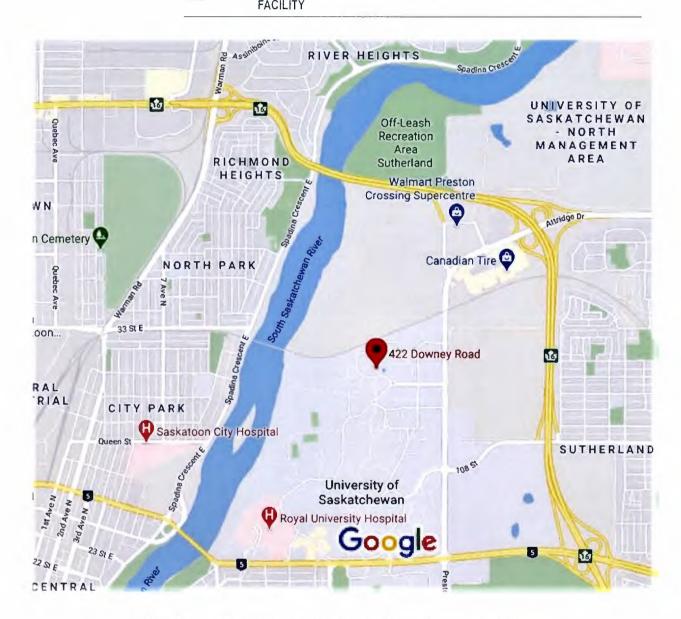


Figure 1 Map of SRC & University of Saskatchewan Located in Saskatoon

Source: http://www.maps.google.com

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Nuclear Project#:	655352	Contract#:	255095	Page:	11 of 201
Customer Doc#:		Customer:	Saskatchewan	Research Coun	cil (SRC)
Title:	END STATE DE	ECOMMISSIONIN	G REPORT FOR	SRC SLOWPO	KE-2

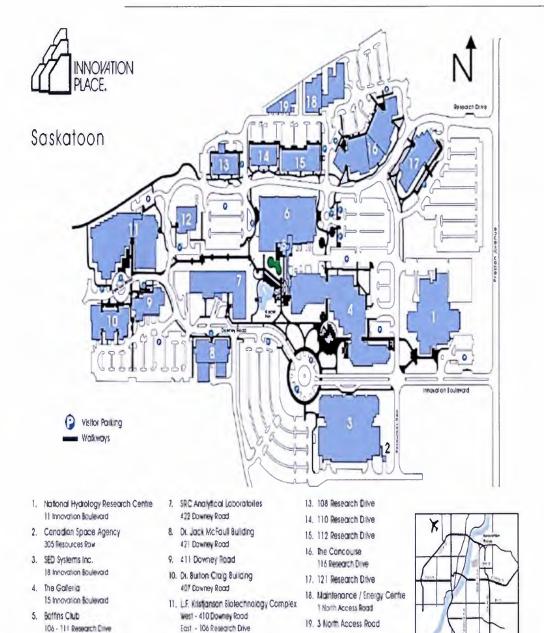


Figure 2 Innovation Place Layout

12. Bio Processing Centre

107 Research Dave

Source: SRC

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6. The Atrium

111 Research Drive

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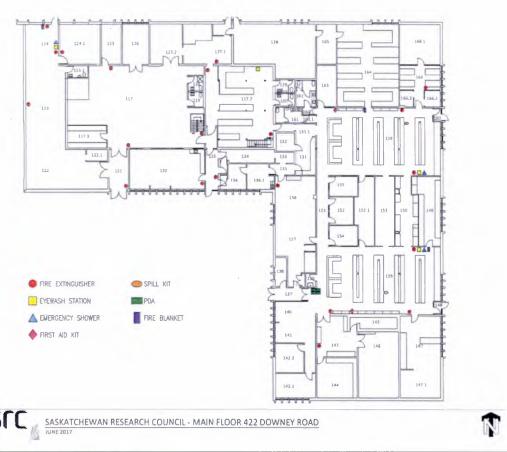
		Doc#.	147-01600-ESDI	R-002	Rev U
Nuclear Project#:	655352	Contract#:	255095	Page:	12 of 201
Customer Doc#:		Customer	Saskatchewan I	Research Coun	cil (SRC)
Title:	END STATE DE	COMMISSIONIN	IG REPORT FOR	SRC SLOWPO	KE-2

The SRCSF consists of 4 rooms as shown in Figure 4. The description, room numbers and sizes are:

- 1. Room 143, uranium analysis laboratory (5.85m x 5.85m)
- 2. Room 144, gamma spectroscopy laboratory (5.85m x 5.85m)
- 3. Room 145, radioactive storage room (2.25m x 5.85m)
- 4. Room 146, reactor room (9.6m x 5.85m)

The only entrance to the SRCSF is through the double doors leading from the Radiochemistry Laboratory (Room 139) see Figure 3, into the Room 143. The entrance to the reactor room (Room 146), in only through the Room 143. All walls of the Room 146 (reactor room) are a minimum of 20 cm masonry construction. The floor is an on-grade concrete slab with no crawl space below. The roof over the Room 146 (reactor room) is a heavy gauge steel. The radioactive samples were stored in the Room 145 and the gamma spectroscopy used to be performed in the Room 144.

The total floor area of SRCSF is 137.5m² and the Room 146 (reactor room) occupies 55.7m². The ceiling height of Room 146 (reactor room) is 3.4m. There is an additional space between the ceiling tiles and the hard ceiling is an additional 0.6m for a total of 4.0m. The concrete floors are covered with linoleum tiles throughout the facility.



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Figure 3 SRC Environmental Analytical Laboratory Layout

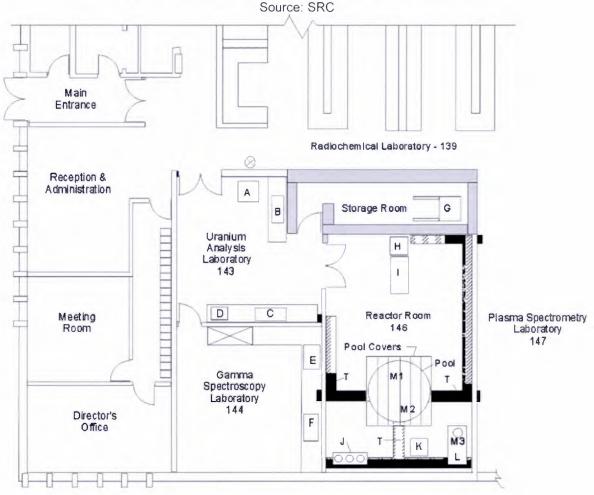


Figure 4 SRCSF and associated rooms Source: SRC

The SRC Analytical building that houses the SRCSF was occupied by a staff of 70. The space has been vacated with the relocation of the Environmental Analytical Laboratory. There was one building technician on site in this space during the regular work days. Rooms 140, 141, 142.1 and 142.2 (Figure 3) have also been vacated.

In an adjoining, but completely separate section of SRC Analytical building, the Potash Corporation of Saskatchewan has a pilot plant in operation. It is located on the west of Rooms 122, 123 and 124 (see Figure 5). North of SRC Analytical (Figure 2), there is a parking lot and the Innovation Place Atrium building that houses offices and research laboratories for several tenants of the Research Park including some SRC facilities. Immediately south of the building is a roadway (Downey Road). There is a parking

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		D00#.	147-01000-2301	1-002	1104.
Nuclear Project#:	655352	Contract#:	255095	Page:	14 of 201
Customer Doc#:		Customer:	Saskatchewan	Research Coun	cil (SRC)
Title:	END STATE DE	ECOMMISSIONIN	NG REPORT FOR	SRC SLOWPO	KE-2

Doc# 147 01600 ESDD 002

lot across the roadway and a building that houses offices and laboratories for tenants of the Research Park.

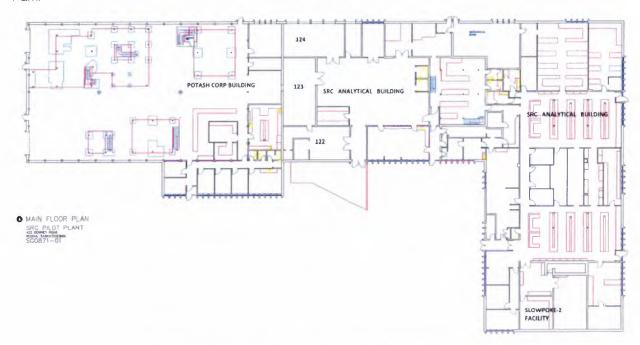


Figure 5 Floor Plan -- Potash Corp and SRC Analytical Source: SRC

2.3 Type of Facility

The SRCSF was a pool type reactor featuring a highly enriched uranium core surrounded by beryllium reflectors, and cooled by light water via natural convection. Biological shielding was provided by the water filled pool, and moveable concrete shielding blocks which covered the pool. The SRCSF major and auxiliary components were located in Rooms 146, 144, and 143. The radioactive samples were stored in the Room 145.

The SRCSF was established in order to operate purely for scientific purposes. The reactor was used as an analytical tool to analyze for uranium and organic halides. It was used primarily as a neutron source for NAA (Neutron Activation Analysis) and in support of research programs of the Saskatchewan University and other institutions, agencies, and industrial groups in Western Canada. The facility was also helping provide uranium analysis by using the delayed neutron counting technique. More recently, the reactor had been used as a teaching tool in cooperation with the University of Saskatchewan. First criticality of the reactor was achieved on March, 1981 and the reactor was formally transferred to the SRC on March, 1981. The SRC was registered by an operating licence from the CNSC NPROL-19.00/2023 valid through June 2023 [7].

The SRCSF operated under a Non-Power Reactor Operating Licence NPROL – 19.00/2023 [7], until an amendment to the licence was issued. The Record of Decision for this amendment is presented in Appendix A. The SRCSF is currently in the decommissioning process, according to the Non-Power Reactor Licence Amendment (NPROL – 19.01/2023 valid until June 2023), which was issued to Saskatchewan Research Council pursuant to the Nuclear Safety and Control Act, on December 6, 2019.

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		DOC#;	147-01000-ESDI	K-UUZ	Rev.	U
Nuclear Project#:	655352	Contract#.	255095	Page:	15 of	201
Customer Doc#:		Customer	Saskatchewan I	Research Coun	cil (SRC)
Title:	END STATE DI FACILITY	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPOI	KE-2	

447 04600 ECDD 003

The Amended Non-Power Reactor Operating Licence includes both: operation and decommissioning activities, which allows the SRC to decommission the SRCSF and meet the regulatory requirements for decommissioning. The amended licence is presented in Appendix B. Over the period that the SRCSF was in service, it was successfully operating with no significant interruptions.

The reactor was licensed to operate at a maximum nominal thermal neutron flux of 1E+12 n/cm²/s. The primary use of the reactor had been as a neutron source to perform neutron activation analysis (NAA) and to produce radionuclides. At the time of commissioning the reactor the licence allowed a maximum excess reactivity of 3.4mk.

During the initial years of reactor operation, numerous uranium analyses were performed. The demand for the uranium analyses gradually declined; however, the decline had been offset by increased demand for neutron activation analyses. On average, the reactor operates three days a week, five hours a day. As per April 2018, the reactor had been operated for 97,930E+11 flux-hours. Reactor usage prior to the decommissioning was relatively constant over the previous decade at around 3,000E+11 flux-hours per year.

The additional neutron flux seen by the components and fuel during the period leading up to the decommissioning, following the cessation of operation for the purpose of irradiating samples, was predicted to result in a negligible increase in activity relative to the values indicated [8].

2.4 Buildings and Areas Affected by Decommissioning

A radiological baseline survey was performed throughout all the four rooms (143, 144, 145, and 146,) of the facility. The SRCSF layout is presented in Figure 4. This included random direct checks and smears (biased to most probable contaminated locations) to establish an understanding of the contamination levels. No contamination above absolute release criteria and no unexpected radiation fields were found in the baseline survey. The baseline survey data for the facility is presented in Appendix C.

Room 143 was a Uranium Analysis Laboratory. It was equipped with uranium analysis system which was removed from SRCSF before decommissioning work began. The irradiation controllers and a sample irradiation receiver were dismantled. This equipment was checked for contamination and disposed for recycle/reuse. The end state radiological survey was performed to ensure there is no removable or fixed contamination in excess of the established release criteria. No contamination was found in this room exceeding release criteria. The end state radiological survey data of the facility is presented in Appendix D.

Room 144 was equipped with gamma spectroscopy equipment which was removed from the facility before decommissioning work began. The irradiation controllers and irradiation receivers located in room 144 were dismantled. This equipment was checked for contamination and disposed for recycle/reuse within SRC. An initial radiological baseline survey was performed in the Room 144 to ensure there was no removable or fixed contamination in excess of the established release criteria. No contamination was found in this room exceeding release criteria. The end state radiological survey data of the facility is presented in Appendix D.

Room 145 was used as a storage room for radioactive samples. All radioactive material was removed from this room. There was no hazardous material left in the Room 145. Previously used ion exchange columns of the reactor purification system and the previously used beryllium shims were removed from this room, packaged into Type A container and shipped to CNL as a radioactive waste. The radioactive waste data sheets and associated gamma spec reports regarding all radioactive waste shipped to CNL is

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		Doc#	147-01600-ESDI	₹-002	Rev	0
Nuclear Project#:	655352	Contract#:	255095	Page:	16 of	201
Customer Doc#:		Customer	Saskatchewan I	Research Coun	cil (SRC)
Title:	END STATE D	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPO	KE-2	

presented in the Appendix E. The end state final radiological survey was performed in this room to ensure there was no removable or fixed contamination in excess of established release criteria.

Room 146 was a Reactor Room. The reactor was located inside a pool built into the floor of this room. The only access to the reactor room is through entrance from Room 143. Radiological baseline surveys were performed in this room and the data is presented in Appendix C.

All radioactive and hazardous material was removed. It includes, irradiated fuel, reactor components, auxiliary components, activated concrete, and lead acid batteries.

The end state final systematic survey was performed and the data is presented in Appendix D.

2.5 Materials, Equipment and Premises Released from Regulatory Control

The premises expected to be released from regulatory control, as a result of the decommissioning work, is the space occupied by SRCSF as identified in Figure 3 above, consisting of the rooms and the remaining amenities described in the previous section. As shown in Section 7 of this report, the remaining premises, materials and equipment meet the clearance criteria for unrestricted use stipulated in the Radiation Protection Requirements applicable to the SRCSF Decommissioning Project [9], for surface contamination or in the CNSC "Nuclear Substances and Radiation Devices Regulations", SOR/2000-207 [10] for activity concentrations.

The highly enriched uranium (HEU) fuel was removed from the reactor in the presence of IAEA, CNSC, and US DOE representatives. The HEU fuel was transferred into its dedicated transfer flask (F-257) which was later shipped to the licenced facility (Savannah River Site in US) for final storage. The Bill of Lading and the confirmation of the irradiated fuel received by US DOE are presented in Appendix F.

During the execution of the decommissioning work, all radioactive material which left the SRCSF (excluding the HEU fuel) was packaged into Type A containers and transported to the licensed facility of CNL in Chalk River. Ontario for long term storage.

Numerous samples were collected during decommissioning in order to determine the radionuclide inventory and chemical/biological contaminants prior to their disposal. The list of samples is presented below:

- The reactor water and pool water mixture was run through the reactor water deionizer (ion exchange column) for several days to remove the radionuclides. A sample from the mixed water was obtained and analysed for radionuclides and chemical/biological contaminants. The water sample was analyzed by the SRC for radionuclides and also by an external laboratory BV Labs (Bureau Veritas Laboratories) for other chemical/biological contaminants. The data is presented in Appendix G. The mixed pool water met the release criteria. The reports were sent to the City of Saskatoon and the CNSC. The City of Saskatoon accepted the report and allowed the water to be discharged into the sanitary sewer. The approval from the City of Saskatoon and recommendation from CNSC is presented in Appendix G.
- Gamma spectrometer analysis was performed on several samples of the reactor components.
 The gamma spec reports of the samples are presented in Appendix E. These reports were sent to CNL for acceptance as radioactive waste.
- Several samples of concrete from the reactor pool floor and wall was drawn in order to assess the extent of activation. All samples were analysed by gamma spectrometry. All concrete and rebar, that did not meet the unconditional release criteria, was removed and packaged. A detailed technical letter was written in support of this activity [11]. This letter will be re-submitted as a

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		Doc#:	147-01600-ESDI	R-002	Rev: 0
Nuclear Project#.	655352	Contract#.	255095	Page:	17 of 201
Customer Doc#:		Customer:	Saskatchewan I	Research Coun	cil (SRC)
Title:	END STATE DI FACILITY	ECOMMISSIONIN	G REPORT FOR	SRC SLOWPO	KE-2

separate document with the Application for the Licence to Abandon. Appendix H presents the sampling plan for concrete in the reactor pool. The details can also be found in the CNSC compliance inspection report [12].

- Part of the removed concrete was packaged and shipped to CNL to be stored as radioactive waste. Remaining part of the concrete is packaged in 6 industrial drums and is currently located in the SRC site. CNL has been contacted to accept this waste. It is planned that this waste will be shipped to CNL in the coming weeks. The site data sheets and gamma spectroscopy reports of this concrete have been provided to CNL for their internal process. A copy of email from SRC to CNSC which includes these reports is presented in Appendix I. A separate letter will be submitted to the CNSC after the concrete has been shipped to CNL waste storage facility.
- All equipment and material that met the unconditional release criteria was released from the SRC site after necessary radiological surveys for fixed and non-fixed contamination. The release forms for all the equipment and material that was released is presented in Appendix J. The majority of the equipment was shipped to local recycling and waste disposal facilities in the Saskatoon area. The other auxiliary reactor components were released to various facilities/organizations as per the Detailed Decommissioning Plan [2].

3. **DECOMMISSIONING OBJECTIVES**

3.1 **Objectives**

The end state objective for the decommissioning of the SRCSF is to have the Operating Licence revoked allowing the SRC unrestricted use of the building and services remaining in the space previously occupied by the facility.

At the completion of SRCSF decommissioning process, all contaminated and other equipment associated with the nuclear operation of SRCSF have been removed. The SRCSF has been confirmed as being below approved radioactive contamination criteria, below the allowable IAEA clearance limits as defined in RS-G-1.7 [13], IAEA Safety Standard Series; Application of the Concepts of Exclusion, Exemption and Clearance, August 2004, or below clearance criteria accepted by the CNSC. The unconditional clearance level limits are defined in Schedule 2 of SOR/2000-207 [10].

The ventilation system and other service systems (water, air, electrical) remain in service, and the structures associated with them are confirmed to be below the established unconditional release limits. The ventilation system was surveyed for radiological contamination and no contamination was found above unconditional release limits.

The reactor pool remains in place, and will be filled with grout after the necessary approval from the CNSC is obtained. It was confirmed that the structural materials and inner surface coating satisfy the applicable IAEA clearance limits and that radionuclides concentrations are below the unconditional limits.

The biological shielding blocks, other equipment and systems have been removed from the SRCSF, and have been sent to the appropriate waste management facilities. The unconditional release documentation is presented in Appendix J.

A radiation physics assessment report [8] was written in support of the SRCSF decommissioning. The [8] describes the acceptance criteria in further detail.

The irradiated fuel was sent to the US DOE Savannah River Site (SRS). All other radioactive equipment and radioactive waste was shipped to licensed facilities at CNL as a RAM shipment. The associated documentation is presented in Appendix E.

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		DOCH.	147-01000-1301	(-002	rtev. U
Nuclear Project#:	655352	Contract#:	255095	Page:	18 of 201
Customer Doc#:		Customer:	Saskatchewan I	Research Coun	cil (SRC)
Title:	END STATE DE	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPO	KE-2

Doo#: 447 04600 ECDD 000

The results of the radiological surveys and assessments presented in Section 7 of this report confirm that the premises, equipment, and materials located in the space previously occupied by SRCSF meet the clearance criteria for unrestricted use stipulated in the Radiation Protection Requirements applicable to SRCSF [9] for surface contamination, or in the CNSC "Nuclear Substances and Radiation Devices Regulations" SOR/2000-207 [10] for activity concentrations.

All equipment and waste that met the unconditional release criteria was sent to appropriate waste management facilities in the local area or the destinations where they could be reused/recycled.

3.1.1 Objectives of Room 146 (Reactor Room)

The end state objective of this room is for it to be free of all radioactive and hazardous material.

The end state objectives of Room 146 as presented in DDP [2] were:

- o Remove irradiated fuel and ship to SRS (Savanah River Site) in F-257 flask.
- Remove all reactor components from the reactor pool and ship to CNL as radioactive waste in Type A containers, this includes upper reactor container, LRC, all irradiated beryllium components, irradiation tubes, thermocouple, flux detector, control rod, and all fasteners etc.
- Remove reactor water purification system will be shipped to CNL as radioactive waste in Type A container.
- o Remove pool water purification system and reuse.
- Remove reactor control console and reuse or recycle.
- Remove sump pump to dispose as non-radioactive waste.
- Remove all irradiation controllers and receivers for reuse or recycle.
- Remove all fixed or loose radioactive contamination in excess of regulatory limits.
- Process the reactor pool water (mixed water) through ion exchange columns and dispose the water in the sewer after achieving the free release criteria.
- Remove irradiated part of the reactor pool floor which will include the concrete and the rebar and dispose as radioactive waste.
- Ensure there is no hazardous material left in the room e.g. radioactive samples resulting from irradiation in the reactor, waste materials (gloves, irradiated vials and swipes).
- Fill the reactor pool and the trenches with concrete after necessary inspection and clearance from the CNSC.

The end state objectives for this room were completed and are presented below:

- Irradiated fuel was removed and shipped to SRS site in F-257 flask.
- All reactor components from the reactor pool were removed and shipped to CNL as radioactive waste in Type A containers; this includes upper reactor container, lower reactor container, all irradiated beryllium components, all irradiation tubes, thermocouple, flux detector, control rod, and plastic tubing.
- Reactor water purification system and previously used ion exchange columns were removed and shipped to CNL as radioactive waste in Type A containers.
- Pool water purification system was removed, it was unconditional released, and shipped to Ecole Polytechnique SLOWPOKE-2 facility.

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		Doc#:	147-01600-ESDI	R-002	Rev:	U
Nuclear Project#:	655352	Contract#:	255095	Page:	19 of	201
Customer Doc#:		Customer:	Saskatchewan I	Research Coun	cil (SRC)
Title	END STATE DE	ECOMMISSIONIN	G REPORT FOR	SRC SLOWPO	KE-2	

- Reactor control console was removed, unconditional released and shipped to IAEA.
- Sump pump was not removed from the room as there's still a need to remove the water in case of flooding.
- Irradiation controllers were removed and recycled/reused.
- All surfaces were surveyed for fixed and non-fixed contamination. There is no fixed or non-fixed contamination in excess of the regulatory limits present in this room. The end state radiological survey data is presented in Appendix D.
- The reactor pool water (mixed water) was processed through ion exchange column and disposed the water into the sewer after achieving the approvals from the City of Saskatoon, see Appendix G.
- All the irradiated parts of the reactor pool floor and wall was removed. There is no irradiated concrete left in the reactor pool which is above UCL [11]. The reactor pool Areas 48 and 48.5 (as shown in Appendix D) showed elevated counts. This area was treated for further removal of the paint, due to which the count rates were elevated. After removal of the paint, the count rate reduced significantly. The maximum residual fixed/non-fixed activity was 0.24 Bq/cm². The details are provided in Reference [12] (Page 30).
- Cadmium capsules were packaged and transported to Environmental and Analytical Laboratory (Atrium Building) for reuse/recycle.
- o There is no radioactive or hazardous material left in the room.
- The reactor pool and the trenches have NOT been filled with concrete/grout as yet. The necessary clearance from the CNSC is awaited. SRC will execute this activity and inform/update CNSC after the completion of this end state objective.

3.1.2 Objectives of Room 145

The Room 145 (Radioactive Storage Room) contained radioactive materials. It was used as a storage room for the previously used ion exchange columns of the reactor purification system and the previously used beryllium shims.

The end state objectives of Room 145 as presented in DDP [2] were:

- Remove previously used ion exchange columns and ship to CNL as radioactive waste in Type A container.
- Remove all radioactive beryllium shims and ship to CNL as radioactive waste in Type A
 container. These will be packaged with the remaining beryllium components removed from the
 reactor.
- The non-irradiated beryllium shims will be shipped to RMC of Canada for use at their SLOWPOKE-2 facility or returned back to CNL for safe storage.
- Ensure there is no loose or fixed contamination in excess of the regulatory limits.
- Ensure there is no hazardous material left in the room e.g. radioactive samples resulting from irradiation in the reactor, waste materials (gloves, irradiated vials and swipes).

The end state objectives for this room were completed and are presented below:

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		Doc#:	147-01600-ESDR-002	2	Rev.	0
Nuclear Project#:	655352	Contract#:	255095	Page:	20 of	201
Customer Doc#:		Customer.	Saskatchewan Rese	arch Coun	cil (SRC)
Title	END STATE D	ECOMMISSIONIN	IG REPORT FOR SRC	SLOWPO	KE-2	

- Previously used ion exchange columns were removed and shipped to CNL as radioactive waste in Type A container.
- All irradiated beryllium shims were removed and shipped to CNL as radioactive waste in Type A container. These were packaged with the remaining beryllium components removed from the reactor.
- The un-irradiated beryllium shims (that were never used in the reactor) were shipped to RMC for use at their SLOWPOKE-2 facility.
- All surfaces were surveyed for fixed and non-fixed contamination. There is no fixed or non-fixed contamination in excess of the regulatory limits present in this room. The end state radiological survey data is presented in Appendix D.
- There is no radioactive or hazardous material left in the room.

3.1.3 Objectives of Room 144

The Room 144 (Gamma Spectrometry Lab) contained gamma spectroscopy equipment and irradiation controller/receiver.

The end state objectives of Room 144 as presented in DDP [2] were:

- o Remove gamma spectroscopy equipment from the room and relocate in SRC for recycle/reuse.
- Perform radiation survey of the removed components.
- o Remove all irradiation controllers and receivers for reuse or recycle.
- Dispose the plastic tubing as radioactive waste that connects the auxiliary components to the reactor.
- Ensure there is no loose or fixed contamination in excess of the regulatory limits.
- Ensure there is no hazardous material left in the room e.g. radioactive samples resulting from irradiation in the reactor, waste materials (gloves, irradiated vials and swipes).

The end state objectives for this room were completed and are presented below:

- The gamma spectroscopy equipment was removed from the Room 144 before the decommissioning work began. This equipment is being used by the SRC at a different location.
- Radiation survey of the removed equipment was performed.
- One (1) irradiation controller and one (1) receiver were shipped to IAEA. The remaining irradiation controllers and receivers were shipped to the RMC of Canada SLOWPOKE-2 facility for recycle/reuse.
- The plastic tubing which connected the auxiliary components to the reactor was packaged into Type A containers and shipped to CNL as radioactive waste.
- All surfaces were surveyed for fixed and non-fixed contamination. There is no fixed or non-fixed contamination in excess of the regulatory limits present in this room. The end state radiological survey data is presented in Appendix D.
- There is no radioactive or hazardous material left in the room.

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		DOC#.	147-01000-ESD	1-002	Rev.	U
Nuclear Project#	655352	Contract#:	255095	Page:	21 of	201
Customer Doc#:		Customer	Saskatchewan	Research Coun	cil (SRC)	
Title:	END STATE DE	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPO	KE-2	

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3.1.4 Objectives of Room 143

The Room 143 served as the entrance to the facility and also used as uranium analysis laboratory. It contained the same equipment. The room contained irradiation controllers and a sample irradiation receiver.

The end state objectives of Room 143 as presented in DDP [2] were:

- Perform radiation survey of the removed components.
- The uranium analysis system will be removed from the SRCSF after the planned shutdown of the reactor in April 2019 but before the decommissioning work begins. This system will be reused or recycled.
- o Remove all irradiation controllers and receivers for reuse or recycle.
- Dispose the plastic tubing as radioactive waste that connects the auxiliary components to the reactor.
- o Ensure there is no loose or fixed contamination in excess of the regulatory limits.
- Ensure there is no hazardous material left in the room e.g. radioactive samples resulting from irradiation in the reactor, waste materials (gloves, irradiated vials and swipes).

The end state objectives for this room were met and completed and are presented below:

- o Radiation survey of the all the removed equipment was performed.
- The uranium analysis system was removed from the SRCSF after the planned shutdown of the reactor in April 2019 and transferred to the RMC (Royal Military College) of Canada SLOWPOKE-2 facility for reuse.
- All irradiation controllers and receivers were shipped for future use to the RMC of Canada SLOWPOKE-2 facility.
- The plastic tubing which connected the auxiliary components to the reactor was packaged into Type A containers and shipped to CNL as radioactive waste.
- All surfaces were surveyed for fixed and non-fixed contamination. There is no fixed or non-fixed contamination in excess of the regulatory limits present in this room. The end state radiological survey data is presented in Appendix D.
- There is no radioactive or hazardous material left in the room.

3.2 Decommissioning Strategy

The decommissioning strategy chosen by SRC was a prompt removal of fuel and all radioactive materials; in order to get the operating licence revoked permitting an unrestricted use of the facility.

The decommissioning work started after the NPROL amendment had been issued by the CNSC. The Record of Decision for this amendment is presented in Appendix A. The SRCSF is currently in the decommissioning process, according to the Non-Power Reactor Licence Amendment (NPROL – 19.01/2023 valid until June 2023), which was issued to SRC pursuant to the Nuclear Safety and Control Act, on December 6, 2019.

The decommissioning work included removal of reactor components followed by packaging and transportation to licensed radioactive waste facility in CNL. The decommissioning work also included obtaining concrete core samples from the reactor pool for activation assessment followed by removal of

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		DOC#:	147-01000-E3D1	(-002	Rev. U
Nuclear Project#:	655352	Contract#	255095	Page	22 of 201
Customer Doc#.		Customer.	Saskatchewan F	Research Coun	cil (SRC)
Title:	END STATE DI FACILITY	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPO	KE-2

.. 447 04000 ECDD 000

all activated concrete which was above the unconditional release criteria. End state radiation surveys were performed to ensure no fixed or non-fixed contamination is present above the clearance levels.

CNSC performed a compliance inspection from July 8 to 10, 2020, which included the areas of environmental protection, waste management, and radiation protection. The CNSC compliance inspection report (SRC-2020-01) was issued on September 22, 2020 [12]. The report concluded the following:

- There are no solids present above unconditional clearance levels in the SRC facility.
- There is no liquid present above unconditional clearance levels in the SRC facility.
- The iCAM was in use on continuous basis (24 hours a day) throughout the decommissioning process in order to monitor the quality of air in the reactor room. There was no incident to report for any airborne contamination in the reactor room except due to radon progeny.
- A non-compliance was noted by the CNSC [12], that the gamma characterization of the remaining concrete in the drums was not provided at the time of writing of this inspection report. However, the non-compliance has now been addressed by performing the gamma characterization of the concrete in the drums. A copy of the email from SRC to CNSC and the characterization report is presented in Appendix I. This provides the confirmation that the non-compliance has been addressed.

Further details can be found in the inspection report [12].

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		Door,	147-01000-2301	1-002	1104.	U
Nuclear Project#:	655352	Contract#.	255095	Page:	23 of	201
Customer Doc#:		Customer:	Saskatchewan I	Research Coun	cil (SRC)
Title ⁻	END STATE DI FACILITY	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPO	KE-2	

Doc#: 147-01600-FSDR-002

4. RELEASE CRITERIA

4.1 Non-Radiological Contaminants

The Hazard Analysis that was carried out in preparation for the decommissioning work in the SRCSF recognized that beryllium and cadmium presented potential non-radiological hazards for the workers. As a result, the decommissioning work instructions included appropriate precautions and requirements for protective equipment and clothing to minimize the risk to the workers. These precautions were adhered throughout the decommissioning process which resulted in an incident free work.

4.2 Radiological Contaminants

The radiological contaminants expected during the decommissioning activities were in liquid, solid, and airborne forms. Estimates of the radiological contaminants were documented in References [9] and [11], which served as bases for irradiated waste management and collective dose assessment in addition to evaluating the radiological hazards.

Information about the types of contaminants encountered during decommissioning and the criteria used for the release of radiological contaminants from the SRCSF is provided in the following sections.

4.2.1 Liquids

The liquid discharge was the water from the reactor pool (approximately 28,000 litres), which was discharged into the City of Saskatoon sanitary sewer system after it had been treated to reduce the activity to be below the release limits accepted by the CNSC and the City of Saskatoon. Appendix G provides the acceptance criteria which were used to support the decision to release the water. Appendix G also provides the detailed results of the analysis of water samples. The analysis results confirm that the release criteria were satisfied and the water was released into the City of Saskatoon sewer system.

4.2.2 Solids

The disposal of radioactive reactor components was performed as described in the Detailed Decommissioning Plan (See Section 10 of [2]). All items were monitored for radioactive contamination before released from SRCSF. The HEU fuel was transferred into its dedicated transfer flask (F-257) which was later shipped to the licenced facility (Savannah River Site in the US) for final storage.

Radioactive and contaminated components for which no re-use has been identified were packaged in Type A containers and sent for storage at a licensed facility in CNL.

Radioactive wastes were characterized as they were packaged. Characterization included monitoring for fixed and removable contamination with bulk radiochemical analysis for significant radionuclides. The analyses (Bq/kg) were combined with the masses of the materials to generate an estimate of the radionuclide inventories in each shipping container. A listing of the inventory of each container was maintained and it was accompanied to the shipment when the wastes were transported from the SRCSF.

A radioactive waste management plan [14] was written as a separate document to full fill the requirements as stipulated in CSA N294-09 [5].

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		Doc#	147-01600-ESDI	R-002	Rev. U
Nuclear Project#	655352	Contract#:	255095	Page:	24 of 201
Customer Doc#:		Customer:	Saskatchewan	Research Coun	cil (SRC)
Title:	END STATE DE	COMMISSIONIN	G REPORT FOR	SRC SLOWPO	KE-2

4.2.2.1 Solids Removed

The results of the radiation measurements and the final destination of the reactor components and other waste that was removed are presented in Appendix E, which provides the waste management records for all radioactive solid waste shipped from SRC. The F-257 Flask containing the irradiated fuel was transported to the US DOE, SRS. The bill of lading and the receipt confirmation is presented in Appendix F.

The radioactive concrete waste which was generated during the activated concrete removal process are described in Section 2.5 of this document. Appendix H presents the sampling plan for concrete cores in the reactor pool. The removed concrete was shipped from SRC in the Type A container as a radioactive waste to CNL. The remaining concrete is packaged into 6 steel drums and is planned to be shipped to CNL in the next few weeks. A technical letter will be provided to CNSC to confirm that the shipment has taken place.

4.2.2.2 Solids Retained

Measurement results of the remaining reactor pool shows that there is no concrete remaining in the reactor pool which is above unconditional release limit, see [12] for details.

4.2.3 Airborne Contaminants

The Alpha/Beta Integrated Continuous Air Monitoring (iCAM) was used throughout the project (24 hours a day) to monitor for any potential radioactive airborne contaminants in room 146. No measurable non-NORM in-air radioactivity was detected during decommissioning process.

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		DOC#	147-01000-E3D	K- 002	Kev. U
Nuclear Project#:	655352	Contract#:	255095	Page:	25 of 201
Customer Doc#:		Customer	Saskatchewan F	Research Coun	cil (SRC)
Title:	END STATE DE	COMMISSIONIN	IG REPORT FOR	SRC SLOWPO	KE-2

4 147 01600 ECDD 002

5. DECOMMISSIONING ACTIVITIES

5.1 Major Decommissioning Activities

The decommissioning of the SRCSF was completed using seven Decommissioning Work Plan/Packages (DWPs).

For each DWP, documentation was prepared to include, as applicable: Radiological Work Plan [15], Decommissioning Instructions (DIs), Decontamination Procedures, Hazard Assessment, Waste Management Data Sheets, Work Permits, StepBack (Pre-Job), Post-job Reviews, and Confined Space Clearances.

The summary of work packages is presented in the following sub-sections.

5.1.1 Defueling Preparations – DWP #1

The work competed under DWP #1, Defueling Preparations:

- Radiological baseline surveys were performed of Rooms 143, 144, 145, and 146 (reactor room), similar to operational surveys performed previously, to confirm radiological status of the facility.
 The results of the baseline surveys are presented in Appendix C.
- Removal of equipment from Rooms 143, 144, 145, and 146 (reactor room) which were not required for the subsequent operation of the reactor and the decommissioning process, and which were not previously removed as permitted under the Operating Licence. Such items were surveyed to ensure that they met criteria for release.
- Established of a 1m x 1m grid on the walls and floor for systematic square meter baseline radiological survey of Room 146. All transferrable contamination found was removed, and the area resurveyed to confirm release criteria were met, no fixed or non-fixed contamination was left.
- Radiation survey of the concrete blocks (biological shielding) was performed to confirm they met established unconditional release criteria and were subsequently removed from the facility and disposed for landfill.
- Installation of the safety railing around the reactor pool was completed in order to comply the safety guidelines.
- Safety checks were performed to ensure radiation monitoring devices were working properly.
- Safety check were performed to ensure reactor auxiliary systems were working properly.
- o Safety check were performed to ensure irradiation systems were working properly.
- o Removal of pool water cooling coil and attachments were performed.
- Collected pool water and reactor water samples to establish baseline for radionuclides and chemical contaminants.
- Operated the reactor at low power to verify proper operation of all necessary control equipment and instrumentation.
- Verified existing excess reactivity of the fuel by performing a period measurement.
- Determined the reactivity worth of cadmium capsules.

5.1.2 Core Removal – DWP #2

The work completed under DWP #2, Core Removal:

Removal of the following components, in order to make the reactor sub-critical:

- Small irradiation tubes.
- Large irradiation tube.

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		Doc#.	147-01000-ESDF	K-UUZ	Rev.	U
Nuclear Project#:	655352	Contract#:	255095	Page:	26 of	201
Customer Doc#:		Customer.	Saskatchewan F	Research Coun	cil (SRC)	
Title:	END STATE DE	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPOI	ΚΕ-2	

447 04600 ECDD 002

- o Beryllium shims.
- o Shim tray.
- o Outlet core water thermocouple and guide tube.
- Neutron flux detector and guide tube.
- Control rod.

Other activities that were completed in order to remove the fuel and prepare for shipment:

- Removed the upper reactor container tie rods.
- o Transferred the F-257 Flask to the reactor pool floor.
- Relocated the upper reactor container to the side to allow unrestricted access to the fuel assembly.
- Removed the irradiated fuel from the critical assembly.
- o Performed underwater video inspection of the irradiated fuel
- Transferred irradiated fuel into F-257 flask.
- o Placed the plug on the F-257 flask.
- o Removed F-257 flask from the reactor pool.
- Obtained water samples from the F-257 flask.
- o Performed radiation survey of the F-257 flask.
- o Installed the fire shield on the F-257 flask and completed shipment preparations.
- o Transferred F-257 transport package to the designated temporary storage area in Room 146.
- o Transferred F-257 transport package from temporary storage onto the transporter.
- Shipped F-257 transport package to Savannah River Site, US.

Staff from the IAEA, CNSC and US DOE witnessed the loading of the core into the F-257 flask, IAEA staff placed safeguards seal on the F-257 flask after it was raised from the reactor pool.

5.1.3 Reactor Components Removal – DWP #3

The work completed under DWP #3, Reactor Components Removal:

- Removed the control rod motor and drive assembly.
- Sampled pool water and performed a radiological assessment.
- Removed the critical assembly (beryllium assembly) and packed into the beryllium shielding container.
- Removed the shim tray and transferred into the beryllium shielding container.
- Transferred all irradiated beryllium shims into the shim tray in the beryllium shielding container.

The following components were removed from the reactor pool, cut and packed for shipment:

- Upper reactor container.
- Irradiation tubes.
- Outlet core water thermocouple.
- Neutron flux detector.
- Control rod.

Other activities that were completed under DWP-003, Reactor Components Removal:

- Removed of the longitudinal support beams.
- o Removed the lower reactor container out from the reactor pool.
- Cut the lower reactor container support bars and packed.
- Transferred the lower reactor container into the shielding container.
- Cut and packed the lower section support rods.
- Removed the reactor radiation monitor.

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		Doc#:	147-01600-ESDI	₹-002	Rev.	0
Nuclear Project#:	655352	Contract#.	255095	Page:	27 of 2	201
Customer Doc#:		Customer	Saskatchewan I	Research Coun	cil (SRC)	
Title:	END STATE DE	COMMISSIONI	NG REPORT FOR	SRC SLOWPO	KE-2	

- o Removed and disposed the longitudinal support beams and platform plates.
- Prepared and installed pumping system for the pool water disposal.
- Measured pool water sample for radionuclides and chemicals.
- Disposed pool water.

5.1.4 Auxiliary Components Removal – DWP #4

The work completed under DWP #4, Auxiliary Components Removal:

- o Removed the reactor water purification system and packed for shipment.
- Packed previously used purification columns.
- Packed the pool water purification system and associated tubing.
- Removed disposed the sample irradiation system and associated tubing.
- o Removed and disposed the radiation monitoring system.
- Removed and disposed the area radiation monitor.
- Removed and packed the gas purge system.
- Removed and disposed the service box.
- Removed and disposed the reactor control console.

5.1.5 Pool Cleanup – DWP #5

The work completed under DWP-005, Pool Cleanup:

- Established confined space clearance after performing initial hazard assessment.
- Established a 1m x 1m grid on the pool wall and floor.
- o Performed radiation survey to identify the fixed and non-fixed contamination locations.
- Removed non-fixed and fixed contamination.
- o Performed systematic radiation survey of pool walls and floor.
- Removed activated concrete from pool floor and wall.
- Measured the concrete samples for radioactivity due to neutron activation.

5.1.6 Final Survey – DWP #6

The work completed under DWP #6, Final Survey:

- Performed systematic end state radiation survey of Room 146 to ensure decommissioning activities have not resulted in radioactive contamination.
- Performed general end state radiation survey of all the remaining areas including the other rooms in the SRCSF (Rooms 143, 144, and 145).
- Removed of all fixed and non-fixed contamination found during the radiation survey.
- Repeated radiation survey of the recently decontaminated locations.
- Shipped all radioactive waste to the waste management facility of CNL.

A Compliance Inspection was conducted by CNSC during July 10-12, 2020 [12].

5.1.7 Civil Work and Restoration – DWP #7

This work is pending completion under DWP #7, Civil Work and Restoration:

SRC has requested CNSC to perform this activity.

Interior work in Room 146:

- Filling and covering the reactor pool with grout.
- Filling the trenches with grout.

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		Doc#:	147-01600-ESDI	R-002	Rev: 0
Nuclear Project#	655352	Contract#.	255095	Page.	28 of 201
Customer Doc#:		Customer	Saskatchewan I	icil (SRC)	
Title:	END STATE DE	ECOMMISSIONIN	NG REPORT FOR	SRC SLOWPO	KE-2

- o General cleaning of the room.
- Confirming that the lighting, fire alarm and internal access doors are all operational.
- Ensuring that appropriate signage is in place and locks are installed to the SRC standard for this space.

5.2 Decommissioning Schedule

A schedule showing the start and completion of the major activities comprising the SRCSF decommissioning project is presented in Appendix K.

5.3 Budgeted versus Actual Decommissioning Cost

The project approved budget was \$6,665,826.00 (including taxes). The project cost breakdown figures are as listed in the DDP, Section 12 [2]. The actual cost of the project is well within the available budget. The breakdown of cost is presented in Appendix N.

		Doc#	147-01600-ESDI	R-002	Rev U
Nuclear Project#.	655352	Contract#:	255095	Page:	29 of 201
Customer Doc#:		Customer:	Saskatchewan I	Research Coun	cil (SRC)
Title ⁻	END STATE DI FACILITY	ECOMMISSIONIN	NG REPORT FOR	SRC SLOWPO	KE-2

447 04000 FCDD 000

6. REMAINING ENTITIES AND INSTITUTIONAL CONTROLS

The scope of the SRCSF decommissioning project included to obtain the unrestricted use of the building and services remaining in the space currently occupied by the facility.

It is expected that the current operating licence will be revoked by the CNSC. This will confirm that the objective has been achieved.

After obtaining the clearance and revoking the operating licence, provisions will be made, if necessary, to allow for further inspections by IAEA/CNSC personnel reporting to the non-proliferation of nuclear weapons division.

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		Doc#:	147-01000-ESDI	R-002	Rev: U
Nuclear Project#:	655352	Contract#	255095	Page	30 of 201
Customer Doc#:		Customer:	Saskatchewan I	Research Coun	cil (SRC)
Title:	END STATE DI	ECOMMISSIONIN	NG REPORT FOR	SRC SLOWPO	KE-2

447 04C00 FCDD 000

7. FINAL RADIOLOGICAL STATUS

7.1 Final Radiological Condition

Following the dismantling of the SLOWPOKE-2 reactor at Saskatchewan Research Council and the removal of non-radioactive and radioactive waste, a final end state survey was performed in the reactor pool, in the exhaust ventilation system, and in the facility rooms affected by decommissioning work. The surveys were performed to verify that decommissioning activities have not resulted in radioactive contamination being spread to other areas of the facility, and to ensure that those areas which had originally contained radiological materials were within the accepted release limits. The absence of any contamination within the facility confirmed that the measures taken to decontaminate and survey all items leaving the facility were fully effective in eliminating the spread of radioactive contamination.

The surveys performed in the facility consisted of gamma dose rate measurements, surface contamination, and removable contamination measurements (beta/gamma, alpha emitters). The unconditional release criteria used to assess the surface contamination measurements are obtained from Table 7 of [9]. The results of the final release survey are provided in Appendix D and confirm that all surveyed areas of the reactor facility have a level of radiation below the unconditional release criteria.

Concentrations of radionuclides in the reactor pool concrete and reinforcing steel re-bars from the walls and the pool floor were measured and compared with the unconditional release limits from [10]. Reference [11] provides the results of the testing for each of the concrete samples taken from the reactor pool. The results show that the activity concentrations in the remaining pool structure are below unconditional clearance levels.

7.2 Areas Remaining Above the Release Criteria

No areas of the SRCSF remain above the unconditional release criteria as shown in Appendix D and [12].

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0 147-01600-ESDR-002 Nuclear Project#. 655352 Contract# 255095 31 of 201 Page Customer Doc#. Saskatchewan Research Council (SRC) END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2 Title: **FACILITY**

Rev

8. STATE RELEASE

The decommissioning of the SRCSF as authorized by NPROL-19.01/2023 (Revision 2), Appendix B, has been completed as described in this report. The space occupied by the facility is deemed to be suitable for unrestricted use, and it is expected to be confirmed by the CNSC by revoking the current operating licence.

There are no conditions remaining in the SRCSF that are considered to require further monitoring.

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		Doc#:	147-01600-ESDI	K-002	Rev: U
Nuclear Project#.	655352	Contract#:	255095	Page:	32 of 201
Customer Doc#:		Customer:	Saskatchewan	Research Coun	cil (SRC)
Tille:	END STATE DE	COMMISSIONIN	IG REPORT FOR	SRC SLOWPO	KE-2

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WASTE QUANTITIES AND DISPOSITION

9.1 Planned versus Actual Quantities

There has been no change between the planned and the actual waste quantities except the activated concrete removed from the reactor pool. Additional amount of concrete was removed from the reactor pool in order to meet the requirements. The [11] provides the details.

9.2 Radioactive Waste, Cleared Materials and Other Special Wastes

Appendix E provides a listing of all radioactive waste that was shipped to the CNL Waste Management Area.

Appendix J provides a listing of all the materials that were cleared for unconditional release, and the destination of those items. As described in Section 2.5, most of the items were segregated for reuse, recycling, or waste disposal.

9.3 Disposition to Storage Sites

Materials and items of equipment with activity below the unconditional release limit were released from SRCSF by the Radiation Safety Officer after they were surveyed for radioactive contamination by the Candu Group 1 Radiation Surveyor. Records of the release of those materials are included in Appendix J.

These releases include hazardous and non-hazardous wastes that were transported to local waste disposal and recycling facilities.

Samples of materials (solids and liquids) which were sent for analysis by outside laboratories were assessed and determined to be below the limits for Exempt Shipments.

Materials, equipment, and wastes which were determined to have activity above the limits for unconditional release, and which were not sent as Exempt Shipments to laboratories for analysis and disposal, were transported from the facility as Radioactive Material (RAM) consignments. These shipments were assessed and released by a certified RAM Shipper.

The RAM consignments departed from Saskatoon on March 6, 2020 following the release by the CNL RAM Shipper. The details of the contents of the Type A containers and the records of the shipment are provided in Appendix E.

9.4 Material Buried on the Site

Surveys of the rooms and equipment remaining in the SRCSF demonstrated that activity was below the unconditional release limits. There is no radioactive material buried or left behind in the SRC site which is above unconditional release limits.

9.5 Airborne or Liquid Waste Emissions

There were no radiological airborne or liquid wastes emissions during the decommissioning process.

The reactor room was maintained under slight negative pressure and the air quality was measured continuously by using iCAM. A sample report is presented in Appendix L. The air monitoring equipment, iCAM, results also show that there were no non-NORM radioactive airborne materials detected during the decommissioning process.

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		Doc#:	147-01600-ESDI	R-002	Rev: U
Nuclear Project#	655352	Contract#:	255095	Page	33 of 201
Customer Doc#:		Customer.	Saskatchewan I	Research Coun	cil (SRC)
Title:	END STATE DE	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPO	KE-2

10. PERSONNEL DOSES

The individual and collective worker dose estimates for the decommissioning of the SRCSF are shown in Table 20 of [8]. The measured doses are provided in Appendix M.

The action level was defined to be 1 mSv/person. Only one crew member (Mechanical Technician 1) received whole body dose beyond 0.1 mSv for the whole duration of the decommissioning process. The total reportable dose for the whole crew was 0.16 mSv. This is an exceptionally low dose compared to the previous experiences of UASF and DUSR decommissioning. The dose report is presented in Appendix M.

No recordable dose to the extremities was received to any crew members.

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		Doc#:	147-01600-ESD	R-002	Rev U
Nuclear Project#:	655352	Contract#:	255095	Page:	34 of 201
Customer Doc#:		Customer.	Saskatchewan	Research Coun	cil (SRC)
Title:	END STATE DE	COMMISSIONIN	IG REPORT FOR	SRC SLOWPO	KE-2

11. ABNORMAL OCCURRENCES AND INCIDENTS

No reportable event occurred during the execution of the decommissioning work of the SRCSF.

Since the SRCSF reactor assembly has been effectively and successfully dismantled, we include recommendations in the Lessons Learned Document, to ensure that future jobs of a similar nature benefit from this experience. Section 12 of this report provides details regarding the associated lessons learned.

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		Doc#.	147-01600-ESDF	R-002	Rev:	0
Nuclear Project#:	655352	Contract#:	255095	Page:	35 of	201
Customer Doc#;		Customer:	Saskatchewan I	Research Coun	cil (SRC)
Title:	END STATE DE	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPO	KE-2	

12. LESSONS LEARNED

A Lessons Learned Document (LLD) has been prepared for the SRCSF Decommissioning Project and is documented in [16]. Summaries of the lessons learned identified in the LLD are provided below:

- Excellent radiation protection techniques were employed which resulted in the low radiation dose to personnel.
- The daily Step-Back (pre-job) and post-job helped to plan the daily activities and identifying who
 was performing each task. This resulted in reducing the dose to the workers
- An additional RP resource was employed during the final stages of the project. The RP workload was elevated during the end state surveys. This reduced the site work duration and hence saved unnecessary cost.
- The staff were well trained, coordinated and competent in their work which helped the site work to finish ahead of schedule.
- The SRCSF SLOWPOKE-2 decommissioning Project Team played an active and invaluable role throughout the planning and execution stages of the decommissioning. Involvement by the Project Team contributed significantly to keeping the project focused, avoided situations which might have negatively impacted scheduling and aided in bringing the project within schedule and under budget.
- During the public hearing for the Licence to Decommission, it was noted by the public that concrete slurry which was above UCL, was buried inside the reactor pool prior to filling with grout. This end state report and the associated supporting document [11] shows that no such material above UCL is present in the SRC.

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		Doc#:	147-01600-ESDI	R-002	Rev: U
Nuclear Project#:	655352	Contract#	255095	Page:	36 of 201
Customer Doc#:		Customer: Saskatchewan Research Council (SRC)			
Title:	END STATE DE FACILITY	COMMISSIONIN	IG REPORT FOR	SRC SLOWPO	KE-2

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13. REFERENCES

- [1] SNC-Lavalin, "SRC Decommissioning Quality Assurance Plan", <u>147-912020-QAP-004</u> Revision 1, 2019.
- [2] SNC-Lavalin, "SRC Detailed Decommissioning Plan", 147-01600-DDP-002 Revision 1, 2019;
- [3] Canadian Nuclear Safety Commission, "Decommissioning Planning for Licensed Activities", Regulatory Guide G-129, 2000.
- [4] Canadian Standards Association, "Management System Requirements for Nuclear Facilities", CSA N286-12 (R2017).
- [5] Canadian Standards Association, "Decommissioning of Facilities Containing Nuclear Substances", CSA N294-09, 2014.
- [6] Saskatchewan Research Council, "Site Security Plan".
- [7] Saskatchewan Research Council, "Non-Power Reactor Operating Licence SLOWPOKE-2 Reactor", NPROL-19.00/2023.
- [8] SNC-Lavalin, "Radiation Physics Assessment Report", <u>147-03320-ASD-004</u> Revision 1, 2019.
- [9] SNC-Lavalin, "Action Levels and Radiation Protection Requirements", <u>147-03400-REPT-002</u> Revision 1, 2019.
- [10] Government of Canada: SOR/2000-207, "Nuclear Substances and Radiation Devices Regulations", Canada Minister Of Justice, June 6, 2016.
- [11] SNC Lavalin, "Supporting Evidence for Unconditional Release of SRC SLOWPOKE 2 Reactor Pool Concrete", 147-CECNSC-20-0001, 2020.
- [12] CNSC: SRC-2020-01, CNSC Compliance Inspection Report
- [13] International Atomic Energy Agency, "Application of the Concepts of Exclusion, Exemption and Clearance", IAEA RS-G-1.7.
- [14] SNC-Lavalin, "Action Levels and Radiation Protection Requirements", <u>147-01622-REPT-002</u> Revision 0, 2018.
- [15] SNC-Lavalin, "Radiological Work Plan for SRC SLOWPOKE-2 Facility", <u>147-03400-RWP-002</u> Revision 0, 2018.
- [16] SNC-Lavalin, "SRCSF Decommissioning Project Lessons Learned Report", 147- 904010-LLD-005 Latest Revision.

 Doc#: 147-01600-ESDR-002
 Rev. 0

 Nuclear Project#: 655352
 Contract#: 255095
 Page: 37 of 201

 Customer Doc#: Customer.
 Customer. Saskatchewan Research Council (SRC)

 Title: FACILITY
 END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2

Appendix A THE RECORDS OF DECISION FOR ISSUING THE NON-POWER REACTOR LICENCE AMENDMENT

 Nuclear Project#:
 655352
 Contract#
 255095
 Page:
 38 of 201

 Customer Doc#:
 Customer:
 Saskatchewan Research Council (SRC)

 Title:
 END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2



Canadian Nuclear Safety Commission

Commission canadienne de sûreté nucléaire

Record of Decision

DEC 19-H100

In the Matter of

Applicant Saskatchewan Research Council

Subject Application to Amend the Non-Power Reactor

Licence for the SLOWPOKE-2 Reactor to

Authorize Decommissioning

Public Hearing Date

September 26, 2019

Record of Decision Date December 6, 2019



-4-

- 16. The Impact Assessment Act⁴ (IAA) came into force August 28, 2019. Under the IAA and the Physical Activities Regulations⁵ made under it, impact assessments (IA) will be conducted on projects identified as having the greatest potential for adverse environmental effects in areas of federal jurisdiction. While CEAA 2012 and not the IAA applies to this project, the Commission notes that the decommissioning of an existing reactor is not an activity identified in the regulations for an IA under the IAA.
- 17. The Commission considered the completeness and adequacy of the environmental protection review under the NSCA and its regulations that CNSC staff conducted for this licence amendment. CNSC staff findings for the proposed SRCSF decommissioning included, but were not limited to:
 - Radiation doses to the public resulting from decommissioning activities are
 estimated to be 0.1 mSv, well below the regulatory dose limit for members of
 the public of 1.0 mSv;
 - Air will be continuously monitored and any radioactive or hazardous substances will be captured using high efficiency particulate air filters to ensure that no airborne contaminants are released into the environment;
 - Liquid effluents would be treated using a container water deionizer system to meet the release criteria specified by the CNSC and the City of Saskatoon.
- 18. The Commission is satisfied that the environmental protection review conducted by CNSC staff was appropriate for this licence amendment and that the NSCA provides a strong regulatory framework for environmental protection.
- 19. Based on the information provided for this hearing, the Commission concludes that the licence amendment is not a designated project under CEAA 2012 and that an EA under CEAA 2012 is not required prior to its approval. Further, the Commission is satisfied that SRC has made, and will continue to make, adequate provision for the protection of the environment throughout the decommissioning activities to be authorized by this amendment.

4.0 ISSUES AND COMMISSION FINDINGS

- 20. In making its licensing decision, the Commission considered a number of issues and submissions relating to SRC's qualification to carry out the licensed activities that the amended licence would authorize. The Commission also considered the adequacy of the proposed measures for protecting the environment, the health and safety of persons, national security and international obligations to which Canada has agreed.
- 21. SRC submitted a licence amendment application for the SRCSF on December 14, 2018. In its consideration of this matter, the Commission examined the completeness of the application and the adequacy of the information submitted by the SRC, as

⁴ S.C. 2019, c. 28, s. 1

³ SOR/2019-285

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		Doc#:	147-01600-ESDR-002		Rev 0
Nuclear Project#:	655352	Contract#:	255095	Page:	40 of 201
Customer Doc#:		Customer:	Saskatchewan Research Council (SRC)		
Title:	END STATE DI	ECOMMISSIONIN	IG REPORT FOR SRC	SLOWPO	KE-2

N. Greencom	Senior Project Officer, Waste and Decommissiong Division	
B. Thériault	Dosimetry Specialist, Radiation Protection Division	
W. Islam	Project Officer, Canadian Nuclear Laboratories Regulatory Program Division	

	Intervenors	
See Appendix A		

Licence: Amended

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Nuclear Project#.	655352	Contract#:	255095	Page:	41 of 201	
Customer Doc#:		Customer	Customer Saskatchewan Research Council (SF			
Title.	END STATE DE	ECOMMISSIONIN	IG REPORT FOR	R SRC SLOWPO	KE-2	

i

Table of Contents

1.0	INTRODUCTION	1
2.0	DECISION	2
3.0	ENVIRONMENTAL ASSESSMENT	3
4.0	ISSUES AND COMMISSION FINDINGS	4
4.1	Human Performance Management	5
4.2	Radiation Protection	7
4.3	Environmental Protection	9
4.4	Waste Management	11
4.5	Packaging and Transport	14
4.6	Indigenous Engagement and Public Information	15
4.6		15
4.6		16
4.6	3 Public Information	16
4.6		
4.7	Decommissioning Plans and Financial Guarantee	18
5.0	CONCLUSION	19
Append	lix A – Intervenors	A

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1.0 INTRODUCTION

- The Saskatchewan Research Council (SRC) has applied to the Canadian Nuclear Safety Commission¹ for the amendment of the Non-Power Operating Reactor Licence for its SLOWPOKE-2 reactor facility located at the SRC Environmental Analytical Laboratories complex in Saskatoon, Saskatchewan. The current licence, NPROL-19.00/2023, expires on June 30, 2023. SRC has requested an amendment of the licence to authorize the decommissioning of the SRC SLOWPOKE-2 reactor facility (SRCSF).
- 2. The current licence authorizes SRC to operate the SRCSF and to transition the reactor into a safe state, but does not authorize SRC to decommission the reactor. Prior to transitioning into a safe state, the SRCSF provided a source of neutrons for neutron activation analysis and isotope production. It was also used for teaching purposes in conjunction with the University of Saskatchewan.
- 3. SRC is seeking to decommission its SRCSF at this time because it has been able to replace the reactor's analytical capabilities with alternative technologies at SRC's environmental analytical laboratories. The proposed licence amendment would authorize SRC to decommission the SRCSF to achieve an end-state of unrestricted use. This includes dismantling the reactor, segregating and removing the materials for storage, and restoring the site to its original state.
- 4. In June 2019, up to \$15,000 in funding to participate in this licence amendment process was made available to Indigenous groups, not-for-profit organizations and members of the public through the CNSC's Participant Funding Program (PFP). A Funding Review Committee (FRC) independent of the CNSC recommended that up to \$14,714 in participant funding be provided to two applicants. These applicants were required, by virtue of being awarded participant funding, to submit a written intervention and/or an oral presentation at the public hearing commenting on SRC's application.

Issues

In considering the application, the Commission was required to decide:

- a) what environmental assessment review process to apply in relation to this application;
- whether SRC is qualified to carry on the activity that the amended licence would authorize; and

¹ The Canadian Nuclear Safety Commission is referred to as the "CNSC" when referring to the organization and its staff in general, and as the "Commission" when referring to the tribunal component.

Candu Energy Inc. and SNC-Lavalin Nuclear Inc.

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		Doc#:	147-01600-ESD	R-002	Rev: U
Nuclear Project#:	655352	Contract#:	255095	Page:	43 of 201
Customer Doc#.		Customer: Saskatchewan Research Council (SRC)			
Title:	END STATE DI FACILITY	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPO	KE-2

- 2 -

c) whether, in carrying on that activity, SRC would make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed.

Public Hearing

- 6. On June 12, 2019, the Commission issued a notice of public hearing in writing for SRC's licence amendment application. Following its publication, the Commission received a request from the Canadian Environmental Law Association (CELA) on behalf of Northwatch, the Inter-Church Uranium Committee Educational Cooperative (ICUCEC) and the Concerned Citizens of Renfrew County and Area (CCRCA) to allow for oral interventions, a longer intervention submission period, and to offer participant funding in relation to SRC's application. Following the Commission's consideration of this request, the Commission, in recognition of demonstrated public interest in SRC's application, published a revised notice of public hearing on June 27, 2019 for an oral hearing. The revised notice provided for a 30-day period to seek intervenor status as per the Canadian Nuclear Safety Commission Rules of Procedure² (Rules of Procedure). Intervenors were provided an opportunity to intervene in writing and orally and were offered up to \$15,000 in participant funding through the PFP.
- 7. Pursuant to section 22 of the NSCA, the President established a Panel of the Commission to consider the information presented for a public hearing held on September 26, 2019 in Ottawa, Ontario. The public hearing was conducted in accordance with the Rules of Procedure. During the public hearing, the Commission considered written submissions and heard oral presentations from SRC (CMD 19-H100.1A) and CNSC staff (CMD 19-H100.A). The Commission also considered oral and written submissions from seven intervenors (see Appendix A for a list of interventions). The hearing was audiocast live via the CNSC website, and audio archives are available on the CNSC's website.

2.0 DECISION

8. Based on its consideration of the matter, as described in more detail in the following sections of this Record of Decision, the Commission concludes that SRC is qualified to carry on the activity that the amended licence will authorize. The Commission is of the opinion that SRC, in carrying on that activity, will make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed. Therefore,

² SOR/2000-211.

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- 3 -

the Commission, pursuant to section 24 of the *Nuclear Safety and Control Act*, amends the Non-Power Reactor Operating Licence issued to the Saskatchewan Research Council for its SLOWPOKE-2 reactor facility located in Saskaton, Saskatchewan to authorize SRC to decommission the facility. The amended licence, NPROL-19.01/2023, remains valid until June 30, 2023.

- The Commission is satisfied that an environmental assessment (EA) under the Canadian Environmental Assessment Act, 2012³ (CEAA 2012) was not required in this matter and considers the environmental protection review that was conducted by CNSC staff to be acceptable and thorough.
- The Commission amends Part IV a) of SRC's licence as recommended by CNSC staff in CMD 19-H100, to authorize SRC to decommission the SRCSF.
- 11. The Commission does not amend the licence period as recommended by CNSC staff in CMD 19-H100. The Commission is satisfied that the start date of the licence need not change. The licence period shall remain as "July 1, 2013 to June 30, 2023" with the authorization to decommission taking effect as of the date of this decision.
- 12. The Commission anticipates that, following its decision in this matter. CNSC staff will update SRC's Licence Conditions Handbook (LCH) to include references to the Detailed Decommission Plan (DDP) and other documents as presented during this hearing. A draft amended LCH was not included in the hearing materials as is usual; CNSC staff will update it following this decision.
- 13. The Commission would like to note its displeasure that, during the hearing, it did not receive satisfactory information about how the waste would be characterized during the decommissioning of the SRCSF or about the specific radionuclide activities data. Should SRC submit an application to abandon the SRCSF, the detailed waste characterization data and a confirmation of the accuracy of the estimates will be required to be submitted by SRC, and reviewed by CNSC staff.

3.0 ENVIRONMENTAL ASSESSMENT

- In coming to its decision, the Commission was first required to determine whether an EA was required.
- 15. SRC's application was made December 14, 2018, at which time CEAA 2012 and its regulations provided the requirements for EA for nuclear projects. The decommissioning of an existing nuclear reactor is not included on the Designated Project list for an EA, as decommissioning is not an activity identified in the Regulations Designating Physical Activities.

³ S.C. 2012, c. 19, s. 52

-4-

- 16. The Impact Assessment Act⁴ (IAA) came into force August 28, 2019. Under the IAA and the Physical Activities Regulations⁵ made under it, impact assessments (IA) will be conducted on projects identified as having the greatest potential for adverse environmental effects in areas of federal jurisdiction. While CEAA 2012 and not the IAA applies to this project, the Commission notes that the decommissioning of an existing reactor is not an activity identified in the regulations for an IA under the IAA.
- 17. The Commission considered the completeness and adequacy of the environmental protection review under the NSCA and its regulations that CNSC staff conducted for this licence amendment. CNSC staff findings for the proposed SRCSF decommissioning included, but were not limited to:
 - Radiation doses to the public resulting from decommissioning activities are
 estimated to be 0.1 mSv, well below the regulatory dose limit for members of
 the public of 1.0 mSv.
 - Air will be continuously monitored and any radioactive or hazardous substances will be captured using high efficiency particulate air filters to ensure that no airborne contaminants are released into the environment;
 - Liquid effluents would be treated using a container water deionizer system to meet the release criteria specified by the CNSC and the City of Saskatoon.
- 18. The Commission is satisfied that the environmental protection review conducted by CNSC staff was appropriate for this licence amendment and that the NSCA provides a strong regulatory framework for environmental protection.
- 19. Based on the information provided for this hearing, the Commission concludes that the licence amendment is not a designated project under CEAA 2012 and that an EA under CEAA 2012 is not required prior to its approval. Further, the Commission is satisfied that SRC has made, and will continue to make, adequate provision for the protection of the environment throughout the decommissioning activities to be authorized by this amendment.

4.0 ISSUES AND COMMISSION FINDINGS

- 20. In making its licensing decision, the Commission considered a number of issues and submissions relating to SRC's qualification to carry out the licensed activities that the amended licence would authorize. The Commission also considered the adequacy of the proposed measures for protecting the environment, the health and safety of persons, national security and international obligations to which Canada has agreed.
- 21. SRC submitted a licence amendment application for the SRCSF on December 14, 2018. In its consideration of this matter, the Commission examined the completeness of the application and the adequacy of the information submitted by the SRC, as

⁴ S.C. 2019, c. 28, s. 1

⁵ SOR/2019-285

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Rev

-5-

required by the NSCA, the General Nuclear Safety and Control Regulations (GNSCR) and other applicable regulations made under the NSCA.

In CMD 19-H100.A. CNSC staff provided responses to some of the questions and issues raised by intervenors. This Record of Decision reflects the Commission's consideration of matters as discussed during the hearing and as raised in written submissions.

4.1 Human Performance Management

- The Commission assessed SRC's human performance management programs which encompass activities that enable effective human performance through the development and implementation of processes that ensure that SRC staff are sufficient in number in all relevant job areas and have the necessary knowledge, skills, procedures and tools in place to safely carry out their duties. During the current licence period. CNSC staff rated SRC's performance in this safety and control area (SCA) as satisfactory."
- The Commission examined the information submitted by SRC regarding its human 24. performance program. SRC submitted that the SRCSF decommissioning project included work that its personnel did not normally perform and, therefore, the decommissioning work would be contracted to and carried out by Candu Energy Inc. (Candu Energy), which has specific training and experience for these types of projects.
- 25. The Commission considered the information submitted by SRC about its personnel training programs, noting that SRC's programs met the specifications of REGDOC-2.2.2. Personnel Training. SRC submitted information about its decommissioning training program, which applies to all workers and contractors who are required to perform work, as set out in SRC's Decommissioning Training Plan for SRC SLOWPOKE-2 Facility.8
- SRC reported that all Candu Energy staff were required to complete basic industrial safety and radiological training and that all personnel in direct operating positions would be trained in accordance with Candu Energy's Systematic Approach to Training (SAT) program, unless their current CNSC certification covered the activities to be performed during decommissioning. SRC further reported that a review of training and qualifications would be conducted for employees assigned to work at the SRC facility. noting that, as part of the SAT process, a Training Needs Analysis was conducted to examine the tasks involved and the qualification of the personnel assigned to perform the tasks. SRC reported that this analysis produced a matrix which showed the

ONSC Regulatory Document REGDOC-2.2.2, Personnel Training, 2016.

SRC, SLOWPOKE-2 Detailed Decommissioning Plan, March 04, 2019

⁶ SOR/2000-202.

-6-

additional training modules or courses were required to fill any gaps in a worker's required knowledge and skills.

- 27. CNSC staff reviewed the SRC's detailed training plan, including the advanced training schedule, which provides timelines for all tasks requiring training as identified in the job and task analysis. From this review, CNSC staff were satisfied that the decommissioning training and evaluation program met expectations.
- 28. The Commission enquired as to whether workers assigned to the decommissioning of the SRCSF were also involved during the decommissioning of the University of Alberta (U of A) SLOWPOKE-2 reactor. An SRC representative responded that, although not all of the workers present during the U of A decommissioning project were working on the SRCSF decommissioning, several were.
- 29. The Commission assessed the SRC's programs for the certification of employees in certain positions at the SRCSF. SRC submitted that, under its operating licence and pursuant to the Class I Nuclear Facilities Regulations⁹ (Class I Regulations), the positions requiring a valid CNSC certification included: reactor operator, reactor engineer, and reactor technician.
- 30. CNSC staff submitted that there were three SLOWPOKE-2 reactor operators employed by SRC who were certified by the CNSC, and the reactor engineer and the reactor technician were Candu Energy employees, who were also certified by the CNSC to work on the SRC SLOWPOKE-2 reactor.
- 31. Based on the information presented during this hearing, the Commission is satisfied that SRC has appropriate training and certification programs in place at the SRCSF for carrying out the decommissioning of the SRCSF. The Commission is also satisfied that SRC's programs meet the objectives of REGDOC-2.2.2.
- The Commission is satisfied that appropriate programs are in place for contracted Candu Energy workers.
- 33. Based on its consideration of the information presented on the record for this hearing, the Commission concludes that SRC has appropriate programs in place and that current efforts related to human performance management provide a positive indication of SRC's ability to adequately carry out the proposed decommissioning activities at the SRCSF.

⁹ SOR/2000-204

-7-

4.2 Radiation Protection

- 34. As part of its evaluation of the adequacy of the measures for protecting the health and safety of persons, the Commission considered the performance of SRC in the area of radiation protection. The Commission also considered how SRC's radiation protection program specified that radiation doses to persons and contamination would be monitored, controlled and kept as low as reasonably achievable (ALARA), with social and economic factors taken into consideration, during the decommissioning of the SRCSF. Throughout the current licence period thus far, CNSC staff rated SRC's performance in this SCA as "satisfactory."
- 35. The Commission considered the information provided by SRC and CNSC staff to assess whether the SRC radiation protection program satisfied the requirements of the Radiation Protection Regulations. SRC submitted that Candu Energy's Radiation Protection Plan for the decommissioning of the SRCSF was based on Candu Energy's radiation protection program requirements used at CANDU licensed sites and would see to it that doses to workers would remain below regulatory limits during the decommissioning project.
- 36. SRC submitted that, in order to keep doses ALARA, a radiation protection surveyor would provide oversight throughout the decommissioning work and that workers would perform decommissioning work at a safe distance from the radiation source using cranes and extension tools. SRC further submitted that the use of personal dosimetry in radiological work zones to control the spread of contamination would be utilized.
- 37. CNSC staff submitted that, throughout the current licence period, SRC had implemented an appropriate and effective radiation program at the SRCSF that satisfied the regulatory requirements set out in the Radiation Protection Regulations. CNSC staff also reported that SRC used a licensed dosimetry service to monitor, assess, record and report doses received by workers, noting that the workers in the SRCSF were not designated as nuclear energy workers (NEWs). CNSC staff further submitted that doses to public and the workers during the current licence period were well below the public annual whole-body regulatory dose limit of 1 mSv. 11 CNSC staff noted that the maximum effective dose to an SRC worker during the current licence period was 0.28 mSv, well below the 1 mSv regulatory dose limit.
- 38. CNSC staff reported that radioactive fields to which workers may be exposed during the decommissioning project were estimated to be between 0.30 μSv/h and 0.37 μSv/h. CNSC staff further submitted that, based on previous decommissioning projects, SRC established action levels¹² for the decommissioning project of 1 mSv effective dose, 50

11 SOR/2000-203. subsection 13(1)

¹⁰ SOR/2000-203

¹² The Radiation Protection Regulations define an "action level" as a specific dose of radiation or other parameter that, if reached, may indicate a loss of control of part of a licensee's radiation protection program and triggers a requirement for specific action to be taken.

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-8-

mSv for skin dose and 50 mSv for extremities. CNSC staff submitted that there would be real time monitoring of alpha, beta, and gamma radiation using Improved Chemical Agent Monitors (ICAM).

- 39. The Commission asked for information in regard to a concern raised by the National Council of Women of Canada with respect to the estimated collective dose for the decommissioning of the SRCSF. A Candu Energy representative responded that the total dose received by workers in the three-month duration of the U of A decommissioning was 0.26 mSv and that Candu Energy was anticipating a similar collective dose for the SRCSF decommissioning. The Candu Energy representative added that for the activities that Candu Energy had carried out at SRCSF to date (including the removal and shipment of the fuel from the reactor), the collective dose was 0.165 mSv.
- 40. The Commission asked SRC to opine on which decommissioning activity was considered the most hazardous from a radiological perspective. A Candu Energy representative responded that the removal of the beryllium annulus was the most hazardous activity with respect to radiation, as the beryllium annulus had to be brought up to the surface of the reactor pool and stored in a shielding container while workers were present.
- 41. Further on that topic, the Commission asked about what was considered to be the worst case scenario during the SLOWPOKE-2 decommissioning and what controls were in place to prevent such an accident from occurring. The Candu Energy representative responded that the worst case scenario would be a worker standing near the beryllium annulus for an extended duration of approximately four hours which would result in a regulatory dose limit for a member of the public of 1 mSv. The Candu Energy representative added that, in order to prevent this from occurring, radiation detectors to monitor radiation levels, and radiation protection personnel to monitor doses to workers, were in place. The Commission was satisfied with the information provided.
- 42. Following the concerns about alpha hazards expressed in the intervention from the National Council of Women of Canada, the Commission asked if alpha radiation hazards were anticipated during the decommissioning of the SRCSF and whether SRC's radiation protection program would adequately provide for protection in regard to such hazards. CNSC staff responded that, although there were alpha hazards present in the SRCSF, SRC had provisions in place such as contamination monitoring; real-time monitoring of alpha, beta, and gamma radiation; and the use of personal protective equipment such as respiratory systems and radiation protection coveralls to limit the intake of alpha particles.
- 43. The Commission asked for information regarding the methodology that was used to determine that five samples from the pool floor would be adequate to ensure that no contamination would be left behind in the SRCSF. A Candu Energy representative responded that the samples were to confirm the computer model prediction that provided the activity on the reactor pool floor. The Candu Energy representative added

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- 9 -

that once the results were validated, they would know exactly how much concrete would need to be removed from the reactor pool to ensure that there will be no contamination left behind in the SRCSF.

- 44. Based on the information considered for this hearing, the Commission is satisfied that the ALARA concept is adequately applied to all SRCSF activities.
- 45. Based on the information provided on the record for this hearing, the Commission concludes that, given the mitigation measures and safety programs that are in place and will be in place to control radiation hazards, SRC provides for, and will continue to provide for, the adequate protection of the health and safety of persons and the environment throughout the decommissioning of the SRCSF.
- 46. The Commission is satisfied that SRC's radiation protection program at the SRCSF will continue to meet the requirements of the Radiation Protection Regulations during the decommissioning of the facility.

4.3 Environmental Protection

- 47. The Commission examined SRC's environmental protection programs at the SRCSF, which are intended to identify, control and monitor all releases of radioactive and hazardous substances, and aim to minimize the effects on the environment which may result from the licensed activities. These programs include effluent and emissions control, environmental monitoring and estimated doses to the public. CNSC staff rated SRC's performance in this SCA as "satisfactory" during the current licence period.
- The Commission considered whether the SRCSF environmental protection programs adequately met the specifications of REGDOC-2.9.1, Environmental Protection Policies, Programs and Procedures.¹³
- 49. CNSC staff reported that SRC's environmental protection program met the requirements of the Class I Regulations and that radiological and non-radiological releases at the SRCSF remained below regulatory limits during the current licence period.
- 50. The Commission considered SRC's programs to control the release of effluents and emissions from the SRCSF to the environment. In its written submission, SRC submitted that the release of radioactive material was expected to be below the regulatory limits and that airborne emissions would be continuously monitored and filtered using high efficiency particulate air filters prior to being released into the environment during the decommissioning of the SRCSF.

¹³ CNSC Regulatory Document REGDOC-2.9.1, Environmental Protection Policies, Programs and Procedures. 2013.

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- 10 -

Title

- The Commission assessed SRC's programs to mitigate risk to members of the public from hazardous substances discharged from the SRCSF. CNSC staff submitted that airborne releases from the SRCSF were below regulatory limits and that the dose to the public was estimated to be 0.010 mSv as compared to the regulatory limit for the dose to a member of the public of 1 mSv. SRC submitted that it would have mitigation measures in place to ensure that airborne emissions are minimal and that operating experience had shown no instances where airborne radioactivity was detected.
- In its written submission, SRC submitted that approximately 28,380 L of contaminated reactor pool water to be disposed of during the decommissioning process will be treated using a container water deionizer system prior to release into the City of Saskatoon sewer system. SRC further submitted that the level of activity in the pool water would be subject to CNSC release criteria as detailed in the Nuclear Substances and Radiation Devices Regulations 14 (NSRDR) and City of Saskatoon by-laws for hazardous substances. 15
- In consideration of concerns raised by the National Council of Women of Canada regarding the release of liquid waste into the City of Saskatoon sewage system, the Commission asked CNSC staff to elaborate on the type of assessment that was conducted with respect to the cumulative risks to the environment associated with SRC's liquid waste disposal proposal. CNSC staff stated that, when assessing whether liquid waste could be released into the municipal sewage system, it had to be ascertained that the waste was below the clearance levels set out in Appendix R of REGDOC-1.6.1, Licence Application Guide: Nuclear Substances and Radiation Devices, Version 216, and IAEA-TECDOC-1000, Clearance of Materials Resulting from the Use of Radionuclides in Medicine, Industry and Research. 17 CNSC staff further added that these clearance levels were derived to ensure that no member of the public received an annual dose of more than 0.01 mSv.
- Based on the assessment of the application and the information provided on the record 54. at the hearing, the Commission is satisfied that, given the mitigation measures and safety programs that are in place to control hazards. SRC will provide adequate protection to the health and safety of persons and the environment throughout the decommissioning activities.
- The Commission is satisfied that the SRCSF environmental protection programs continue to meet the specifications of REGDOC-2.9.1.

15 https://www.saskatoon.ca/services-residents/power-water/water-wastewater/sewer-use-bylaw

¹⁴ SOR/2000-207

¹⁶ CNSC Regulatory Document REGDOC-1.6.1, Licence Application Guide: Nuclear Substances and Radiation

Devices, Version 2

17 INTERNATIONAL ATOMIC ENERGY AGENCY. Clearance of Materials Resulting from the Use of Radionuclides in Medicine, Industry and Research, IAEA-TECDOC-1000, IAEA, Vienna (1998).

- 11 -

4.4 Waste Management

- 56. The Commission assessed SRC's site-wide waste management program. During the current licence period, CNSC staff assessed SRC's performance in this SCA, including waste minimization, segregation, characterization, and storage programs, as "satisfactory."
- 57. SRC submitted that waste generated at the SRCSF could be categorized as radioactive waste, non-radioactive hazardous waste, and non-radioactive and non-hazardous waste. SRC further submitted that it has an effective waste management plan and that all waste generated during the SRCSF's decommissioning would be managed in accordance with licensing requirements.
- 58. SRC provided the Commission with information regarding its waste minimization strategy reporting that, in order to minimize waste, SRC would decontaminate, segregate, reuse and recycle non-radioactive waste material to the extent possible and that the remaining waste will be shipped to either a landfill disposal site or a licensed waste management facility.
- 59. SRC submitted that non-radioactive chemical waste would be sent to a licensed hazardous waste management facility and that demolition debris that is determined to be below the release limits would be send to a landfill that is authorized to receive the waste. SRC further submitted that all waste would be transported in accordance with the Transportation of Dangerous Goods Regulations. 13
- 60. CNSC staff reported that SRC's Decommissioning Waste Management Plan (DWMP) met the specifications of CSA N292.3-08, Management of low and intermediate-level radioactive waste, ¹⁹ and N292.0-14, General principles for the management of radioactive waste and irradiated fuel. ²⁰ CNSC staff submitted that SRC's DWMP and supporting documents were satisfactory and met licensing requirements.
- 61. SRC reported that the reactor core containing the used highly enriched uranium fuel had been transported from the SRCSF to Savannah River. South Carolina, in accordance with the Canada-US agreement to return highly enriched uranium fuel to the country of origin. SRC further reported that the fuel had been transported in accordance with a CNSC-issued transportation licence in a Type B container. specifically an F-257 flask which had been certified by the CNSC.
- 62. The Commission enquired as to the volume of non-radioactive hazardous waste that is expected from the proposed decommissioning project. An SRC representative responded that the amount of non-radioactive hazardous waste would be minimal, approximately three car batteries that would be sent for recycling.

15 N292.3, Management of low and intermediate-level radioactive waste, CSA Group. 2008 and 2014.

¹⁵ SOR/2001-286

N292.0-14, General principles for the management of radioactive waste and irradiated fuel. CSA Group, 2014.

- 12 -

- On an issue raised by the Concerned Citizens of Renfrew County and Area (CCRCA). that radioactive waste resulting from the decommissioning of the SRCSF would be transported to the Canadian Nuclear Laboratories (CNL) site in Chalk River, Ontario. the Commission enquired about whether SRC would have any liability in respect of the waste once the title of the waste was transferred to CNL. CNSC staff responded that once the waste has been accepted by CNL. CNL will be the owner of the waste. An SRC representative further added that SRC would not hold any long-term liability in regard to the SRCSF radioactive waste following its transfer to Chalk River Laboratories (CRL). The Commission was satisfied with the information provided.
- Noting the interventions submitted by CCRCA. Northwatch and the National Council of Women regarding alternative decommissioning options, the Commission asked SRC if the removal of the reactor concrete pool in its entirety had been considered. A Candu Energy representative responded that the general practice in decommissioning SLOWPOKE-2 reactors is to survey and remove concrete wherever there is contamination above unconditional clearance levels as specified in the NSRDR. The Candu Energy representative added that although it was possible to remove the entire reactor pool, it is not the general practice as there is no benefit of removing concrete that is below the clearance levels.
- On a concern raised by Nuclear Waste Waste + Inter-Church Uranium Committee Educational Cooperative (NWW + ICUCEC). the Commission requested details about Canada's regulatory framework for the decommissioning of nuclear facilities. CNSC staff responded that the high-level requirements are set out in the regulations and the policy for waste management and decommissioning is set out in Natural Resources Canada's (NRCan) Radioactive Waste Policy Framework²¹ and CNSC regulatory document REGDOC-2.11, Framework for Radioactive Waste Management and Decommissioning in Canada.22 CNSC staff added that there is a Regulatory Guide G-219, Decommissioning Planning for Licensed Activities, 23 for decommissioning, and CNSC staff is currently in the process of developing regulatory documents for both waste management and decommissioning.
- The Commission requested information on the concerns expressed by NWW + 66 ICUCEC, Northwatch and CCRCA that the U of A SLOWPOKE-2 reactor was abandoned without having removed all the radiological hazards. A Candu Energy representative responded that the initial post-decommissioning measurements had shown that radiological hazards were still present and that further decontamination had to be done. CNSC staff confirmed this to be the case and reported that, when CNSC staff carried out the final surveys as part of the end-state inspection, dose rates were below the industry standard clearance level of 0.5 µSv/hour.

²¹ Retrieved from https://www.nrcan.gc.ca/energy/energy-sources-distribution/uranium-nuclear-energy/radioactivewasteradioactive-waste-policy-framework/7725

22 CNSC Regulatory Document REGDOC-2.11. Framework for Radioactive Waste Management and

Decommissioning in Canada, 2018.

²³ CNSC Guidance Document G-219, Decommissioning Planning for Licensed Activities, 2000.

- 13 -

- 67. The Commission notes the concerns raised by intervenors with respect to the abandonment of the U of A reactor facility and their uncertainty concerning the unconditional release levels at the time of abandonment of that facility. The Commission authorized the U of A to abandon its facility upon receipt of its application and the evidence that it had met the regulatory requirements. When SRC has completed its decommissioning activities, any licence application it makes to be authorized to abandon will be subjected to the same regulatory requirements. The Commission will require evidence to satisfy itself, before making a decision, of the completion of satisfactory decommissioning. That is not the subject of this application.
- 68. On an issue raised by Northwatch regarding the terminology used to describe the decommissioning of the SLOWPOKE-2 reactor, the Commission asked staff to clarify whether the proposed decommissioning project could be referred to as "entombment" or "in situ waste disposal". CNSC staff responded that, as per international standards that speak to all options of decommissioning. "in situ" refers to leaving the reactor in place and that the decommissioning of the SRCSF could not be defined as "in situ waste disposal" as there will be no parts of the reactor left behind and the facility will be free of contamination. The Commission is satisfied with this information and does not consider the proposed decommissioning of the SRCSF to be an "in situ waste disposal" or "entombment."
- 69. The Commission enquired as to how SRC would treat the liquid waste in the event that it is still radioactive after passing through the ion exchange column. An SRC representative stated that the radioactivity in the liquid waste has already been brought down to the unconditional release limits. A Candu Energy representative added that SRC had a backup ion exchange column that was always available in the event that the water had to be further processed in order to meet the release limits. The Commission was satisfied with the information provided.
- 70. Noting the concerns raised by the Nation Council of Women of Canada about the disposal of non-radioactive liquid waste in the City of Saskatoon's landfill and municipal sewage system, the Commission enquired about the consultation that SRC had carried out with the City of Saskatoon in regard to sending non-radioactive waste materials to landfills and the sewage system. An SRC representative responded that SRC maintained an ongoing discussion with the City of Saskatoon on these issues.
- 71. On a concern raised by Northwatch, the Commission asked for clarification as to the criteria for the classification of radioactive waste as low or intermediate level. CNSC responded that there are a number of considerations that need to be taken into account when characterizing waste, such as the radioisotope and the decay scheme. CNSC staff added that upon reviewing SRC's application to amend, some inconsistencies were found and were taken back to the licensee to address.

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- 14 -

- 72. The Commission expressed concern as to whether processes are in place to ensure that waste is adequately characterized given the presence of hard to measure radionuclides. CNSC staff responded that waste is characterized based on the waste receivers' acceptance criteria and also in accordance with CSA N292.0-14. A Candu Energy representative responded that the presence of radionuclides in waste resulting from the SRCSF decommissioning had been estimated using an industry standard computation code and that the estimates would be validated as measurements were taken during the decommissioning process.
- 73. Further on that topic, the Candu Energy representative added that, although not all the radionuclides such as Nickel-59. Tritium, and Calcium-41 had been measured, the ones that were measured contributed to approximately 99% of the radionuclides with respect to the unconditional release limit. During the hearing, the Commission did not receive satisfactory confirmation that the waste would be adequately characterized and anticipates that reliable data will be available upon conducting decommissioning activities. Should SRC submit an application to abandon the SRCSF, the detailed waste characterization data and a confirmation of the accuracy of the estimates will be required to be submitted by SRC, and reviewed by CNSC staff.
- 74. The Commission enquired about the assessment that institutional control for the decommissioned SRCSF would not be required. CNSC staff responded that, because the proposed decommissioning strategy is for complete decommissioning, the SRCSF would be cleaned to below the unconditional release limits and therefore no CNSC regulatory control would be required, if the strategy materializes.
- 75. Based on the above information and consideration of the hearing materials, the Commission is satisfied that, according to SRC's decommissioning plans, there will be no waste left at the SRCSF and that SRC has appropriate programs in place to safely characterize and manage the waste generated at the SRCSF as part of decommissioning.

4.5 Packaging and Transport

76. The Commission examined SRC's packaging and transport program. Packaging and transport covers the safe packaging and transport of nuclear substances and radiation devices to and from the licensed facility. The licensee must adhere to the Packaging and Transport of Nuclear Substances Regulations 2015 (PTNSR, 2015).²⁴ and Transport Canada's Transportation of Dangerous Goods Regulations for all shipments. During the licence period, CNSC staff rated SRC's performance in this SCA as "satisfactory."

²⁴ SOR/205-145

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- 15 -

- 77. On a concern raised by the Northwatch regarding the education and training for first responders, the Commission asked CNSC staff to comment on the training provided to first responders along the transportation route of radioactive waste, specifically, the rural and remote areas along the route. CNSC staff responded that all first responders in Canada receive HAZMAT training which includes radioactive material emergency management training. CNSC staff added that an emergency number through which any necessary information on the specific material being transported could be obtained in the event of emergency was required to be included in shipping documents. CNSC staff also stated that the CNSC has a duty officer and Transport Canada had the Canadian Transport Emergency Centre (CANUTEC) which are available at all times to provide technical information and guidance in the event of an emergency.
- 78. Noting that approximately 8 m³ of radioactive waste would be generated through the decommissioning of the SRCSF, the Commission enquired as to how many shipments of radioactive waste would be sent to CRL. An SRC representative responded that it would be a single shipment of three Type A packages.
- 79. Based on the information presented on the record for this hearing, the Commission is satisfied that SRC is meeting, and will continue to meet, regulatory requirements regarding packaging and transport of waste generated during the decommissioning of the SRCSF.

4.6 Indigenous Engagement and Public Information

4.6.1 Participant Funding Program

- 80. The Commission assessed the information provided by CNSC staff regarding public engagement in the licensing process as enhanced by the CNSC's Participant Funding Program (PFP). CNSC staff submitted that, in June 2019, up to \$15,000 in funding to participate in this licensing process was made available to Indigenous groups, members of the public and other stakeholders to review SRC'S licence amendment application and associated documents, and to provide the Commission with value-added information through topic-specific interventions.
- 81. A Funding Review Committee (FRC), independent of the CNSC, recommended that two applicants be provided with up to \$15,000 in participant funding. These applicants were required, by virtue of being awarded participant funding, to submit a written intervention and to make an oral presentation at the public hearing on SRC's licence amendment application.
- 82. Based on the information submitted for this hearing, the Commission is satisfied that Indigenous groups, members of the public and other stakeholders were encouraged to participate in this process.

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- 16 -

4.6.2 Indigenous Engagement

- 83. The common law duty to consult with Indigenous peoples applies when the Crown contemplates action that may adversely affect established or potential Aboriginal and/or treaty rights. The CNSC, as an agent of the Crown and as Canada's nuclear regulator, recognizes and understands the importance of building relationships and engaging with Canada's Indigenous peoples. The CNSC ensures that its licensing decisions under the NSCA uphold the honour of the Crown and consider Indigenous peoples' potential or established rights pursuant to section 35 of the Constitution Act, 1982.²⁵
- S4. CNSC staff submitted that, because the proposed decommissioning activities would be conducted within the facility with no adverse impact to the surrounding environment, the duty to consult does not arise with respect to the proposed licence amendment. CNSC staff further submitted that the proposed activities would not have an impact on potential or established Indigenous and/or treaty rights.
- 85. Noting the concerns expressed about the impacts on Indigenous groups along the transportation route to CRL, the Commission enquired about the duty to consult with Indigenous communities in relation to this activity. CNSC staff submitted that the transportation of radioactive materials is heavily regulated and safety during transport is inherent in the CNSC's packaging and certification process which is based in accordance with the PTNSR, 2015. CNSC staff added that although they are of the opinion that there was no impact to Indigenous community or treaty rights along the route, participant funding had been offered. No request from Indigenous communities for funding had been made.
- 86. Based on the information provided for this hearing, the Commission is satisfied that Indigenous engagement activities carried out for this licence amendment were adequate.

4.6.3 Public Information

87. The Commission assessed SRC's public information and disclosure program (PIDP) for the SRCSF. A public information program is a regulatory requirement for licence applicants and licensed operators of Class I nuclear facilities. Paragraph 3(j) of the Class I Nuclear Facilities Regulations²⁶ requires that licence applications include

"the proposed program to inform persons living in the vicinity of the site of the general nature and characteristics of the anticipated effects on the environment and the health and safety of persons that may result from the activity to be licensed."

26 SOR/2000-204

²⁵ Constitution Act, 1982, Schedule B to the Canada Act 1982, 1982, c. 11 (U.K.).

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- 17 -

- 88. The Commission also assessed how SRC's PIDP met the specifications of RD/GD-99.3. Public Information and Disclosure²⁷. SRC provided the Commission with information regarding its PIDP including the mechanisms in place to provide the public information related to its operations and a dedicated web page for the decommissioning of the SRCSF. CNSC staff informed the Commission that SRC has undertaken a number of initiatives in support of its PIDP and added that there has been a very low level of public interest regarding the decommissioning of the SRCSF.
- 89. SRC submitted that it held a public meeting on December 5, 2018 to provide information to the public about its decommissioning plans and answer any questions that may arise. SRC further submitted that the interest from the public was minimal and that it would continue to share information via newsletters and invite members of the public to submit comments or concerns.
- 90. The Commission requested additional details about the public information forum held at the SRCSF on December 5, 2018, including attendance and the concerns that were raised. An SRC representative responded that approximately seven people came to the information forum, representing various groups and SRC's stakeholders, and that the concerns were similar to the concerns raised by intervenors in this hearing.
- 91. In consideration of a concern raised by NWW + ICUCEC, the Commission asked CNSC staff if there were lessons learned reports for the previous SLOWPOKE-2 decommissioning projects and if they were publicly available. CNSC staff responded that the lessons learned were a section of the end-state report that the licensee must submit upon the completion of decommissioning and that they were available to the public upon request. CNSC staff added that the end state reports for previous decommissioning projects were available, with the exception of University of Toronto, and that the lessons learnt from the University of Toronto decommissioning project were implemented in other projects such as the increased shielding of the beryllium package. An SRC representative reported that Candu Energy had conducted the decommissioning of the U of A and lessons learned from previous decommissioning projects were incorporated into the work plans developed for the decommissioning of the SRC SLOWPOKE-2 reactor. The Commission was satisfied with the information provided.
- 92. Based on the information presented for this hearing, the Commission is satisfied that SRC's PIDP has and will continue to communicate to the public, information about the health, safety and security of persons and the environment and other issues. This will continue throughout the decommissioning of the SRCSF.
- 93. Recognizing that parts of the end-state report may contain commercially sensitive information, and in anticipation of interest, the Commission expects that SRC share the publicly available portions of the end-state report with interested stakeholders if requested upon completion of the decommissioning project.

²⁷ CNSC Regulatory/Guidance Document RD/GD-99.3. Public Information and Disclosure. 2012.

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Rev

- 18 -

Conclusion on Indigenous Engagement and Public Information

- Based on the information presented, the Commission is satisfied that, overall, SRC's PIDP meets regulatory requirements and is effective in keeping Indigenous groups and the public informed of SRC's operations.
- Based on the information presented on the record for this hearing, the Commission is satisfied that this licence amendment will not result in changes to SRC's operations that would cause adverse impacts to any potential or established Indigenous and/or treaty rights.

4.7 Decommissioning Plans and Financial Guarantee

- The Commission requires SRC to have a detailed decommissioning plan for the decommissioning of the SRC SLOWPOKE-2 facility and a long-term management plan for waste produced from the project. In order to ensure that adequate resources are available for safe and secure decommissioning of the SRCSF, the Commission requires that an adequate financial guarantee for realization of the planned activities is put in place and maintained in a form acceptable to the Commission throughout the licence period.
- As part of the licence amendment application, SRC submitted a Detailed Decommissioning Plan (DDP) which describes the decommissioning process for the SRCSF and the measures in place to ensure that the public and the environment are protected during the decommissioning project. CNSC staff reported that the DDP was assessed against the requirements of CNSC Regulatory Guide G-219. Decommissioning Planning for Licensed Activities and CSA N294-09: Decommissioning of Facilities Containing Nuclear Substances 28 and CNSC staff found it to be acceptable.
- CNSC staff submitted that SRC's activities that are authorized under the operating licence included defueling the reactor, maintenance of the reactor, and transport of spent fuel and radioactive waste. CNSC staff further submitted that the defueling of the SLOWPOKE-2 reactor had been subject to a CNSC inspection in which inspectors from the International Atomic Energy Agency (IAEA) participated and found no regulatory non-compliances.
- The Commission asked for clarification in regard to the financial guarantee that SRC has in place for the decommissioning of the SRCSF. CNSC staff submitted that SRC has in place a financial guarantee in the amount of \$5,760,000, which will be used towards decommissioning and that the SRC's Board of Directors had approved expenditures in the amount of up to \$7,500,000. An SRC representative responded that the current financial guarantee in place was in the form of a trust fund for the amount of \$7.500,000 approved by the SRC Board of Directors and accepted by the CNSC.

²⁸ N294-09 (R2014), Decommissioning of facilities containing nuclear substances, CSA Group, reaffirmed in 2014.

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- 19 -

The SRC representative added that the decommissioning work would be funded out of SRC's operating budget of \$ 5,760,000 and that the trust fund in place would be released to the SRC upon successful decommissioning and final approval from the Commission.

100. Based on the record, the Commission concludes that the detailed decommissioning plan and related financial guarantee for the SRCSF are acceptable for the purpose of the current application for licence amendment.

5.0 CONCLUSION

- 101. The Commission has considered the amendment application submitted by the SRC. Based on its consideration of the information submitted, the Commission is satisfied that the application meets the requirements of the NSCA, the GNSCR and other applicable regulations made under the NSCA.
- 102. The Commission has also considered the information and submissions of the applicant, CNSC staff and all participants as set out in the material available for reference on the record, as well as the oral presentations made by the participants at the hearing.
- 103. The Commission is satisfied that SRC meets the test set out in subsection 24(4) of the Nuclear Safety and Control Act. That is, the Commission is of the opinion that SRC is qualified to carry on the decommissioning activity that the amended licence will authorize and that it will make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed.
- 104. Therefore, the Commission, pursuant to section 24 of the Nuclear Safety and Control Act, amends the Non-Power Reactor Operating Licence issued to the Saskatchewan Research Council for its facility located in Saskatoon, Saskatchewan. The amended licence, NPROL-19.01/2023, is valid until June 30, 2023.
- The Commission amends Part IV a) of SRC's licence as recommended by CNSC staff in CMD 19-H100, to authorize it to decommission the SRCSF.
- 106. The Commission would like to note that this decision does not authorize abandonment. Should SRC apply for a licence to abandon, this will be the subject of a different proceeding.
- 107. The Commission anticipates that, following its decision in this matter, CNSC staff will update SRC's Licence Conditions Handbook (LCH) to include references to the Detailed Decommission Plan (DDP) and other documents as presented during this hearing.

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- 20 -

- 108. The Commission considers the environmental protection review that was conducted by CNSC staff to be acceptable and thorough. The Commission is satisfied that an EA under CEAA 2012 was not required for the SRCSF licence amendment application and notes that the NSCA provides a strong regulatory framework for environmental protection.
- 109. The Commission anticipates that, following its decision in this matter, CNSC staff will update SRC's Licence Conditions Handbook (LCH) to include references to the Detailed Decommission Plan (DDP) and other documents as presented during this hearing. A draft amended LCH was not included in the hearing materials following usual practice; CNSC will update it following this decision.

Rumina Velshi

Date

Krohn Dec 6,2019

President.

Canadian Nuclear Safety Commission

		Doc#	147-01600-ESDI	R-002	Rev: U
Nuclear Project#	655352	Contract#:	255095	Page:	62 of 201
Customer Doc#:		Customer	Saskatchewan I	Research Coun	cil (SRC)
Title:	END STATE D	ECOMMISSIONIN	NG REPORT FOR	SRC SLOWPO	KE-2

- A -

Appendix A - Intervenors

Intervenors - Oral Presentations	Document Number
Concerned Citizens of Renfrew County and Area, represented by O. Hendrickson	CMD 19-H100.5 CMD 19-H100.5A
National Council of Women of Canada, represented by G. Janes	CMD 19-H100.2
Nortwatch, represented by B. Lloyd	CMD 19-H100.6 CMD 19-H100.6A
Nuclear Waste Watch and Inter-Church Uranium Committee Educational Cooperative, represented by J. Karban	CMD 19-H100.8 CMD 19-H100.8A

Intervenors - Written Interventions	Document Number
Elaine Hughes	CMD 19-H100.3
Linda Murphy	CMD 19-H100.4
North American Young Generation in Nuclear	CMD 19-H100.7

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 Nuclear Project#:
 655352
 Contract#:
 255095
 Page:
 63 of 201

 Customer Doc#:
 Customer:
 Saskatchewan Research Council (SRC)

 Title:
 END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2 FACILITY

Appendix B THE AMENDED NON-POWER REACTOR OPERATING LICENCE

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Doc#: 147-01600-ESDR-002

Nuclear Project#:	655352	Contract#	255095	Page:	64 of 201
Customer Doc#:		Customer.	Saskatchewan	Research Coun	cil (SRC)
Title.	END STATE DI FACILITY	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPO	KE-2



Commission canadienne de sûreté nucléaire

> Word Ref: e-Doc 5899570 PDF Ref: e-Doc 5905832

File: 2.03

NON-POWER REACTOR OPERATING LICENCE SLOWPOKE-2 REACTOR

SASKATCHEWAN RESEARCH COUNCIL

I) LICENCE NUMBER: NPROL-19.01/2023

II) LICENSEE: Pursuant to section 24 of the Nuclear Safety and Control

Act. this licence is issued to

Saskatchewan Research Council

15 Innovation Boulevard Saskatoon, Saskatchewan

S7X 0X1

III) LICENCE PERIOD: This licence is valid from July 1, 2013, to June 30, 2023,

unless otherwise suspended, amended, revoked, or replaced.

(71)LICENSED ACTIVITIES:

This licence authorizes the licensee to:

- (a) operate and decommission the Saskatchewan Research Council SLOWPOKE-2 reactor and associated facilities (hereinafter "the facility"), located in the Analytical and Radiochemical Laboratory of the Council in the Innovation Place Research Park. in Saskatoon, Saskatchewan:
- (b) produce, possess, transfer, use, package, manage, and store the nuclear substances that are required for, associated with or arise from the activities described in (a); and
- (c) possess and use prescribed equipment and prescribed information required for, associated with or arise from the activities described in (a).

Saskatchewan Research Council Non-Power Reactor Operating Licence

Page 2 of 6 NPROL-19.01/2023

V) EXPLANATORY NOTES:

- (a) Nothing in this licence shall be construed to authorize non-compliance with any other applicable legal obligation or restriction.
- (b) Unless otherwise provided for in this licence, words and expressions used in this licence have the same meaning as in the Nuclear Safety and Control Act (hereinafter "NSCA") and associated regulations.
- (c) The Saskatchewan Research Council Licence Conditions Handbook (hereinafter "SRC-LCH") provides
 - compliance verification criteria in order to meet the conditions set out in this licence.
 - (ii) information regarding delegation of authority to CNSC staff, and
 - (iii) applicable versions of documents and a process for version control of codes, standards or other documents that are used as compliance verification criteria.

VI) CONDITIONS:

1. GENERAL

- 1.1 The licensee shall conduct the activities described in Part IV of this licence in accordance with the licensing basis for the facility, unless otherwise approved in writing by the Commission.
- 1.2 The licensee shall give written notification of changes made to the licensee documents submitted to support the license application.
- 1.3 The licensee shall maintain a preliminary decommissioning plan for the facility, and shall review and revise the plan at such times as the Commission may require and in any event, no later than ten years from previous revision.
- 1.4 The licensee shall maintain in effect a financial guarantee for decommissioning of facility that is acceptable to the Commission. The licensee shall report annually that the financial guarantee is valid and in effect.
- 1.5 The licensee shall implement and maintain a public information program including a public disclosure protocol.
- 1.6 The licensee shall, in the event of any conflict or inconsistency between licence conditions, codes or standards or regulatory documents used as compliance verification criteria in the SRC-LCH, refer the matter to the Commission for resolution.

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Saskatchewan Research Council	
Non-Power Reactor Operating Licence	

Page 3 of 6 NPROL-19.01/2023

2. MANAGEMENT SYSTEM

2.1 The licensee shall implement and maintain a management system for activities carried out under this licence.

3. HUMAN PERFORMANCE MANAGEMENT

- 3.1 The licensee shall ensure that persons appointed to the positions of reactor engineer, reactor technician, or reactor operator hold certifications in accordance with the requirements of the NSCA.
- 3.2 The licensee shall establish and maintain a training program for certified persons.

4. OPERATING PERFORMANCE

- 4.1 The licensee shall operate the facility subject to the terms and conditions of this licence and within the limits specified in Appendix A to this licence.
- 4.2 The licensee shall maintain an accurate inventory of their sealed sources, both in use and in storage, and provide details of this inventory when requested.
- 4.3 The licensee shall report to the Commission unplanned situations or events at the facility.
- 4.4 The licensee shall submit annual compliance monitoring and operational performance reports to the Commission.

5. SAFETY ANALYSIS

5.1 The licensee shall conduct and maintain safety analyses that are representative for the current hazards of the facility or process analyzed.

6. PHYSICAL DESIGN

6.1 The licensee shall ensure that the defence-in-depth principle is applied and maintained in the design of the nuclear facility in order to prevent, or if prevention fails, to mitigate the consequences resulting from radioactive releases.

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Saskatchewan Research Council Non-Power Reactor Operating Licence

Page 4 of 6 NPROL-19.01/2023

FITNESS FOR SERVICE

- 7.1 The licensee shall develop, implement and maintain documented programs of maintenance, testing, surveillance, and inspection of structures, systems and components important to safety to ensure that their availability, reliability and functionality remain in accordance with the design over the lifetime of the facility.
- 7.2 The licensee shall develop, implement and maintain an aging management program for the facility to identify all aging mechanisms relevant to structures, systems and components important to safety; to evaluate their possible consequences; and to provide direction for the activities required to maintain the operability and reliability of these structures, systems and components.

8. RADIATION PROTECTION

8.1 The licensee shall implement and maintain a radiation protection program which includes action levels. When the licensee becomes aware that an action level has been reached, the licensee shall notify the Commission within seven days.

9. CONVENTIONAL HEALTH AND SAFETY

9.1 The licensee shall implement and maintain an occupational health and safety program at the facility.

10. ENVIRONMENTAL PROTECTION

10.1 The licensee shall control, monitor and record releases of radioactive nuclear substances and hazardous substances from the facility.

11. EMERGENCY MANAGEMENT AND FIRE RESPONSE

11.1 The licensee shall implement and maintain an emergency management program to prepare for and respond to emergency events, including fires, initiating at or impacting the facility, and for dealing with the effects of such emergencies both in the facility and outside the facility.

12. WASTE MANAGEMENT

12.1 The licensee shall implement and maintain a waste management program documenting handling processing transportation, storage and disposal of nuclear wastes, including nuclear wastes mixed with other hazardous substance.

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Saskatchewan	Research	Counci	!
Non-Power Re	actor Ope	erating I	icence

Page 5 of 6 NPROL-19.01/2023

13. SECURITY

13.1 The licensee shall implement and maintain a nuclear security program to prevent persons from carrying out malevolent actions capable of affecting the safe operation of the facility.

14. SAFEGUARDS AND NON-PROLIFERATION

14.1 The licensee shall implement and maintain safeguards measures required to ensure safeguards implementation at the facility.

15. PACKAGING AND TRANSPORT

15.1 The licensee shall implement and maintain a program for the packaging and transport of nuclear substances.

SIGNED at OTTAWA, this 6 day of December, 2019.

Rumina Velshi, President

on behalf of the Canadian Nuclear Safety Commission

e-Doc 5899570 (Word) e-Doc 5905832 (PDF) Nuclear Project#: 655352 Contract#: 255095 Page: 69 of 201

Customer Doc#.

END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2 FACILITY

Saskatchewan Research Council Non-Power Reactor Operating Licence Page 6 of 6 NPROL-19.01/2023

APPENDIX A

Operating Limits

- The licensee shall ensure that the total thermal power from the reactor fuel does not exceed 20 kilowatts under steady-state operating conditions.
- The licensee shall ensure that the maximum excess reactivity of the reactor does not exceed 4.0 mk.
- 3. The licensee shall not operate the reactor at neutron flux levels exceeding 1.05 x 10¹² n cm⁻² s⁻¹, except that while increasing power under automatic control a peak power of no more than 1.4 x 10¹² n cm⁻² s⁻¹ may be permitted for a time of no more than one minute.
- 4. The licensee shall not allow the reactor to contain more than 300 finished SLOWPOKE-2 fuel elements except otherwise approved in writing by the Commission. The total amount of uranium-235 in the reactor shall not exceed 0.95 kg. The fuel elements shall consist of only an uranium-aluminum alloy containing 28% by weight uranium and the uranium enriched to no more than 95% by weight uranium-235.
- The facility may contain sealed sources of uranium-235 for use as testing or calibration devices. The licensee shall ensure that no sealed source contains more than 1.0 grams of uranium-235.

e-Doc 5899570 (Word) e-Doc 5905832 (PDF)

Doc#: 147-01600-ESDR-002

Rev:

0

70 of 201 Page:

Nuclear Project#: Customer Doc#:

655352

Contract#: 255095

Customer: Saskatchewan Research Council (SRC)

Title:

END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2 FACILITY

Appendix C SUMMARY OF BASELINE RADIOLOGICAL SURVEYS

Nuclear Project#	655352	Contract#	255095	Page:	71 of 201
Customer Doc#:		Customer:	Saskatchewan	Research Coun	cil (SRC)
Title:	END STATE DI	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPO	KE-2

Floor Plan Of Reactor, Rm #146 Baseline Survey 2019-07-22

Squares chosen for baseline survey will be in yellow with results shown below Squares are actually 1 metre"

DE-IONIZER Cement Floor F-42 F-38 F-37 F-39 I REACTOR F-36 F-32 F-31 East F-30 F-29 F-28 F-27 F-26 F-25 F-24 F-23 F-22 -21 F-20 F-19 F-18 F-16 F-15 F-17 F-14 -13 Floor Tiles F-11 F-10 F-9 -8 F-7 76 F-5 F°3 T L F-2

West

South

North

F-41: Bkgd a Ocpm β 241cpm, D/C a Ocpm β 88cpm, O/S a Ocpm β Ocpm F-29: Bkgd a 2cpm β 228cpm, D/C a 0cpm β 92cpm, O/S a 0cpm β 0cpm F-26: Bkgd α 1cpm β 238cpm, D/C α 0cpm β 62cpm, O/S α 0cpm β 0cpm F-14: Bkgd a 0cpm β 223cpm, D/C a 0cpm β 0cpm, O/S a 0cpm β 0cpm F-12: Bkgd a Ocpm β 206cpm, D/C a Ocpm β Ocpm, O/S a Ocpm β Ocpm For squares coloured red; De-ionizer increases background counts for floor squares F-45 to F-60

F-2: Bkgd a 1cpm β 201cpm, D/C a 0cpm β 0cpm, O/S a 0cpm β 0cpm

Bkgd = Background of 2360 (4393), D/C = Direct Check, O/S = On Swipe. All counts are net counts, (gross counts - Bkgd counts) Ludium 2929 Bkgd $\alpha = 1$ cpm $\beta = 55$ cpm

F-44: Bkgd α 1cpm β 400cpm (affected by de-ionizer gamma), D/C α 0cpm β 27cpm, 0/S α 2cpm β 0cpm

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Rev. 0	72 of 201
	Page:
147-01600-ESDR-002	255095
Doc#:	Contract#:

Nuclear Project#: Customer Doc#:

Customer Saskatchewan Research Council (SRC)	END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2 FACILITY
Customer.	END STATE DECOMMISSIONIN FACILITY

West Wall Of Reactor Room, Rm #146 Baseline Survey 2019-07-22

Squares chosen for baseline survey will have results printed in the square Squares are 1 metre²

South End North End

WW-III	WW Et	W# 24	WW-21	WW-18	WW-15	WW-12	WW-9	WW-6 <u>Bkgd</u> α Ocpm β 246cpm <u>O/C</u> α Ocpm β Ocpm <u>O/S</u> α Ocpm <u>O/S</u> α Ocpm	WW-3
-	WW 30	West	WW-20 Bkgd a 1cpm β 244cpm O/C α 2cpm β 61cpm O/S α 0cpm β 0cpm	WW-17	WW-14	WW-11 Bkgd α 1cpm β 215cpm D/C α 0cpm β 60cpm O/S α 0cpm β Ucpm	WW-8	ww-s	WW-2 8kgd α 0cpm β 219cpm O/C α 0cpm β 0cpm O/S α 0cpm β 0cpm
Will-28	4W.26	WAY 25	WW-19	WW-16	WW-13	WW-10	WW-7	WW-4	WW-1

Bkgd = Background of 2360 (4393), D/C = Direct Check, O/S = On Swipe Ludlum 2929 8kgd a=0cpm, B=65cpm All counts are net counts, (Gross counts - Bkgd counts) Squares in red, WW-22 to WW-30, are too close to the de-ionizer where the dose rate pushes up the Bkgd too much. Candu Energy Inc. and SNC-Lavalin Nuclear Inc.

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Nuclear Project#	655352	Contract#:	255095	Page:	73 of 201
Customer Doc#:		Customer	Saskatchewan	Research Coun	cil (SRC)
Title:	END STATE DE	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPOI	KE-2

North Wall Of Reactor Room, Rm #146 Baseline Survey 2019-07-22

Squares chosen for baseline survey will have results printed in the square Squares are 1 metre²

West

NW-2	L-MN
NW-5 <u>Bkgd</u> α Ocpm β 191cpm <u>D/C</u> α 1cpm β 28cpm <u>O/S</u> α ücpm	NW-4
8-WN	7-WN
NW-11	NW-10
NW-14	NW-13 Bkgd u 1cpm \$ 209cpm D/C u 0cpm \$ 0cpm \$ 0cpm
NW-17	NW-16
	NW-5 NW-8 NW-11 NW-14 Β kgd α θερm β 191ερm D/C α 1ερm β 28ερm Φ 2/5 α θερm β θ θερm

East

Bkgd = Background of 2360 (4393), D/C = Direct Check, O/S = On Swipe Ludium 2929 Bkgd α =0cpm, β =65cpm All counts are not counts, (Gross counts – Bkgd counts)

Nuclear Project#:	Project#: 655352 Contract#: 255095				74 of 201	
Customer Doc#:	*	Customer Saskatchewan Research Council (SRC)				
Title:	END STATE D	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPO	KE-2	

East Wall Of Reactor Room, Rm #146 Baseline Survey 2019-07-22

Squares chosen for baseline survey will have results printed in the square Squares are 1 metre*

North End

South End

EW-3	EW-2	EW-1 Bkgd a Lcpm \$ 184cpm \$ 2/5 a Ocpm \$ 3cpm \$ O/5 a Ocpm
EW-6	EW-5	EW-4
EW-9	EW-8 Bkgd a 1cpm \$ 241cpm D/C a 1cpm O/S a 0cpm O/S a 0cpm	EW-7
EW-12 Bkgd a Ocpm B 201cpm D/C a 1cpm B 68cpm O/S a 2cpm	EW-11	EW-10
EW-15	EW-14	EW-13
EW-18	EW-17	EW-16
EW-21	EW-20 Bked a 1cpm \$ 233cpm D/C a 2cpm \$ 37cpm O/S a 0cpm	EW-19
*	1	-
3	-	**
100		

FACILITY

Bkgd = Background of 2360 (4393), D/C = Direct Check, O/S = On Swipe

All counts are net counts, (Gross counts - Bkgd counts) Ludium 2929 8kga α=0cpm, β=65cpm

Squares in red, EW-22 to EW-30, are too close to the de-ionizer where the dose rate pushes up the Bkgd too much.

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		Doc#	147-01600-ESD	R-002	Rev.	0
Nuclear Project#:	655352	Contract#	255095	Page:	75 of	201
Customer Doc#:		Customer.	Saskatchewan	wan Research Council (SRC)		
Title.	END STATE DE	COMMISSIONIN	ONING REPORT FOR SRC SLOWPOKE-2			

Surveyed by Roger Rees 2019-07-24

Internal Radiological Survey Of Fumehood (Rm 144)

Direct Check Using 2360 with 4393 Detector (background β186cpm α 1cpm) Net Counts

- Bottom α 1cpm, β 0cpm
- Right side α 1cpm, β 0cpm
- Left side α 1cpm, β 0cpm
- Back α Ocpm, β Ocpm
- Top α Ocpm, β 4cpm
- Vent α 8cpm, β 47cpm
- Inner glass α Ocpm, β Ocpm

Indirect Check Counted with Ludium 2929 (background β 55cpm α 0cpm Net Counts

- Bottom α 6cpm, β 0cpm
- Right side α 1cpm, β 0cpm
- Left side α 2cpm, β 11cpm
- Back α 2cpm, β 12cpm
- Top α 2cpm, β 10cpm
- Vent α 5cpm, β 4cpm
- Inner glass α 1cpm, β 0cpm

		Doc#	147-01600-ESDR	-002	Rev:	0	
Nuclear Project#:	655352	Contract#.	255095	Page ⁻	76 of	201	
Customer Doc#:		Customer:	Saskatchewan Research Council (SRC)				
Title.	END STATE D	ECOMMISSIONIN	MISSIONING REPORT FOR SRC SLOWPOKE-2				

Surveyed by Roger Rees 2019-07-22 to 2019-07-27

Survey of Zones 1 and 2

Zone 1 Rooms 139, 140, 141, 142.1, 142.2, 147 and 147.1

- Bkgd of 4393 α Ocpm β 162cpm, Bkgd of 2929 α Ocpm β 53cpm
- Direct and indirect checks of benches carried out using Ludlum instruments 2360 with 4393 and 2929.
- Random spot direct checks carried out of the floor.
- 5M² areas of floor surface indirect checked by Masslinn mop.
- Gamma survey carried out at zone boundaries and throughout zone using Bot P-200 with SM305 probe.

Results

- Direct checks = Nothing noted above background for α or β
- Indirect checks = Nothing noted above background levels for α or βy
- Masslinn mop of floors = Nothing noted above background levels for α or β
- Random spot checks of floors (direct check) = Nothing above background levels for α or β
- Highest recorded gamma level noted = 0.03mrem/h

Zone 2 Rooms 143,144,145

- Bkgd of 4393 1 Ocpm β 197cpm, Bkgd of 2929 α Ocpm β 47cpm
- Direct and indirect checks of benches carried out using Ludlum instruments 2360 with 4393 and 2929.
- Random spot direct checks carried out of the floor.
- 5M² areas of floor surface indirect checked by Masslinn mop.
- Gamma survey carried out at zone boundaries and throughout zone using 8ot P-200 with SM305 probe

Results

- Direct checks = Nothing noted above background for α or β
- Indirect checks = Nothing noted above background levels for α or βγ
- Masslinn mop of floors = Nothing noted above background levels for α or β
- Random spot checks of floors (direct check) = Nothing above background levels for α or β
- Highest recorded gamma level noted = 0.04mrem/h

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 Doc#:
 147-01600-ESDR-002
 Rev.
 0

 Nuclear Project#:
 655352
 Contract#
 255095
 Page:
 77 of 201

 Customer Doc#:
 Customer:
 Saskatchewan Research Council (SRC)

 Title:
 END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2 FACILITY

Appendix D SUMMARY OF END STATE RADIOLOGICAL SURVEYS

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		Docur.	147-01000-6301	1-002	Rev. U
Nuclear Project#:	655352	Contract#	255095	Page:	78 of 201
Customer Doc#:		Customer Saskatchewan Research Council (SRC)			
Title:	END STATE DE	COMMISSIONIN	IG REPORT FOR	SRC SLOWPO	KE-2

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Final Surveys For SLOWPOKE Reactor at Saskatchewan Research Council, Saskatoon

The following tables are the results of the final release surveys carried out following the decommissioning of the SLOWPOKE reactor situated at: 422 Downey Rd, Saskatoon, SK S7N 4L8, on the campus of the University of Saskatchewan.

Reactor Room (Zone 3)

Surveys were done over a period of 2 weeks, 2020-02-24 to 2020-03-06, and incorporated the Reactor Room (room #146) walls, floor, and the empty reactor pool wall and floor. Walls were gridded out in squares of 1m², as mandated, and the tables are a direct visual representation of each wall, floor etc. and the squares as they are drawn on the wall. The information inside each square is the final release survey results of that individual square. Crane, manlift and vents above as well as the roof vents have been confirmed free of contamination and radiation.

Zone 2 Rooms

The Uranium Analysis Lab (room#143), Gamma Spectroscopy Lab (room#144), and the Sample Storage Room (room#145) were also surveyed for release and the results will be presented in a separate table. These rooms were not mandated to be gridded in the same fashion as Rm #146.

Instruments Used

- Fixed Contamination: Ludlum 2360 rate meter using 4293 detector. Detects alpha and beta. Portable hand held instrument.
- Loose Contamination: Ludlum 2929 dual scaler with a 43-10-6 detector. Swipes of areas/items that are suspected of being contaminated are placed in the detector and counted.
- Gamma: Bot P200 meter using a SM 305 low range detector. This is a hand held instrument.

Candu Energy Inc. and SNC-Lavalin Nuclear Inc.

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 Nuclear Project#:
 655352
 Contract#:
 255095
 Page:
 79 of 201

 Customer Doc#:
 Customer:
 Saskatchewan Research Council (SRC)

 Title:
 END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2 FACILITY

Survey Sheet Key

Example of one square:

Square Number

<u>Bkgd</u> = Result in counts per minute (cpm) of a 1 minute background count of 4393 fixed contamination instrument.

<u>D/C</u> = Direct Check . Use 4393 to survey square and perform a one minute count on area of with the highest reading. Record net counts (in cpm). Net counts are the counts left after background is subtracted.

O/S = On Swipe. Result of the swipe used on the square after being counted for 1 minute on the Ludlum 2929. Recorded in cpm (net counts)

Swipes area = 100cm²

<u>y</u> = Highest gamma reading, 1cm, near contact from surfaces being surveyed. Recorded in millirem per hour (mrem/h).

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		Doc#:	147-01600-ESDR	-002	Rev 0
Nuclear Project#:	655352	Contract#.	255095	Page:	80 of 201
Customer Doc#:	• •••	Customer	Saskatchewan Research Council (SRC)		
Title:	END STATE DI FACILITY	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPO	KE-2

Uranium Analysis Lab (room#143), Gamma Spectroscopy Lab (room#144), and the Sample Storage Room (room#145) Survey Results

- Swipes (100cm²) were taken on all surfaces of benches, fumehood (internal and external), cupboards, doors, walls, and floor.
- Direct checks were also performed on these surfaces.
- Gamma, near contact, dose checks were carried out on these surfaces as well as a general field measurement taken.
- Net activity is as follows. Highest D/C = α 2cpm, β 23cpm. Highest swipe counted = α 1cpm, β 9cpm. Highest γ dose rate = 0.02mrem/h. γ general field = background (0.02 to 0.03mrem/h)

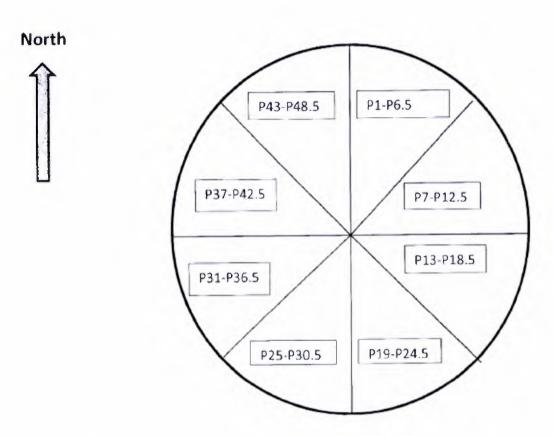
Background Levels During Survey and Swipe Counting

Ludlum 2929 - α Ocpm, β 48cpm Ludlum 4393 - α 1cpm, β 157cpm Bot P200 - γ 0.00 to 0.04mrem/h

Surveyor Sign Off

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		Doc#:	147-01600-ESDI	R-002	Rev U	
Nuclear Project#:	655352	Contract#:	255095	Page:	81 of 201	
Customer Doc#:		Customer: Saskatchewan Research Cou				
Title:	END STATE DI FACILITY	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPO	KE-2	



Plan View of Reactor Pool Hole:

Segments showing where grid numbers will be located within the Reactor Pool Hole.

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0

82 of 201 255095 Page: Nuclear Project#. 655352 Contract#: Customer Doc#: Customer:

Saskatchewan Research Council (SRC)

Title:

END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2 **FACILITY**

LOCATION	p.1	p.2	ρ.3	P-4	P-S	P-6	P-6.5	P-7	P-8	p.9	P-10	P-11	p.12	P-12.5	P-13	P-14	P-15	P-16	P-17	P-18	P-18.5	P-19	P-20	P-21	P-22	P-23	P-24	P-24.5	P-25	P-26	0 77	17-4
Bkg	0	0	0	0	-	0	دـــر	0	1	0	0	0	0	,,	0	2	0	0	0	0	0	0	1	0	1-2	2	0	0	0	0	1	
Bkgd (4393)cpm	165 P	143	173	169	151	165	169	163	157	145	143	154	157	157	163	164	159	155	146	137	145	167	163	163	149	148	163	161	149	144	153	
. D		0	0	2	0	2	0	0	0	Д	1	0	0	0	0	0	0	0	0	0	1	0	0	2	1	1	0	0	0	P	2	,
D/C (net)cpm	15	9	0	0	12	د	00	14	0	0	0	0	0	<u></u>	0	4	0	0	2	0	0	0	0	0	ω	0	0	2	11	0	16	0
0/2	0	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	p	0	0	0	0	0	0	0	0	0	0	0	>
O/S net)cpm	35	0	21	2	2	0	5	10	6	18	10	,,	2	1	0	0	4	7	14	19	0	6	6	25	0	5	11	0	0	9	21	0
Gamma_IIIIeII/II	0.00	0.02	0.01	0.04	0.02	0.01	0.02	0.01	0.01	0.04	0.03	0.03	0.01	0.03	0.00	0.02	0.02	0.04	0.01	0.02	0.01	0.03	0.00	0.01	0.01	0.04	0.02	0.02	0.02	0.04	0.01	0.02

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Nuclear Project#: 655352 Contract#: 255095 Page: 83 of 201

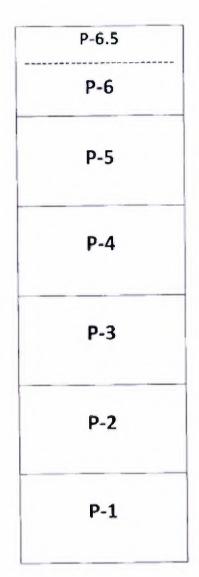
Customer Doc#: Customer: Saskatchewan Research Council (SRC)

Title: END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2
FACILITY

LOCACION	200	CARO (4000)cpm	12	of a (mex) about			
	Ω	g G	Ω	В	ρ	750	
P-29	0	146		4	0	20	0.01
P-30	0	156	ы	0	0	4	0.01
P-30.5	0	162	2	2	0	0	0.03
P-31	0	163	0	0	0	1	0.02
P-32	0	137	2	12	0	4	0.04
P-33	0	146	2	9	0	21	0.02
P-34	1	144	0	0	0	15	0.00
P-35	فتو	152	0	0	0	21	0.01
P-36	0	174	0	21	ш	22	0.01
P-36.5	0	166	0	7	1	12	0.04
P-37	2	154	0	0	1	6	0.01
P-38	0	132	0	0	0	7	0.04
p-39	0	158	0	0	0	21	0.02
P-40	0	139	0	7	0	20	0.02
P-41	0	132	0	2	0	5	0.03
P-42	0	149	0	ω	0	19	0.01
P-42.5	0	158	0	2	0	0	0.02
P-43	0	155	1	0	0	9	0.00
P-44	0	146	0	13	0	w	0.00
P-45	0	163	0	0	1	27	0.02
P-46	0	157	0	0	0	10	0.01
P-47	2	147	0	0	0	13	0.03
P-48	junk	165	2	688	0	18	0.02
P-48.5	0	169	0	637	0	0	0.01
P-49	1	167	0	5	0	0	0.00
P-50	-	156	0	1	0	0	0.02
	1	163	0	1	0	0	0.01
P-51	0		1	0	0	0	0.04

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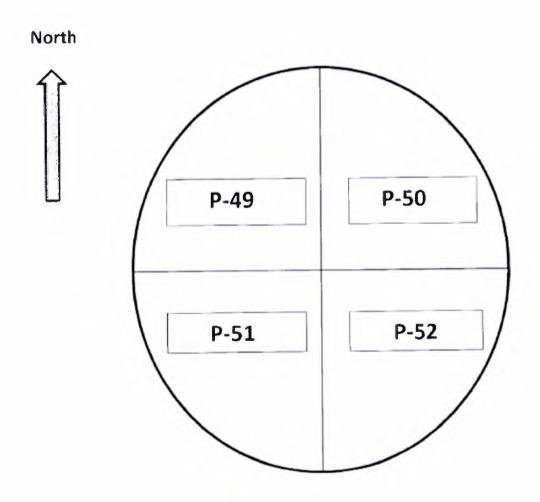
Top of Reactor Pool



Bottom of Reactor Pool

		Doc#	147-01600-ESDI	R-002	Rev: U
Nuclear Project#:	655352	Contract#:	255095	Page:	85 of 201
Customer Doc#:		Customer:	Saskatchewan I	Research Coun	cil (SRC)
Title:	END STATE DE FACILITY	COMMISSIONIN	IG REPORT FOR	SRC SLOWPO	KE-2

Elevation view of Reactor Pool wall grid pattern



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Nuclear Project#:	655352	Contract#:	255095	Page:	86 of 201
Customer Doc#:		Customer.	Saskatchewan I	Research Coun	cil (SRC)
Title:	END STATE D	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPO	KE-2

F-60	F-59	F-58	F-57	F-56	F-55	South
F-54	<u>F-53</u>	<u>F-52</u>	F-51	F-50	F-49	
F-48	F-47	F-46	F-45	F-44	F-43	
F-42	F-41	F-40	F-39	F-38	F-37	
F-36	F-35	POOL	REACTOR	F-32	<u>F-31</u>	IS
F-30	F-29	F-28	F-27	F-26	F-25	West
F-24	F-23	F-22	F-21	F-20	F-19	
F-18	F-17	F-16	F-15	F-14	F-13	
F-12	<u>F-11</u>	<u>F-10</u>	6-3	150	F.7	
F-6	15	12	E.	F.2	E	North

Reactor Room #146 Floor Plan and Final Survey Results

Squares are 1 m

Candu Energy Inc. and SNC-Lavalin Nuclear Inc.

East

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		Doc#:	147-01600-ESDI	R-002	Rev: U
Nuclear Project#:	655352	Contract#:	255095	Page:	87 of 201
Customer Doc#:	1 - 100	Customer:	Saskatchewan I	Research Coun	cil (SRC)
Title.	END STATE DE	ECOMMISSIONIN	G REPORT FOR	SRC SLOWPO	KE-2

0 163 0 0 0 155 0 9 1 167 0 11 0 144 0 4 0 145 0 0 0 0 149 0 0 0 0 157 2 9 0 147 0 3 0 134 0 0 1 144 1 0 0 148 0 0 0 166 0 6 0 158 2 7 0 153 1 9 1 153 1 9 0 169 1 0 1 156 0 0	F-1 F-2 F-3	0 α Bkg	Bkgd (4393)cpm α β 143 137 153	Ω	D/C (net)cpm β 2 4	Ω	+	0/5 (net)cpm β 0 2 0
1 167 0 11 1 167 0 11 0 164 0 4 0 145 0 0 0 0 149 0 0 0 0 157 0 0 0 0 157 2 9 0 149 0 0 15 0 149 0 0 15 0 149 0 0 3 1 144 1 0 0 1 148 0 0 0 0 168 0 0 1 1 153 1 9 0 169 1 0 0	F.A	0	163	0 0	0	0 0	_	5
0 164 0 4 0 145 0 0 0 149 0 0 0 157 0 0 0 149 0 15 0 147 0 3 0 134 0 0 1 144 1 0 0 148 0 0 0 166 0 6 0 158 2 7 0 169 1 9 1 156 0 0	F-6	0	167	0 0	11	0	-	w
0 145 0 0 0 149 0 0 0 157 0 0 0 157 2 9 0 149 0 15 0 134 0 0 1 1444 1 0 0 148 0 0 0 166 0 6 0 158 2 7 0 169 1 9 0 156 0 0	F-7	0	164	0	4	0		6
0 149 0 0 0 157 0 0 0 157 2 9 0 149 0 15 0 134 0 0 1 1444 1 0 0 148 0 0 0 166 0 6 0 158 2 7 0 169 1 9 1 156 0 0	F-8	0	145	0	0	1		14
0 157 0 0 0 157 2 9 0 149 0 15 0 147 0 3 1 144 1 0 1 155 1 0 0 148 0 0 0 166 0 6 0 158 2 7 0 169 1 9 1 156 0 0	F-9	0	149	0	0	1		0
0 157 2 9 0 149 0 15 0 147 0 3 1 144 1 0 1 155 1 0 0 148 0 0 0 166 0 6 0 158 2 7 1 153 1 9 2 156 0 0 0	F-10	0	157	0	0	1	_	00
0 149 0 15 0 147 0 3 0 134 0 0 1 144 1 0 0 148 0 0 0 166 0 6 0 158 0 1 0 158 2 7 1 153 1 9 2 156 0 0	F-11	0	157	2	9	0		0
0 147 0 3 0 134 0 0 1 144 1 0 0 148 0 0 0 166 0 6 0 168 0 1 0 158 2 7 1 153 1 9 2 156 0 0	F-12	0	149	0	15	2		5
0 134 0 0 1 144 1 0 1 155 1 0 0 148 0 0 0 166 0 6 0 158 0 1 1 153 1 9 0 169 1 0 0 156 0 0	F-13	0	147	0	3	0		0
1 144 1 0 1 155 1 0 0 148 0 0 0 166 0 6 0 168 0 1 0 158 2 7 1 153 1 9 0 169 1 0 2 156 0 0	F-14	0	134	0	0	0		2
1 155 1 0 0 148 0 0 0 166 0 6 0 158 0 1 0 158 2 7 1 153 1 9 2 156 0 0	F-15	,_	144	1	0	0		16
0 148 0 0 0 166 0 6 0 168 0 1 0 158 2 7 1 153 1 9 0 169 1 0 2 156 0 0 0	F-16	نو	155	1	0	12		9
0 166 0 6 0 168 0 1 0 158 2 7 1 153 1 9 0 169 1 0 2 156 0 0	F-17	0	148	0	0	0		0
0 168 0 1 0 158 2 7 1 153 1 9 0 169 1 0 2 156 0 0	F-18	0	166	0	6	2		12
0 158 2 7 1 153 1 9 0 169 1 0 2 156 0 0	F-19	0	168	0		0		20
1 153 1 9 0 169 1 0 2 156 0 0	F-20	0	158	2	7	0		0
0 169 1 0 2 156 0 0	F-21	1	153	1	9	0		9
2 000	F-22	0	169) h	0	0 0		0 6
>	F-23	2	156	0		1 0		۵ و

Reactor Room #146 Floor Plan and Final Survey Results

Squares are 1 m

Candu Energy Inc. and SNC-Lavalin Nuclear Inc.

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Doc#: 147-01600-ESDR-002

Rev:

0

 Nuclear Project#:
 655352
 Contract#:
 255095
 Page:
 88 of 201

 Customer Doc#:
 Customer
 Saskatchewan Research Council (SRC)

Title: END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2 FACILITY

F-43 0 F-43 1 F-44 0 F-45 0 F-47 0								F-40 0	F-39 0	F-38 0	F-37 1	F-36 1	F-35 0	pool	F-34 Sp	pool	F-33 Sp	F-32 0	F-31 0	F-30 0	F-29 0	F-28 0	F-27 0	F-26 0	F-25 0		LOCATION
139	3 . 1	141	149	147	157	155	151	159	148	144	158	142	162	Ō.	Space at top of reactor	0	Space at top of reactor	151	154	152	159	167	163	147	157	ρ	Bkgd (4393)cpm
	0	1 0	0 0	0 5	1 6	1 2	2	1 5	0 8	0 0	0 0	0 5	0 0					0 8	1 8	0 17	0 9	0 2	0 0	0 0	2 0	αβ	D/C (net)cpm
	0 1	0 15	0	0	1 6	1 0	0	0 0	1 3	0 0	0	0 1	0 0					0 6	0 2	2 3	0 4	0 0	0 1	0 4	0 4	αβ	O/S (net)cpm
	0.03	0.02	0.01	0.02	0.02	0.01	0.03	0.02	0.00	0.04	0.00	0.01	0.00			- Alexander Alexander		0.01	0.01	0.03	0.02	0.02	0.03	0.04	0.01		Gamma (net)mrem/h

Reactor Room #146 Floor Plan and Final Survey Results

Squares are 1 m²

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Doc#. 147-01600-ESDR-002 Rev.

0

Nuclear Project#	655352	Contract#:	255095	Page:	89 of 201
Customer Doc#:		Customer.	Saskatchewan	Research Coun	cil (SRC)
Title:	END STATE DI	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPO	KE-2

Background
Swipe Counter = α 0cpm, β 49cpm
Gamma Meter= γ 0.02-0.04 mrem/h

LOCATION F-55 F-54 F-53 F-51 F-52 F-50 F-57 F-56 0000000 Bkgd (4393)cpm Ω 155 161 160 148 152 172 172 163 163 158 w 0 0 0 0 0 0 0 0 1 1 خسو Ω D/C (net)cpm 0000000 000 0 000 0 0 0 Ω O/S (net)cpm 0 3 0 0 17 0 0 æ 0.00 0.02 0.03 0.01 0.04 0.03 0.03 0.01 Gamma (net)mrem/h

Reactor Room #146 Floor Plan and Final Survey Results

Squares are 1 m²

Candu Energy Inc. and SNC-Lavalin Nuclear Inc.

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uclear Project#: Customer Doc#:

255095

END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2 FACILITY

West

NW-3

NW-2

NW-1

Swipe Counter = a 1cpm, B 64cpm Gamma Meter= y 0.00-0.04 mrem/h

Bkgd a Ocpm

β 152cpm

B Ocpm

B Ocpm

D/C a Ocpm

O/S a 1cpm

y Dose Rate

0.01mrem/h

Bkgd a 2cpm

8 133cpm

β Ocpm

B 6cpm

D/C a Ocpm

O/S a Ocpm

y Dose Rate

0.01mrem/h

Bkgd a Ocpm

β 167cpm

B Ocpm

B Ocpm

D/C a Ocpm

O/S a Ocpm

y Dose Rate

0.02mrem/h Background NW-6

NW-5

NW-4

Bkgd a Ocpm

B 145cpm

β 4cpm

B 14cpm

D/C a Ocpm

O/S a 1cpm

y Dose Rate

0.04mrem/h

Bkgd a 1cpm

D/C a Ocpm

O/S a Ocpm

y Dose Rate

0.02mrem/h

Bkgd a 1cpm

β 159cpm

B Ocpm

B 11cpm

D/C a 1cpm

O/S a Ocpm

y Dose Rate

0.04mrem/h

B 158cpm

B 17cpm

ß 23cpm

Reactor Room #146 North Wall Final Survey Results Squares are 1 m²

NW-9

NW-8

NW-7

Bkgd a 1cpm

B 157cpm

B Ocpm

D/C a 1cpm

O/S a Ocpm

y Dose Rate

0.02mrem/h

Bkgd a Ocpm

β 165cpm

8 Ocpm

ß 31cpm

D/C a Ocpm

O/S a Ocpm

y Dose Rate

0.01mrem/h

Bkgd a Ocpm

β 151cpm

B 21cpm

B 12cpm

D/C a Ocpm

O/S a Ocpm

y Dose Rate

0.03mrem/h

В 26срт

NW-12

NW-11

NW-10

Bkgd a Ocpm

D/C a Ocpm

O/S a Ocpm

y Dose Rate

0.03mrem/h

Bkgd a Ocpm

D/C a 2cpm

O/S a Ocpm

y Dose Rate

0.03mrem/h

Bkgd a 1cpm

B 167cpm

β Ocpm

B Ocpm

D/C a Ocpm

O/S a Ocpm

y Dose Rate

0.00mrem/h

B 147cpm

B Ocpm

B Ocpm

B 138cpm

B Ocpm

β9cpm

Saskatchewan Research Council (SRC)

201 0

90 of

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East

NW-18

NW-17

NW-16

Bkgd a Ocpm

B 146cpm

B Ocpm

ß 16cpm

D/C a Ocpm

O/S a 2cpm

y Dose Rate

0.00mrem/h

Bkgd a Ocpm

β 149cpm

ß Ocpm

ß 9cpm

D/C a Ocpm

O/S a Ocpm

y Dose Rate

0.04mrem/h

Bkgd a Ocpm

D/C a 1cpm

O/S a 2cpm

y Dose Rate

0.01mrem/h

B 141cpm

B 7cpm

β 1cpm

NW-15

NW-14

NW-13

Bkgd a Ocpm

B 132cpm

β 9срт

B Ocpm

D/C a Ocpm

O/S a Ocpm

y Dose Rate

0.00mrem/h

Bkgd a Ocpm

В 152cpm

ß 12cpm

B Ocpm

D/C a Ocpm

O/S a 1cpm

y Dose Rate

0.03mrem/h

Bkgd a Ocpm

B 149cpm

β Ocpm

B Ocpm

D/C a Ocpm

O/S a 1cpm

y Dose Rate

0.01mrem/h

Customer

255095

END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2 FACILITY

North End

EW-3

Bkgd a Ocpm

B 167cpm

B 15cpm

B Ocom

D/C a Ocpm

O/S a Ocpm

y Dose Rate

0.00mrem/h

EW-2

Bkgd a Ocpm

B 164cpm

B Ocpm

B 6cpm

D/C a 1cpm

O/S a 1cpm

y Dose Rate

0.02mrem/h

EW-1

Bkgd a 1cpm

B 157cpm

ß 3cpm

B 12cpm

D/C a Ocpm

O/S a 1cpm

y Dose Rate

0.01mrem/h

Background

EW-6

Bkgd a Ocpm

B 156cpm

ß 9cpm

B Ocpm

D/C a Ocpm

O/S a Ocpm

y Dose Rate

0.01mrem/h

EW-5

Bkgd a 1cpm

B 149cpm

B Ocpm

B Ocpm

D/C a Ocpm

O/S a 1cpm

y Dose Rate

0.04mrem/h

EW-4

8kgd a Ocpm

В 158cpm

B 6cpm

B Ocpm

Swipe Counter = α Ocpm, β 64cpm Gamma Meter= y 0.00-0.04mrem/h

D/C a Ocpm

O/S a Ocpm

y Dose Rate

0.03mrem/h

EW-9

Bkgd a 1cpm

β 163cpm

β 0cpm

B Ocpm

D/C a 2cpm

O/S a 1cpm

y Dose Rate

0.02mrem/h

EW-8

Bkgd a 1cpm

β 139cpm

B Ocpm

B Ocpm

D/C a Ocpm

O/S a Ocpm

y Dose Rate

0.04mrem/h

EW-7

Bkgd a Ocpm

β 148cpm

B 12cpm

B Ocpm

D/C a 1cpm

O/S a Ocpm

y Dose Rate

0.00mrem/h

EW-12

Bkgd a Ocpm

B 146cpm

B Ocpm

B Ocpm

D/C a Ocpm

O/S a Ocpm

y Dose Rate

0.03mrem/h

EW-11

Bkgd a Ocpm

B 147cpm

β 4cpm

B Ocpm

D/C a Ocpm

O/S a Ocpm

y Dose Rate

0.01mrem/h

EW-10

Bkgd a Ocpm

β 162cpm

B 16cpm

β 11cpm

D/C a 1cpm

O/S a Ocpm

y Dose Rate

0.00mrem/h

Reactor Room #146 East Wall Final Survey Results

Squares are 1 m²

EW-18

Bkgd a Ocpm

B 149cpm

ß 1cpm

B 19cpm

D/C a Ocpm

O/S a Ocpm

y Dose Rate

0.04mrem/h

EW-17

Bkgd a Ocpm

ß 159cpm

B Ocpm

B Ocpm

D/C a Ocpm

O/5 α 0cpm

y Dose Rate

0.00mrem/h

EW-16

Bkgd a Ocpm

B 152cpm

B Ocpm

B Ocom

D/C a Ocpm

O/S a Ocpm

y Dose Rate

0.01mrem/h

EW-15

Bkgd a Ocpm

B 144cpm

B 12cpm

β Ocpm

D/C a Ocpm

O/S a Ocpm

y Dose Rate

0.01mrem/h

EW-14

Bkgd a 2cpm

B 155cpm

B Ocom

ß 8cpm

D/C a Ocpm

O/S a Ocpm

y Dose Rate

0.01mrem/h

EW-13

8kgd a Ocpm

B 158cpm

ß 4cpm

B Ocpm

D/C a 1cpm

O/S a Ocpm

y Dose Rate

0.01mrem/h

655352

Nuclear Project#.

Customer Doc#:

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Candu Energy Inc. and SNC-Lavalin Nuclear Inc.

South End

EW-30

Bkgd a 0cpm

D/C a Ocpm

O/S a Ocpm

y Dose Rate

0.00mrem/h

EW-29

Bkgd a Ocpm

B 158cpm

β 0cpm

B Ocpm

D/C a Ocpm

O/S a Ocpm

y Dose Rate

0.00mrem/h

EW-28

Bkgd a Ocpm

B 167cpm

8 Scpm

B Ocpm

D/C a Ocpm

O/S a Ocpm

y Dose Rate

0.01mrem/h

B 162cpm

B Ocpm

B 2cpm

EW-27

Bkgd a Ocpm

B 145cpm

B Ocpm

B Ocpm

D/C a Ocpm

0/5 a 0cpm

y Dose Rate

0.01mrem/h

EW-26

Bkgd a Ocpm

B 164cpm

ß Ocpm

B 7cpm

D/C a 1cpm

O/S a Ocpm

y Dose Rate

0.01mrem/h

EW-25

Bkgd a Ocpm

D/C a Ocpm

O/S a Ocpm

y Dose Rate

0.03mrem/h

B 157cpm

3 Scpm

B 16cpm

EW-24

Bkgd a Ocpm

B 165cpm

B Ocpm

ß 4cpm

D/C a Ocpm

O/S a Ocpm

y Dose Rate

0.03mrem/h

EW-23

Bkgd a 1cpm

D/C a 1cpm

O/S a Ocpm

v Dose Rate

0.03mrem/h

EW-22

Bkgd a Ocpm

B 151cpm

ß 8cpm

β 0cpm

D/C a Ocpm

0/5 a 0cpm

y Dose Rate

0.04mrem/h

B 146cpm

B Ocpm

B Ocpm

EW-21

Bkgd a 1cpm

B 156cpm

B 14cpm

B 5cpm

D/C a 1cpm

O/S a Ocpm

y Dose Rate

0.02mrem/h

EW-20

Bkgd a 1cpm

D/C a 1cpm

O/S a Ocpm

y Dose Rate

0.04mrem/h

FW-19

Bkgd a 1cpm

ß 161cpm

B Ocpm

B Ocpm

D/C a Ocpm

O/S a 1cpm

y Dose Rate

0.02mrem/h

β 149cpm

B 2cpm

B Ocpm

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Contract#

Saskatchewan Research Council (SRC)

REPORT FOR SRC SLOWPOKE-2

East

SW-18

SW-17

SW-16

Bkgd a Ocpm

B 163cpm

B 2cpm

B 3cpm

D/C a Ocpm

O/Sa 1cpm

y Dose Rate

0.02mrem/h

Bkgd a 1cpm

D/C a 1cpm

O/S a Ocpm

y Dose Rate

0.01mrem/h

Bkgd a Ocpm

D/C a 2cpm

B 155cpm

B 154cpm

ß 9cpm

B Ocom

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92 of

END STATE DECOMMISSIONING FACILITY

D/C a Ocpm β Ocpm O/S a Ocpm

Bkgd a Ocpm

β 163cpm

ß Ocpm

β 9срт

D/C a Ocpm

O/S a 1cpm

y Dose Rate

0.01mrem/h

SW-12

SW-11

SW-10

Bkgd a 2cpm

B 146cpm

ß 7cpm

B Ocpm

D/C a Ocpm

O/S a Ocpm

y Dose Rate

0.01mrem/h

Bkgd a 1cpm

B 158cpm

Reactor Room #146 South Wall Final Survey Results Squares are 1m2

SW-9

SW-8

SW-7

Bkgd a Ocpm

B 144cpm

B Ocpm

B Ocpm

D/C a Ocpm

O/S a Ocpm

y Dose Rate

0.02mrem/h

Bkgd a Ocpm

D/C a 1cpm

O/S a Ocpm

y Dose Rate

0.00mrem/h

Bkgd a 2cpm

B 157cpm

B Ocpm O/S a Ocpm

B Ocpm

D/C a Ocpm

y Dose Rate

0.01mrem/h

B 139cpm

B Ocpm

B Ocpm

β Ocpm y Dose Rate 0.04mrem/h

SW-13 Bkgd a Ocpm B 146cpm

SW-15

SW-14

Bkgd a Ocpm

β 137cpm

B Ocpm

B 10cpm

D/C a Ocpm

O/S a 1cpm

y Dose Rate

0.03mrem/h

Bkgd a Ocpm

β 132cpm

ß 22cpm

B Ocpm

D/C a Ocpm

O/5 α 1cpm

y Dose Rate

0.03mrem/h

D/C a Ocpm

0/5 a 0cpm

B Ocpm

B 16cpm

O/S a 1cpm B Ocpm

ß 12cpm

y Dose Rate

Customer Doc#

655352

y Dose Rate 0.04mrem/h

Swipe Counter = a Ocpm, B 64cpm Gamma Meter= v 0.00-0.04mrem/h

0.00mrem/h Background

Nuclear Proje

West

SW-3

SW-2

SW-1

Bkgd a Ocpm

D/C a 1cpm

O/S a Ocpm

y Dose Rate

0.01mrem/h

Bkgd a 1cpm

D/C a Ocpm

O/S a 1cpm

y Dose Rate

0.02mrem/h

Bkgd a Ocpm

B 165cpm

B Ocpm

β Ocpm

D/C a Ocpm

O/S a Ocpm

y Dose Rate

0.04mrem/h

ß 149cpm

ß 14cpm

B Ocpm

B 174cpm

B Ocpm

B Ocpm

SW-6

SW-5

SW-4

Bkgd a Ocpm

D/C a Ocpm

O/S a 1cpin

y Dose Rate 0.04mrem/h

Bkgd a Ocpm

B 132cpm

B 16cpm

ß 2cpm

D/C a Ocpm

O/S a Ocpm

y Dose Rate

0.03mrem/h

Bkgd a Ocpm

B 147cpm

ß 8cpm

B Ocpm

D/C a Ocpm

O/S a Ocpm

y Dose Rate

0.01mrem/h

β 152cpm

ß 12cpm

ß 7cpm

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Nuclear Project#:	655352	Contract#	255095	Page:	93 of 201
Customer Doc#.		Customer	Saskatchewan	Research Coun	cil (SRC)
Title	END STATE DE	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPO	KE-2

South End

Squares are 1 m²

Reactor Room #146 West Wall Final Survey Results

WW-30	WW-27	WW-24	WW-21	WW-18	WW-15	WW-12	WW-9	WW-6	WW-3
Bkgd a 2cpm	Bkgd a Ocpm	Bkgd a 1cpm	Bkgd a Ocpm	Bkgd a Ocpm	Bkgd a Ocpm	Bkgd a 1cpm	Bkgd a Ocpm	Bkgd a 1cpm	Bkgd a 2cpm
β 16Scpm	β 143cpm	β 173cpm	β 169cpm	β 151cpm	β 165cpm	₿ 163cpm	β 157cpm	β 145cpm	β 143cpm
D/C a 1cpm	D/C a Ocpm	D/C a 1cpm	D/C a Ocpm	D/C a 1cpm	D/C a 2cpm	D/C a Ocpm	D/C a 1cpm	D/C a 1cpm	D/C a Ocpm
β 14cpm	ß Ocpm	₿ Ocpm	ß Ocpm	β 17cpm	ß Ocpm	B Ocpm	ß 2cpm	β Ocpm	β 23cpm
0/S α 2cpm	0/5 α 0cpm	O/S a Ocpm	0/S α 0cpm	O/S a Ocpm	0/5 a 0cpm	0/5 a 0cpm	O/S a Ocpm	0/5 a 0cpm	O/S α Ocpm
β Ocpm	β Ocpm	β Ocpni	В Осрт	ß 4cpm	β Ocpm	β 16cpm	β Ocpm	β Ocpm	\$ Ocpm
y Dose Rate	y Dose Rate	y Dose Rate	y Dose Rate	y Dose Rate	y Dose Rate	y Dose Rate	y Dose Rate	y Dose Rate	y Dose Rate
0.01mrem/h	0.00mrcm/h	0.01mrem/h	0.31mrem/h	0.01mrem/h	0.03mrem/h	0.00mrem/h	0.01mrem/h	0.04mrem/h	0.02mrem/h
WW-29	WW-26	WW-23	WW-20	WW-17	WW-14	WW-11	8-WW	WW-5	WW-2
Bkgd a Ocpm	Bkgd a Ocpm	Bkgd a Ocpm	Bkgd a 1cpm	Bkgd a 1cpm	Bkgd a Ocpm	Bkgd a Ocpm	Bkgd a 1cpm	Bkgd a Ocpm	Bkgd a Ocpm
β 154cpm	B 157cpm	β 163cpm	β 164cpm	β 159cpm	β 155cpm	β 146cpm	в 137срт	β 167cpm	β 163cpm
D/C a 1cpm	D/C a 1cpm	D/C a 1cpm	D/C a 1cpm	D/C a Ocpm	D/C a Ocpm	D/C a Ocpm	D/C a 1cpm	D/C a 1cpm	D/C a 1cpm
β 12cpm	β 3срт	β 14cpm	β 14cpm	₿ 0cpm	ß Ocpm	ß 9cpm	ß 11cpm	ß Ocpm	β 14срт
0/s α 2cpm	0/5 α Ocpm	0/S a 0cpm	0/S a 0cpm	0/S α 0cpm	O/S a Ocpm	0/5 a 0cpm	0/5 a 0cpm	0/5 a Ocpm	0/5 a 0cpm
ß llcpm	β Ocpm	ß Ocpm	β 0cpm	ß Ocpm	β Ocpm	₿ 0cpm	ß Ocpm	ß Ocpm	₿ 0cpm
y Dose Rate	y Dose Rate	y Dose Rate	y Dose Rate	y Dose Rate	y Dose Rate	y Dose Rate	y Dose Rate	y Dose Rate	y Dose Rate
0.02mrem/h	0.02mrem/h	0.02mrem/h	0.00mrem/h	0.01mrem/h	0.01mrem/h	0.01mrem/h	0.04mrem/h	0.01mrem/h	0.03mrem/h
WW-28	WW-25	WW-22	WW-19	WW-16	WW-13	WW-10	WW-7	WW-4	WW-1
8kgd a 2cpm	Bkgd a Ocpm	Bkgd a Ocpm	Bkgd a Ocpm	Bkgd a 1cpm	Bkgd a 2cpm	Bkgd a Ocpm	Bkgd a Ocpm	Bkgd a Ocpm	Bkgd a Ocpm
β 163cpm	β 149cpm	β 148cpm	β 163cpm	β 149cpm	β 144cpm	β 153cpm	β 158cpm	β 146cpm	β 156cpm
D/C a Ocpm	D/C a Ocpm	D/C a Ocpm	D/C a Ocpm	D/C a 1cpm	D/C a Ocpm	D/C a 1cpm	D/C a Ocpm	D/C a Ocpm	D/C a Ocpm
β Ocpm	B 1cpm	β 17cpm	β 8cpm	β 6cpm	β 13cpm	β Acpm	β 1cpm	β 16cpm	β 4cpm
0/S α 1cpm	0/5 a 0cpm	0/5 α 0cpm	O/S a Ocpm	0/5 a 0cpm	O/S a Ocpm	0/5 a 0cpm	0/5 a 0cpm	0/5 a 0cpm	O/S a 1cpm
β Scpm	в Осрт	β 1cpm	\$ Ocpm	β 26cpm	β Ocpm	B Ocpm	β 4cpm	β 9cpm	β 10cpm
y Dose Rate	y Dose Rate	y Dose Rate	y Dose Rate	y Dose Rate	y Dose Rate	y Dose Rate	y Dose Rate	y Dose Rate	y Dose Rate
0.02mrem/h	0.01mrem/h	000	a common /h	O Omramin	-	-	a common /h	0 00mrem/h	000mrem/h

North End

Candu Energy Inc. and SNC-Lavalin Nuclear Inc.

Gamma Meter= y 0.00-0.04mrem/h Swipe Counter = α 1cpm, β 71cpm

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Doc#: 147-01600-ESDR-002

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655352 Contract#: 255095 Page: 94 of 201

Customer Doc#: Customer: Saskatchewan Research Council (SRC)

Title: END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2 FACILITY

Appendix E RADIOACTIVE WASTE DATA SHEETS

Nuclear Project#:

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Doc#:	147-01600-ESDR-002
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Page	95 of 201
Pasaarch Cou	uncil (SRC)

Nuclear Project#:	655352	Contract#:	255095	Page:	95 of 201
Customer Doc#:		Customer:	Saskatchewan	Research Coun	cil (SRC)
Title:	END STATE DI	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPO	KE-2

REQUEST FOR SHIPMI	ENT OF RADIOACTIVE MATERIAL I	FORM (434 FORM)		0	FFICIAL USE ONLY Page 1 of 3
900-508520-FM-001 R	IIVO				Reference: 900	508520-STD-00
		File No.			1	
		Doc. Co	flection ID	Subject Index	Doc. Code	Serial No.
Office Use Only	D# .	Notification G	ven 🗆	CNL Rel # .		
	This form is to be s	submitted to the sit	E CNL RAM SI	alpper.		
PART 1: SHIPMENT DET	AILS					
Proposed shipment date	: [] Unknown - details to follow late	er vie email 🔞 Kni	own-provide	date: 2020 0	12 22	
Description of Item(s)/ Package contents:	SRC SLOWPOKE-2 Reactor Comp	onents – Type-A IB-	25) Serial # 16	592		
Trit um shipment:	™ No	transfer reference r	umber:			
Heason for shipment:	[] Material to be analyzed [8]	Waste disposal	□ Con	mercial project		
	☐ Calibration ☐	Other provide reaso	in:			
Value in Canadian dollars		ection blank. "YES"	- fill out this	section		
Value In Canadian dollars USA shipment: □ No □ The country of origin of the country or origin of the country of origin of the country or origin origin or origin or origin or origin or origin origin or origin o	: \$ 'Yes - provide faderal ID# he item(s): 'Dinknown details to 'D' Known - provide cou	o follow later via em intry erial be returned to	ell	→ □ Yes		
Value in Canadian dollars USA shipment: 12 No 12 The country of origin of the country of origin of the country of the c	: \$ Yes - provide faderal ID# he item(s): □ Unknown - details to □ Known - provide cou No □ Yes Will the mate □ Collect ☑ Prepaid ons: ※ None □ Fragile □ Do not file - prayide description:	o follow later via em untry erial be returned to freeze Other – p	ENL: C No	→ □ Yes		
Value In Canadian dollars USA shipment: No The country of origin of the country of the	: \$ Yes - provide faderal ID# he item(s): □ Unknown - details to □ Known - provide cou No □ Yes Will the mate □ Collect ☑ Prepaid ons: ※ None □ Fragile □ Do not file - prayide description:	o follow later via em intry erial be returned to	ENL: C No	→ □ Yes		
Value in Canadian dollars USA shipment: No The country of origin of the country of origin or origin of the country of the country or origin or origin of the country of the country or	: \$ Yes - provide faderal ID# he item(s): □ Unknown - details to □ Known - provide cou No □ Yes Will the mate □ Collect ☑ Prepaid ons: ※ None □ Fragile □ Do not file - prayide description:	o follow later via em untry erial be returned to freeze Other – p	ENL: C No	→ □ Yes		
Value in Canadian dollars USA shipment: 12 No 12 The country of origin of the country or origin origin or origin or origin or origin origin or origin or origin origin origin or origin origin or origin origin origin origin origin origin origin o	: \$ I Yes - provide federal ID# the item(s): □ Unknown details to □ Known - provide cou No □ Yes Will the mate □ Collect ☑ Prepaid ons: ※ None □ Fragile □ Do not file Is - provide description: Example	o follow later via em untry erial be returned to freeze Other – p	ENL: C No	→ □ Yes		
Value in Canadian dollars USA shipment: © No © The country of origin of the country or origin of the country or origin of the country or	: \$ Yes - provide faderal ID# he item(s): □ Unknown details to □ Known - provide cou No □ Yes Will the mate □ Collect ☑ Prepaid ons: ※ None □ Fragile □ Do not file Is - provide description: Eximple ORMATION (SHIPPING TO)	o follow later via em untry erial be returned to reeze Other – p	ENL: C No	→ □ Yes		
Using the Canadian dollars USA shipment: No E The country of origin of the country of the co	: \$ Yes - provide faderal ID# he item(s): □ Unknown details to □ Known - provide cou E No □ Yes Will the mate □ Collect ☑ Prepaid ons: ※ None □ Fragile □ Do not find the provide description: Example ORMATION (SHIPPING TO) SNC-Lavalin Inc.	or follow later via emunitry erial be returned to reeze Other - p le: Flammable, Corro ON, USK 182 Provide as much	ell CNL: C No rovide Instruc osive	Ves tions:	ct (if applicable)	
Value in Canadian dollars USA shipment: No The country of origin of the country of origin of the third or the country of origin of the third or the country of origin of the country of origin or the country of origin or the country	## Yes - provide faderal ID# The item(s): □ Unknown details to □ Known - provide could be provide ansi No □ Yes Will the mate □ Collect □ Prepaid □ Do not first provide description: □ Example □ Const first provide description: □ Const fi	or follow later via emunitry erial be returned to reeze Other - p le: Flammable, Corro ON, USK 182 Provide as much	ell CNL: C No rovide Instruc osive	Ves tions:	ct (if applicable)	
The country of origin of the country of origin of the shipment be: Special handling instruction of the country	## Yes - provide faderal ID# The item(s): □ Unknown details to □ Known - provide could be provide ansi No □ Yes Will the mate □ Collect □ Prepaid □ Do not first provide description: □ Example □ Const first provide description: □ Const fi	or follow later via emunitry erial be returned to reeze Other - p le: Flammable, Corro ON, USK 182 Provide as much	ell CNL: C No rovide Instruc osive	Ves tions:	ct (if applicable)	
Value in Canadian dollars USA shipment: D No D The country of origin of the country of origin or the country or origin or the country or origin or origin or origin or origin or or origin origin or origin or origin or origin or origin or origin origin or origin	## Yes - provide faderal ID# The item(s): □ Unknown details to □ Known - provide could be provide ansi No □ Yes Will the mate □ Collect □ Prepaid □ Do not first provide description: □ Example □ Const first provide description: □ Const fi	or follow later via emunitry erial be returned to reeze Other - p le: Flammable, Corro ON, USK 182 Provide as much	ell CNL: C No rovide Instruc osive	Ves tions:	ct (if applicable)	

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Nuclear Project#:	655352	Contract#:	255095	Page.	96 of 201
Customer Doc#.		Customer:	Saskatchewan	Research Coun	cil (SRC)
Title:	END STATE DI	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPO	KE-2

Bq Bq/ Bq Bq/ Total activity Bq Total activity Bq/ If the radionuclide(s) are either uranium, thorium or plutonium you must fill in the section below: Natural uranium kg Depleted uranium kg							
Unknown	PART 3: PACKAGE INFO	PRMATION/ DELIVERY INFORMATION	ON				
Method of transport: Read Rail Air Marine Unknown Unknown Unknown Parkage gross weight: 2,100 kg Carrier name: Unknown Unknown Unknown Unknown Unknown Unknown Unknown Parkage/filtern Location Building: Room. Room. PART 4: MATERIAL INFORMATION Parkage/filtern Location Building: Room. Parkage/filtern Location Building: Room. Parkage/filtern Bay Building: Building: Room. Parkage/filtern Location Building: Room. Parkage/filtern Building:	Package description:	Type-A (8-25) Seria # 16592	Package dim	ensions:	75" X 50" X 51" (L	(HxIAIx	
Unknown Carrier name: Unknown	Unknown		☐ Unknown				
Carrier name Carr	Package quantity:		Method of tr	ansport: 🕅 R	pad [] Rail [] Air [Marine	
Duknown Darkage/Item Location Building: Room. PART 4: MATERIAL INFORMATION Prissile material. No res Irradiated: No Mes Physical form Meson Solid I Liquid Gas Beryllium metal insule a shielding container made from steel and lead, soft waste bags, Town of the following OPTIONS Chemical form: Emental (e.g. I-125, Xe-133) Oxide [e.g. U0.), U10a) Other [e.g. [NH42), MO0a) OFFICE USE ONLY - RAM SHIPPER COMMENTS Radionacide inventory: the radionacide(s) and its activity (8q or 8q/g) shall be identified prior to shipping. Check one of the following OPTIONS 1. 3 or less radionacide identified Complete Table 1 2. More than a radionacide identified Attach a radionacide inventory Est/gamma spec including activities (Leave Table 1 blank) Unknown radionacide(s) and activity: A gamma spec shall be completed to identify radionacide(s) and activity: Decide to either: 1. Wait for the results and then choose Option 1 or 2 depending on results 11. Submit the 434-form and ensure the results are sent to the Shipper (leave Table 1 blank) TABLE 1 Radionacide(s) Room. Physical form Meson	Unkagwa			ΠU	nknown		
Parkage/item Location	ackage gross weight:	2,100 kg	Carrier name	U			
PART 4: MATERIAL INFORMATION Tissile material. No Yes	Unknown		□ Unknown	1			
Fissile material. Mo Yes	Package/item Location	В	uliding:		Room.		
Beryllium metal insule a shielding container made from steel and lead, soft waste bags Complete Complete	PART 4: MATERIAL INFO	DRMATION		-			
Chemical form: Elemental (e.g. i-125, Xe-133) Oxide jelg, UO ₂ , U ₂ O ₄) Other (e.g. NH42 ₂)MOO ₄) OFFICE USE ONLY = RAM SHIPPER COMMENTS Radionuclide (eventory) the ranionuclide(s) and its activity (Bq or Bq/g) shall be identified prior to shipping. Check one of the following Officials 1. 3 or less radionuclide identified	Fissile material. 🕍 No	☐ Yes frradiated: ☐	No 🖾 Yes	Physical fo	orm: ⊠ Solid [] tiqui	d 🗆 Gas	
Defice USE ONLY = RAM SHIPPER COMMENTS Radionuclide Inventory: the ranionuclide(s) and its activity (8q or 8q/g) shall be identified prior to shipping. Check one of the following Officials 1. 3 or less radionuclide identified	Chamies I farm	Berylfium metal insute a shielding	cuntainer made ho	ristes aid e	ad, soft waste bags	hay lot	+ Cont
Radionuclide Inventory: the radionuclide(s) and its activity (Bq or Bq/g) shall be identified prior to shipping. 1. 3 or less radionuclide identified	Cueurcai totas.	Elemental (e.g. I-125, Xe-133) Oxid	de le g. UO, U10al O	ther (e.g. INH	i),MoO ₄)	0	Red
Complete Table 1 2. More than a radionuclide identified		OFFICE US	SE ONLY - RAM SHIP	PER COMME	NTS		
Radionuclide(s) Activity – provide either "Bq" or "Bq/g" SEE ATTACHMENT SEE ATTACHMENT Bq Bq Bq Total activity Bq Total activity Bq Total activity Bq Depleted uranium kg	Check one of the following the following of the following	identified Complete 7: clides identified Attach a rad	able 1	[st/gamma sp	er including activities		
SEE ATTACHMENT SEE ATTACHMENT BQ Bq/ SEE ATTACHMENT BQ Bq Bq/ Bq Bq/ Total activity Bq Total activity Bq/ If the radionuclide(s) are either uranium, thorium or plutonium you must fill in the section below: Natural uranium kg Depleted uranium kg	Check one of the following. 3 or less radionuclide More than 3 radionuclide(some control of the control of th	identified Complete Tale Clides identified Attach a rad and activity: A gamma spec shall if the results and then choose C	nible 1 fionuclade inventory be completed to Ideo Option 1 or 2 depens esults are sent to the	Est/gamma sp ntify radionucl Fing on results	er including activities lide(s) and activity. De		
Bq Bq Bq/ Total activity Bq Total activity Bq/ If the radionuclide(s) are either uranium, thorium or plutonium you must fill in the section below: Natural uranium kg Depleted uranium kg	Check one of the following. 3 or less rapionuclide. 2. More than 3 radionuclide(s. Unknown radionuclide(s. U. Wall. Sub	identified Complete Tale Clides identified Attach a rad and activity: A gamma spec shall if the results and then choose C	nitie 1 financiale inventory be completed to ider Option 1 or 2 depend esults are sent to the TABLE 1	list/gamma sp ntify radionucl ling on results s Shipper 📙 (ec including activities lide(s) and activity. De s (Leave Table 1 blank)		
Bq Bq/ Total activity Bq Total activity Bq/ If the radionuclide(s) are either uranium, thorium or plutonium you must fill in the section below: Natural uranium kg Depleted uranium kg	Check one of the following. 3 or less radionuclide. 2. More than 3 radionuclide(s. Unknown radionuclide(s. L. Walls. Sub- Radionuclide(s).	identified	nible 1 financiale inventory libe completed to ider Option 1 or 7 depend esults are sent to the TABLE 1 Activity - p	Ess/gamma sp ntify radionucl ling on results Shipper [] (provide either	ec including activities lide(s) and activity. De s (Leave Table 1 blank)		
Total activity Bq Total activity Bq/ if the radionuclide(s) are either uranium, thorium or plutonium you must fill in the section below: Natural granium kg Depicted granium kg	Check one of the following the	identified Complete Tachlides identified Attach a radio) and activity. A gamma spec shall if for the results and then choose Complete the 434-form and ensure the radio.	nible 1 financiale inventory libe completed to ider Option 1 or 7 depend esults are sent to the TABLE 1 Activity - p	list/gamma sp ntify radionucl ling on results s Shipper [] (provide either Bq	ec including activities lide(s) and activity. De s (Leave Table 1 blank)		Bq/g
if the radionuclide(s) are either uranium, thorium or plutonium you must fill in the section below: Natural granium kg Depleted granium kg	Check one of the following the	identified Complete Tachlides identified Attach a radio) and activity. A gamma spec shall if for the results and then choose Complete the 434-form and ensure the radio.	nible 1 financiale inventory libe completed to ider Option 1 or 7 depend esults are sent to the TABLE 1 Activity - p	iss/gamma sp ntify radionucl ling on results Shipper [] (provide either Bq Bq	ec including activities lide(s) and activity. De s (Leave Table 1 blank)		Bq/E
□ Natural uranium kg □ Depletes uranium kg	Check one of the following the	identified Complete Tachder identified Attach a rad Att	nible 1 financiale inventory libe completed to ider Option 1 or 7 depend esults are sent to the TABLE 1 Activity - p	Est/gamma sp ntify radionucl ling on results Shipper [] (rovide either Bq Bq	ec including activities lidels) and activity. De sign of the second of t		84/8 84/8
	Check one of the follows 1. 3 or less radionuclide 2. More than 3 radionuclide 1. Wall than 3 radionuclide(s) 1. Wall Sub- Redionuclide(s) SEE ATTACHMENT	identified	nible 1 financiale inventory be completed to ideo Option 1 or 2 depend esults are sent to the TABLE 1 Activity p SEE ATTACHMENT	Est/gamma sp ntify radionucl ling on results shipper [] (rovide either Bq Bq Bq Total a	er including activities lidels) and activity. Design of the second of th		Bq/E
Matural thorium	Check one of the follows 1. 3 or less racionuclide 2. More than 3 radionuclide(s) 1. Wall Sub- Radionuclide(s) SEE ATTACHMENT SEE ATTACHMENT	identified	nible 1 financiale inventory be completed to idea Option 1 or 2 depend esults are sent to the TABLE 1 Activity p SEE ATTACHMENT	Est/gamma ap ntify radionucl ling on results shipper [] (provide either Bq Bq Bq Bq Total a	er including activities lidels) and activity. Design of the second of th	cide to either	8 d/8 8 d/8
Se La Fiction Se Se La Fiction Service Se	Check one of the follows 1. 3 or less radionuclide 2. More than 3 radionuclide(s) II. Sub Radionuclide(s) SEE ATTACHMENT SEE ATTACHMENT If the radionuclide(s) ar	identified	nible 1 financiate inventory be completed to ider Option 1 or 2 depend esults are sent to the TABLE 1 Activity p SEE ATTACHMENT	iss/gamma spottify radionucling on results Shipper (1) (rovide either Bq Bq Bq Total a In the section	er including activities lidels) and activity. Design of the second of th	cide to either	8 d/8 8 d/8
□ Emiched uranium g WI% U WI% U-235 in U g U	Check one of the follows 1. 3 or less racionuclide 2. More than 3 radionuclide 1. Wall. Sub- Radionuclide(s) SEE ATTACHMENT SEE ATTACHMENT If the radionuclide(s) are Natural uranium	identified	nible 1 financiate inventory be completed to ider Option 1 or 2 depend esults are sent to the TABLE 1 Activity p SEE ATTACHMENT	iss/gamma spottify radionucling on results Shipper (1) (rovide either Bq Bq Bq Total a In the section	er including activities lidels) and activity. Design of the second of th	cide to either	84/8 84/8
	Check one of the following of the follow	identified	initie 1 financiale inventory be completed to ideo Option 1 or 2 depens esults are sent to the TABLE 1 Activity p SEE ATTACHMENT Conjum you must fill i	iss/gamma spottify radionucling on results Shipper (1) (rovide either Bq Bq Bq Total a In the section	ec including activities lide(s) and activity De side(s) and activity De side(s) and activity Below:	kg	8 d\8 8 d\8 8 d\8
2-41	Check one of the following the	identified	initie 1 financiale inventory be completed to ideo Option 1 or 2 depens esults are sent to the TABLE 1 Activity p SEE ATTACHMENT Conjum you must fill i	iss/gamma spottify radionucling on results Shipper (1) (rovide either Bq Bq Bq Total a In the section	ec including activities lide(s) and activity De side(s) and activity De side(s) and activity Below:	kg	8 d\R 8 d\R 8 d\R

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900-511300-TMP-011 REV. 2

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		DOC#.	147-01000-6301	1-002	Rev. U	
Nuclear Project#.	655352	Contract#	tract#: 255095 Page: 97			
Customer Doc#:		Customer.	Saskatchewan F	Research Coun	cil (SRC)	
Title	END STATE DE	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPO	KE-2	

REQUEST FOR SHIPMENT OF R 900-508520-FM-001 REV 0	ADIOACTIVE	MATERIAL FORM (43	4 FORM) Se Con	stainer	OFFICIAL USE ONLY Page 3 of
PART 6: RADIOLOGICAL SURVEY C	OMPLETED BY	Y GROUP 1 RADIATION	SURVEYOR		
Note: b	ackground for	measurements not to e	xceed befa/gamma 300 cpm	and alpha 3 cpm.	
	enal 🗆 Matr	Contaminati	ONTAINERS CHECKED 8 on Levels on:		
Type	P	teading (gross)	Units	Instrument man	de and serial number
Total beta/gamma (if applicable)	T	SEE ATTACHMENT	cpm		
Total a pha			cpm		
Removable beta/gamnia			cpm/300cm ¹ on swipe		
Removable a pha			cpm/300cm ² on swipe		
			ites on: not shipping container) № Sh		
Near Co				At 1 Meter	a on the
Béta	Background	rem/h Bet			em/h nem/n
Gamma	15 20		rma	-	netr/h
Neutron	Background		atron		renyn
Additional radiological survey resul	is may be atta	cried to this form under	the direction of a free to Fin	Y>K*31.	
Comments: The Gamma Spec, repo	rt is attached	for the most significant	radionuclides.		
Group 1 Radiation Surveyor					

Canadian Nuclear Laboratories

900-511100-TMP-011 REV. 2



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HEU Source

	NT OF RADIOACTIVE MATERIAL FORM (4)	14 FORM)		OFFIC	Page 1 of
900 508520 FM-001 R	EVO		Re	eference: 900-50	-
	File Na.:				
		Dec. Collection ID	Subject Index	Dec. Code	Serial No.
Office Use Only ICI	D.N Notil	ication Given	CNL Ref II .		
All III-A distancement	This form is to be submitted	to the site CNL RAM 5	hipper.		
PART L: SHIPMENT DET	KILS				
Proposed shipment date:	Unknown - details to follow later via ema	H Known-provide	date 2020-02	21	
Description of item(s)/ Package contents	SRC HEU Saurce				
Tritium shipment		eference number		_	
Reason for shipment:	☐ Material to be analyzed ☐ Waste dis ☐ Calibration		nmercial project	RC to CNL	
The country of orlgin of the	ne item(s): Unknown details to follow la G Known provide country:	ter via email			
Is this CNL property			o 🛘 Yes		
is this CNL property (☐ Known provide country: — No ☐ Yes Will the material be re	sturned to CNL: ON			
Is the CNL property () Will the shipment be: () Special handling instruction	☐ Known provide rountry: ☐ No ☐ Yes Will the material be re ☐ Collect ☒ Prepaid ons: ☒ None ☐ Fragile ☐ Do not freeze ☐	sturned to CNL: ON			
is the CNL property () Will the shipment be: () Special handling instruction	☐ Known provide rountry: ☐ No ☐ Yes Will the material be re ☐ Collect ☒ Prepaid ons: ☒ None ☐ Fragile ☐ Do not freeze ☐	oturned to CNI.: ON Other – provide Instru			
Is this CNL property () Will the shipment be: () Special handling instruction () Other dangerous good	☐ Known - provide country: ☐ No ☐ Yes Will the material be re ☐ Collect ☑ Prepaid Ons: ☑ None ☐ Fragile ☐ Do not freeze ☐ Is – provide description:	oturned to CNI.: ON Other – provide Instru			
Will the shipment be: Special handling instruction Other dangerous good	□ Known - provide country: No □ Yes Will the material be re □ Collect ☑ Prepaid ons: ☑ None □ Fragile □ Do not freeze □ is – provide description: Example: Flamm	oturned to CNI.: ON Other – provide Instru			
Is this CNL property Will the shipment be: Special handling instruction Other dangerous good	□ Known - provide country: □ No □ Yes	other – provide Instru able, Corrosive			
is the CNL property Will the shipment be: Special handling instructle Other dangerous good PART 2: CONSIGNEE INFO Company name	□ Known - provide rountry: □ No □ Yes - Will the material be re □ Collect □ Prepaid ons: ② None □ Fragile □ Do not freeze □ is – provide description: Example: Flamm ORMATION (SHIPPING TO) SNC-Lavallin Inc. 2253 Speakman Drive, Mississauga, ON, USK	other – provide Instru able, Corrosive	ctions:		
Is the CNL property Will the shipment be: Special handling Instructle Other dangerous good PART 2: CONSIGNEE INFO Company name	□ Known - provide rountry: □ No □ Yes - Will the material be re □ Collect □ Prepaid ons: ② None □ Fragile □ Do not freeze □ is – provide description: Example: Flamm ORMATION (SHIPPING TO) SNC-Lavallin Inc. 2253 Speakman Drive, Mississauga, ON, USK	other – provide Instru able, Corrosiva	ctions:	(if applicable)	
Is the CNL property Will the shipment be: Special handling Instructle Other dangerous good PART 2: CONSIGNEE INFO Company name		other – provide Instru able, Corrosiva	ctions:	if epplicable)	
is the CNL property Will the shipment be: Special handling Instruction Other dangerous good PART 2: CONSIGNEE INFO Company address		other – provide Instru able, Corrosiva	ctions:	(if applicable)	
is the CNL property Will the shipment be: Special handling Instruction Other dangerous good PART 2: CONSIGNEE INFO Company address Name		other – provide Instru able, Corrosiva	ctions:	(if applicable)	

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500-511300 TMP-011 REV. 2

PART 3: PACKAGE INFORM Package description: 5 Unknown Package quantity:						
□ Unknown	5 Gal Pall		Package dimensions:			
	, 001196		□ Unknown	p.A.		
and multiple efficient attach.	_		Method of transport:	(X Road Rail	Air D Marige	
□ Unknown		.—		L. Unknown		
	2 kg		Carrier name.			
Un nown	-		□ Unknown			
Package/ Jem Location:			Building.	Room:		
PART 4: MATERIAL INFOR	MATION					
Fiss le material: 🗆 No 🛭		trradiated, [I No K Yes Physi	all form: 🗵 Solid 🗆	Diquid C Gas	
Chemical form:		1-125, Xe-1331 O	x de (e.g. UO ₂ , U ₂ O ₃) Other (e.g.	(NI14]-MoO ₄)		
	termination (sc.D)		USE ONLY - RAM SHIPPER COM			
Unknown radionuclidu(s) a	and activity: A	gamma specisha	Il be completed to identify radio		vities (Leave Table y. Decide to eithe	
t. Wait f	for the results	and then choose	II be completed to Identify radio Option 1 or 2 depending on re- results are sent to the Shipper	onuclide(s) and activities.	y. Decide to eithe	
I. Walt I	for the results	and then choose	Il be completed to Identify radio Option 1 or 2 depending on re results are sent to the Shipper TABLE 1	onuclide(s) and activit suits () (Leave Lable 1 bla	y. Decide to eithe	
t. Wait f	for the results	and then choose	Il be completed to Identify radio c Option 1 or 2 depending on re results are sent to the Shipper TABLE 1 Activity – provide e	onuclide(s) and activities.	y. Decide to eithe	
I. Walt I	for the results	and then choose	Il be completed to Identify radio Option 1 or 2 depending on re results are sent to the Shipper TABLE 1	onuclide(s) and activit suits () (Leave Lable 1 bla	y. Decide to eithe	r:
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Wait (Radionuclide(s) If the radionuclide(s) are e Natural granium	for the results it the 434-form Total act	s and then choose m and ensure the tivity n, thorium or plu	Il be completed to Identify radio c Option 1 or 2 depending on re results are sent to the Shipper TABLE 1 Activity – provide c Big Big Big Continuous of the Section of the Section of the Section of the Section of the Sec	onuclide(s) and activity [Leave Fable 1 bil ther "Bq" or "Bq/g" tal activity tion below:	y. Decide to eithe	Bq/g Bq/g Bq/g
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900 511900 TMF-013 REV. 2

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Doc#:	147	-0160	N-FSI)R-002

Rev: 0

Nuclear Project# 655352 Contract# 255095 Page 100 of 201

Customer Doc#: Customer Saskatchewan Research Council (SRC)

Tille: END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2 FACILITY

ART 6: RADIOLOGICAL SURVE	Y COMPLETED B	Y GROUP I RADI	ATION SU	JRVEYOR		
Note	background for	measurements	not to exi	eed beta/gamma 300 cpm	and alpha 3 cpm	
INN	ER CONTAIN	ERS OR SHIPP	ING CO	NTAINERS CHECKED B	Y SURVEYOR:	
50 A			tainer (no	n Levels on: ot shipping container) Ef Sh	olpping container	
Туре	1	learing (gross)		Units	Instrument n	node) and serial number
otal beta/gamma (if applicable)	Вас	kground	срп		
otal alpha			Zern	rpm		
emovable seta/gamma			Zern	cpm/300cm ³ on swipe		
emovable alpha			Zero	cpm/300cm ² on swipe		
DN	laterial		ose rat	es on: t shipping container) 🗵 St	ipping container	
Near	Contact				At 1 Mater	
eta	Hackground	rem/ti	Beta		Background	rem/h
amma	Background	miem/h	(Sam	*******	Background	mrem/h
eutron	Background		Neut		Backgrovind	meem/h
dditional radiological survey re	aults may be atta	ched to this form	n under 1	ne direction of a Health Phy	rsicist_	
omments: The Gamma Spec. re	port is attached	for the most sign	rificant ra	dionuclides		
roup 1 Radiation				0		

Canadian Nuclear Laboratories

900-511300-TMP-011 REV. 2

900-511300-TMP-011 REV. 2

H	CEECEO	0	255025	8	404 -6 204
Nuclear Project#:	655352	Contract#:	255095	Page:	101 of 201
Customer Doc#:		Customer:	Saskatchewan I	Research Cou	ncil (SRC)
Title:	END STATE DE	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPO	OKE-2

	coratories Canadiens	URC	eli 4-saft mili	waste	
REQUEST FOR SHIPE	MENT OF RADIOACTIVE MATERIAL FORM	(434 FORM)	in li	OFFIC	HAL USE ONLY Page 1 of 3
900-508520-FM-001	REV 0		Refe	erence: 900-50	08520-STD-003
	File No.	Doc. Collection ID	Subject Index	Doc. Code	Serial No.
Office Use Only	3CD# . No	otification Given	CNL Ref # .		
-	This form is to be submitted	ed to the site CNL RAM Sh	lpper.		
PART 1: SHIPMENT DI	TAILS				
Proposed shipment da Description of item(s)/ Package contents:	SRC SLOWPORE-2 Reactor Components	~ Туре-А (8-25) Serial # 16		2	a.n.d.orggon
Tritlum shipment:	No Ses - provide tritium transfe	r zeterence number:			
Reason for shipment:	☐ Muserial to be analyzed S Waste	disposal [] Con	nmercial project		
	☐ Yes - provide federal ID#	r later vià email	_		
USA shipment: 🗍 No	☐ Yes - provide federal ID# I the item(s): ☐ Unknown - details to follow ☐ Known - provide country:		o TYPE		
USA shipment: No The country of origin of latest this CNL property:	☐ Yes provide federal ID# If the item(s): ☐ Unknown - details to follow ☐ Known - provide country: M No ☐ Yes Will the material be		o □ Yes		
USA shipment: [] No The country of origin o Is this CNL property: Will the shipment be: Special handling instru	☐ Yes provide federal IOP If the item(s): ☐ Unknown - details to follow ☐ Known - provide country: M No ☐ Yes Will the material be ☐ Collect M Prepald ctions. M None ☐ Fragile ☐ Bornot freeze-	returned to CNI: O No			
USA shipment: No The country of origin of the country of origin of the country of origin of the country of t	☐ Yes provide federal IOP If the item(s): ☐ Unknown - details to follow ☐ Known - provide country: ☑ No ☐ Yes Will the material be ☐ Collect ☑ Prepaid ctions. ☑ None ☐ Fragile ☐ Do not freeze poots ~ provide description: Example: Flan	e returned to CNL: No			
USA shipment: No The country of origin of the country of origin of the country of origin of the country of the	☐ Yes provide federal IOP If the item(s): ☐ Unknown - details to follow ☐ Known - provide country: M No ☐ Yes Will the material be ☐ Collect M Prepaid ctions. M None ☐ Fragile ☐ Do not freeze pocs — provide description: Example: Flan NEORMATION (SHIPPING TO)	e returned to CNL: No			
USA shipment:	☐ Yes provide federal IOP If the item(s): ☐ Unknown - details to follow ☐ Known - provide country: ☑ No ☐ Yes Will the material be ☐ Collect ☒ Prepald ctions: ☒ None ☐ Fragile ☐ Do not freeze boos - provide description: Example: Flan NFORMATION (SHIPPING TO) SNC-Lavalin Inc.	The returned to CNI: Notice No. 1 No			
USA shipment: No The country of origin of the country of origin of the country of origin of the country of the	☐ Yes provide federal IOP If the item(s): ☐ Unknown - details to follow ☐ Known - provide country: M No ☐ Yes Will the material be ☐ Collect M Prepaid ctions. M None ☐ Fragile ☐ Do not freeze pocs — provide description: Example: Flan NEORMATION (SHIPPING TO)	The returned to CNI: Notice No. 1 No			
USA shipment: No The country of origin of the country of origin of the country of origin of the country of the country of the shipment be: Special handling instrument of the country o	☐ Yes provide federal IO# If the item(s): ☐ Unknown - details to follow ☐ Known - provide country: If No ☐ Yes Will the material be ☐ Collect ☒ Prepald ctions. ☒ None ☐ Fragile ☐ Do not freeze pocs ~ provide description: Example: Flant Fl	The returned to CNI: Note that the contraction of t	ctions:	(1 applicable)	
USA shipment:	☐ Yes provide federal ID# If the item(s): ☐ Unknown - details to follow ☐ Known - provide country: If No ☐ Yes Will the material be ☐ Collect ☒ Prepald ctions. ☒ None ☐ Fragile ☐ Bo not freeze poots - provide description: Example: Flan NFORMATION (SHIPPING TO) SNC-Lavalin Inc. 2251 Speakman Drive, Mississauga, ON, LS	The returned to CNI: Note that the contraction of t	as possible	if applicable)	

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Nuclear Project#:	655352	Contract#.	255095	Page:	102 of 201
Customer Doc#.		Customer:	Saskatchewan I	Research Coul	ncil (SRC)
Title.	END STATE DE	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPO)KE-2

Package description:	DRMATION/ DELIVERY INI	FORMATION				
Larrage describings:	Type-A (B-25) Senal # 1	6594' Package din	ensions:	75" X 50" X 51"	HAMAIII	
☐ Unknown		☐ Unknow	n			
Package quantity:		Method of t	ransport: 🖾 lload	□ Rall □ Air	∐ Marine	
□ Unknown			El Unkni	own		
Package gross weight:	2,100 kg	Carrier name	5			
☐ Unknown		□ Unknow	3			_
Package/item Location.		Building		Room.		
PART 4: MATERIAL INF	ORMATION					
Fissile material: (S) No.	□ Yes trradi	ated: □ No □ X Yes	Physical form:	≥ Solid □ Llq	uid 🗆 Gas	
	Aluminum, Plastic, Rubb					
Chemical form:	Elemental (e.g.) 125, Xe	-133 Oxide (e.g. UO ₂ , U ₃ O ₆ O	ther (e.g. [NH4],M	1,00		-
	paint Diddhoon	OFFICE USE ONLY - RAM SHIP				
Radionuclide Inventory: Check one of the follow	the radionuclide(s) and it.	s activity (Eq or Eq/g) shall be	identified prior to	sh'pping.		
Check one of the follow 1. 3 or less rudianuclide 2. More than 3 radionu	Ing OPTIONS: Identified Conclides identified Att	s activity (fliq or fliq/g) shall be implete Table 1 such a radionuclide inventory per shall be completed to ide	lst/gamma spec in	icluding activities		
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Check one of the follow 1. 3 or less radionuclide 2. More than 3 radionu Unknown radionuclidels 1. Wa 11. Sub Radionuclide(s)	ing OPTIONS I dentified	mplete Table 1 sach a radionuclide inventory per shall be completed to idea choose Option 1 or 2 dependence the results are sent to the TABLE 1 Activity - p	Ist/gamma spec Interpretation in the specific sp	icluding activities s) and activity Do e Table 1 blank or "Bq/g"		8q/g 8q/g
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Carradian Nuclear Laboratories

900-521300-TMP-011 REV 1

Doc#:	14	7.01	1600	-ESDF	2.002

Rev:

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Nuclear Project#:	655352	Contract#:	255095	Page:	103 of 201
Customer Doc#:		Customer:	Saskatchewan I	Research Cou	ncil (SRC)
Title:	END STATE DI	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPO	OKE-2

Contaminati	surveyor sceed beta/gamma 360 cpm a ONTAINERS CHECKED BY on Levels on: not shipping container) [] Sh	and alpha 3 cpm. Y SURVEYOR:	
Contamination of contamers:	xceed beta/gamma 300 cpm a ONTAINERS CHECKED BY on Levels on:	and alpha 3 cpm. Y SURVEYOR:	
Contaminati Contaminati al in inner container (of containers:	ONTAINERS CHECKED BY	Y SURVEYOR:	
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al in inner container (of containers:		ipping container	
of containers:	not shipping container) LI Sh	ipping container	
of containers:		_	
ading (gross)			
ading (gross)			
The same	Units	Instrument m	nodel and serial number
SEE ATTACHMEN	cpin		
- 114-114	cpin		
	cpm/300cm² on swipe		
	cpm/300cm ² on swige		
		Ipping container	
rem/h Be	2	Background	rem/h
mrem/n Ga	mma	0.04	miein/ii
mrem/ii Ne	utron	Background	mrem/i
hed to this form unde	the direction of a Health Phy-	sicist.	
	al in inner container (i rem/h Bet rnrem/h Gai rnrem/h Nei	cpm/300cm² on swipe cpm/300cm² on swipe Dose rates on: al In Inner container (not shipping container)	cpm/300cm² on swipe cpm/300cm² no swipe Dose rates on: all in linner container (not shipping container)

Canadian Nuclear Laboratories

900-511300-TMP-011 REV. 2

Nuclear Project#:	655352	Contract#	255095	Page	104 of 201
Customer Doc#:		Customer:	Saskatchewan I	Research Cou	ncil (SRC)
Title:	END STATE DI	ECOMMISSIONIN	G REPORT FOR	SRC SLOWPO	DKE-2

REQUEST FOR SHIPM	ENT OF RADIOACTIVE MATERIAL FORM (4	34 FORM)		OFFIC	Page 1 of
900 508520 FM-001 F	EV 0		Re	eference: 900-50	-
	File No.:		1		
		Doc. Callection ID	Subject Index	Dac. Cade	Serial No.
Office Use Only 10	D# . Noti	fication Given []	CNL Ref # .		
	This form is to be submitted	to the site CNL RAM S	hipper.		
PART 1: SHIPMENT DET					
Proposed shipment date	Unknown - details to follow later via em	ail 🛭 Known-provide	date: 2020-02	72	
Description of item(s)/ Package contents:	SRC SLOWPOKE-2 Reactor Components -	Type-A (B-25) Seria R I	6593		
Tritium shipment:	No □ Yes - provide tritium transfer r	eforence number:			POLICIA DE LA CONTRACTOR DE LA CONTRACTO
Reason for shipment:	☐ Material to be analyzed ☑ Waste dis	posal LI Co	etimercial project		
The country of origin of t	he item(s): Unknown details to follow (a	iter via emali			
Is this CNL property:	図 No ☐ Yes Will the material be re	nturned to CNL: D N	lo 🗆 Yes		
Will the shipment be	□ Collect ☑ Prepaid				
Special handling instructi	ons: 🛭 None 🗆 Fragile 🗆 Do not freeze 🗅	Other - provide Instru	ctions:		
Other dangerous good					
	Example: Flamin	able, Corrosive			
PART 2: CONSIGNEE INF	ORMATION (SHIPPING TO)				
Сопірапу патіп	SNC-Lavalin Inc.				
Company address	2251 Speakman Drive, Mississauga, ON, L5K	102			
	Provid	e as much information	as possible		
	Radioactive Material (Class 7) Shipper		Technical Contact	[if applicable]	
Name					
Telephone number					
Fax number					

Candu Energy Inc. and SNC-Lavalin Nuclear Inc.

Canadian Nuclear Laboratories

900-511300 TMP 011 REV. 2

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		Doc#:	147-01600-ESDR	-002	Rev	0
Nuclear Project#:	655352	Contract#	255095	Page:	105 of 2	201
Customer Doc#:		Customer:	Saskatchewan R	esearch Cour	ncil (SRC)	
Title	END STATE D	ECOMMISSIONIN	IG REPORT FOR S	SRC SLOWPO	KE-2	

PART 3: PACKAGE INFO	RMATION/ DELIVERY INFORMATI	1 384				
					D. dah. M.	
Package description:	Type-A (8-25) Sarlal # 16593	Package dimens	lons"	75" X 50" X 51"	DKWXHI	_
☐ Unknown		[] Unknown				
Package quantity:		Method of trans		Rail DAir	☐ Marine	
C. Linknown			□ Unkn	DWI		
Package gross weight.	2,600 kg	Carrier name:				
☐ Unknown		□ Uninown				
Package/item Location:	Bi	rild ng:		Room.		
			_		-	
PART 4: MATERIAL INFO			Also slead to com	M Cellie III Clie	old 17 fac	
Hissile material: 🗵 No			ELINZIEN IDEM.	Sofid □ Dep	uiu 11 005	
Chemical form:	Aluminum, Plastic, Rubber, Resid Elemental (e.g. 1-125, Xe-133) Oxi		r le a (NIMA) &	de O.S		
		ge (e.g. UU ₂ , U ₃ U ₆) UUIE	a facilitation 15 pr	mr/VII		
theck one of the following. 3 or less radionuclide. More than 3 radionuclide.	the radionuclide(s) and its activity ing OPTIONS. Identified [1] Complete Touches identified [2] Attach a rase	riale 1 rionacTde inventory list	ntified prior to	a shipping.		
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Check one of the following. 1. 3 or less radionuclide. 2. More than 3 radionuclide. 3. Wall. Substitution of the following service. Radionuclide(s) SEE ATTACHMENT SEE A	the radionuclide(s) and its activity ing OPTIONS. Identified	(lig or flg/g) shall be identified in the identification of the shall be identified in the shall be completed to identification of the shall be identified in the shall be identified i	gamma spec i y cadionLclide on results lipper (1) (Lea lide either "Bo Total active se section belo s uranium	a shipping. Including activit & (s) and activity. O ve Table 1 blank) Tor "Bq/g"	ecide to eithe	8q/s 8q/s 8q/s
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Canadlan Nuclear Laboratories

900-511300-TMP-011 HLV 2

Doc#: 147-01600-ESDR-002

Rev

			111 01000 200		
Nuclear Project#:	655352	Contract#:	255095	Page:	106 of 201
Customer Doc#;		Customer.	Saskatchewan	Research Cour	ncil (SRC)
Title:	END STATE DI	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPO	KE-2

PART 6: RADIOLOGICAL SURVEY	COMPLETED B	Y GROUP 1 RAD!	ATION 5	JAVEYOR		
Note:	background for	measurements (nat to ex	ceed beta/gamma 300 cpm	and alpha 3 cpm	
	aterial 🗆 Mate	Contam	ninatio	NTAINERS CHECKED B' n Levels on: it shipping container) Sh		
Type	F	teading (gross)		Units	Instrument n	nodel and serial number
lotal beta/gamma (if applicable)		SEE ATTAC	HMENT	cpm		
Total algna				срт		
Removable beta/gamma				cpm/300cm² on swipe		
Removable alpha				cpm/300cm ² on swipe		
	sterial Mate		ose rat	t shipping container) Shi	pping container	
Deta	Background	rem/h	Beta		Background	rem/h
Samma	19.28	mrem/h	Canw	Tiū	0.44	mrnm/h
Veutron	Background	mrem/n	Neut	ron	Background mremy	
Additional radiological survey res	uits may be atta	then to this form	under ti	ne direction of a Health Phy:	sicist	
Comments: The Gamma Spec. rep	port is attached	for the most sign	ificant ra	dionutlides.		

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900-511300-TMP-011 REV. 2

		DOC#.	147-01000-650	K-002	Rev. U		
Nuclear Project#:	655352	Contract#.	255095	Page:	107 of 201		
Customer Doc#: Customer: Saskato				atchewan Research Council (SRC)			
Title ⁻	END STATE DI	ECOMMISSIONIN	G REPORT FOR	SRC SLOWPO	OKE-2		

4.47 04000 ECDD 000



Environmental Analytical Laboratories T: 306-933-6932 F: 306-933-7922 143-111 Research Drive, Saskatoon, SK Canada 57N 3R2 E: analytical@src.sk.ca

www.src.sk.ca/analytical

SRC Group # 2020-1119

Feb 03, 2020

Analytical, SRC 143-111 Research Drive Saskatoon, SK S7N 3R2 Attn: Dave Chorney, 11526

Date Samples Received: Jan-29-2020

Client P.O.:

All results have been reviewed and approved by a Qualified Person in accordance with the Saskatchewan Environmental Code, Corrective Action Plan Chapter, for the purposes of certifying a laboratory analysis

Results from Lab Section 4 authorized by Vicky Snook, Supervisor

- * Test methods and data are validated by the laboratory's Quality Assurance Program.
- * Routine methods follow recognized procedures from sources such as
 - * Standard Methods for the Examination of Water and Wastewater APHA AWWA WEF
 - * Environment Canada
 - * US EPA
 - * CANMET
- * The results reported relate only to the test samples as provided by the client.
- * Samples will be kept for 30 days after the final report is sent. Please contact the lab if you have any special requirements.
- * Additional information is available upon request.
- * Where applicable, unless otherwise noted. Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

This is a final report.

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Saskatchewan Research Council (SRC)

Customer.

5758

Contract#

END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2

255095

FACILITY

655352

Nuclear Project#

Customer Doc#

Title

Analytical, SRC

143-111 Research Drive, Saskatoon, SK Canada S7N 3R2 **Environmental Analytical Laboratories**

T: 306-933-6932 F: 306-933-7922 Toll-free: 1-800-240-8808 E: analytical@src.9k.ca

www.src.sk.ca/analytical

SRC Group # 2020-1119

Feb 03, 2020

Saskatoon, SK S7N 3R2 143-111 Research Drive Attn: Dave Chorney, 11526

Date Samples Received: Jan-29-2020

01/29/2020 SHIM SOLIDS

Client P.O.:

Zinc-65	Manganese-54	Iron-59	Cobalt-80	Cesium-134	Scandium-46	Europium-154	Europium-152	Lab Section 4	Analyte
Bqig	Bqig	Baja	Bajg	Bq/g	Bdyg	Baig	Bq/g		Units
2.2	<0.1	≪0.4	450	<0.09	<0.2	0.8	9.7		5758

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

Baig

Potassium-40

The temperature of the cooler was 21.9 °C upon receipt.

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Nuclear Project#: 655352 Contract#: 255095 Page: 109 of 201

Customer Doc#: Customer. Saskatchewan Research Council (SRC)

Title: END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2 FACILITY



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T: 306-933-6932 F: 306-933-7922 Toll-free: 1-800-240-8808 E: analytical@src.sk.ca

www.src.sk.ca/analytical

SRC Group # 2020-694

Jan 28, 2020

Analytical, SRC 143-111 Research Drive Saskatoon, SK S7N 3R2 Attn: Dave Chorney, 11526

Date Samples Received: Jan-20-2020

Client P.O.:

All results have been reviewed and approved by a Qualified Person in accordance with the Saskatchewan Environmental Code, Corrective Action Plan Chapter, for the purposes of certifying a laboratory analysis

Results from Lab Section 4 authorized by Vicky Snook, Supervisor

* Routine methods follow recognized procedures from sources such as

- * Standard Methods for the Examination of Water and Wastewater APHA AWWA WEF
- * Environment Canada
- * US EPA
- * CANMET

- * Samples will be kept for 30 days after the final report is sent. Please contact the lab if you have any special requirements.
- * Additional information is available upon request.
- * Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

This is a final report.

^{*} Test methods and data are validated by the laboratory's Quality Assurance Program.

^{*} The results reported relate only to the test samples as provided by the client.

Candu Energy Inc. and SNC-Lavalin Nuclear Inc.

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Environmental Analytical Laboratories 143-111 Research Drive, Saskation, SK Canada S7N 3R2

Toll-free: 1-800-240-8808 E: analytical@src.sk.ca T: 306-933-6932 F: 306-933-7922

www.src.sk.ca/analytical

SRC Group # 2020-694

Jan 28, 2020

Saskatchewan Research Council (SRC)

END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2

Analytical, SRC

Saskatoon, SK S7N 3R2 143-111 Research Drive Attn: Dave Chorney, 11526

Client P.O.:

4352 Date Samples Received: Jan-20-2020 01/18/2020 EXTENTION ROD *SOLIDS*

Contract# Customer:

Iron-50 Manganese-54	Cobat-60	Cesium-134	Scandium-48	Europium-154	Europium-152
84/g	Bq/g	Bq/g	g/dg	Bq/g	පිදාලි
5,4	240	<0.1	3.4	0.4	3.2

655352

FACILITY

Lab Section 4

Analyte

4352

Nuclear Project#:

Customer Doc#

Title

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

0.5

Potassium-40 Zino-85

The temperature of the cooler was 24.2 °C upon receipt

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www.src.sk.ca/analytical

SRC Group # 2020-483

Jan 21, 2020

Analytical, SRC 143-111 Research Drive Saskatoon, SK S7N 3R2 Attn: Dave Chorney, 11526

Date Samples Received: Jan-14-2020

Client P.O.:

All results have been reviewed and approved by a Qualified Person in accordance with the Saskatchewan Environmental Code. Corrective Action Plan Chapter, for the purposes of certifying a laboratory analysis

Results from Lab Section 4 authorized by Vicky Snook, Supervisor

- * Test methods and data are validated by the laboratory's Quality Assurance Program.
- * Routine methods follow recognized procedures from sources such as
 - * Standard Methods for the Examination of Water and Wastewater APHA AWWA WEF
 - * Environment Canada
 - * US EPA
 - * CANMET
- * The results reported relate only to the test samples as provided by the client.
- * Samples will be kept for 30 days after the final report is sent. Please contact the lab if you have any special requirements.
- * Additional information is available upon request.
- * Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

This is a final report.

Candu Energy Inc. and SNC-Lavalin Nuclear Inc.

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		Doc#:	Doc#: 147-01600-ESDR-002	Rev. 0
Nuclear Project#: 655352	655352	Contract#:	Contract#: 255095	Page: 112 of 201
Customer Doc#:		Customer.	Customer Saskatchewan Research Council (SRC)	ch Council (SRC)
Тие:	END STATE DEC	OMMISSIONIN	END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE.2	LOWPOKE-2



Environmental Analytical Laboratories

143-111 Research Drive, Saskatoon, SK, Canada S7N 3R2

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SRC Group # 2020-483

Jan 21, 2020

Analytical SRC 143-111 Research Drive Saskatoon, SK, S7N 3R2 Attn: Dave Chorney, 11526

Sample #: Date Sampled: Sample Matrix:

Description:

2020003534

Jan 10, 2020

METAL

01/10/2020 IRRADIATION TUBE

Client PO#:

Date Received: Jan 14, 2020

Analyte	Units	Result	DL
Lab Section 4			
Europium-152	Bq/g	0.04	0.01
Europium-154	Bq/g	0.03	0.009
Scandium-46	Bq/g	0.08	0.02
Cesium-134	Bq/g	<0.01	0.01
Cobalt-60	Bq/g	2.8	0.009
Iron-59	Bq/g	<0.03	0.03
Manganese-64	Bq/g	0.11	0.02
Zinc-65	Bq/g	10	0.04
Potassium-40	Bala	0.09	0.05

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

Gamma spectroscopy detection limits are influenced by several factors. "Less than" values reported above represent the lowest detection limits achievable for the sample.

The temperature of the cooler was 21.4 °C upon receipt.

Candu Energy Inc. and SNC-Lavalin Nuclear Inc.

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		Doc#	147-01600-ESD	R-002	Rev.	U		
Nuclear Project#:	655352	Contract#:	255095	Page:	113 of	201		
Customer Doc#:	Customer: Saskatchewan Research							
Title.	END STATE DE	COMMISSIONIN	IG REPORT FOR	SRC SLOWPO	OKE-2			



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www.src.sk.ca/analytical

RUSH

SRC Group # 2020-1703

Feb 13, 2020

Analytical, SRC 143-111 Research Drive Saskatoon, SK S7N 3R2 Attn: Dave Chorney, 11526

Date Samples Received: Feb-12-2020

Client P.O.:

All results have been reviewed and approved by a Qualified Person in accordance with the Saskatchewan Environmental Code, Corrective Action Plan Chapter, for the purposes of certifying a laboratory analysis

Results from Lab Section 4 authorized by Vicky Snook, Supervisor

- * Test methods and data are validated by the laboratory's Quality Assurance Program.
- * Routine methods follow recognized procedures from sources such as
 - * Standard Methods for the Examination of Water and Wastewater APHA AWWA WEF
 - * Environment Canada
 - * US EPA
 - * CANMET
- * The results reported relate only to the test samples as provided by the client.
- * Samples will be kept for 30 days after the final report is sent. Please contact the lab if you have any special requirements.
- * Additional information is available upon request.
- * Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

This is a final report.

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Doc#. 147-01600-ESDR-002

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Nuclear Project#	655352	Contract#:	255095	114 of 201		
Customer Doc#:		Customer:	Saskatchewan Research Council (SRC)			
Title.	END STATE DE	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWP	OKE-2	



Environmental Analytical Laboratories 143-111 Research Drive, Saskatoon, SK Canada S7N 3R2

T. 306-933-6932 F; 306-933-7922

Toll free: 1 800 240 8808 E: analytical@src.sk.ca

www.src.sk.ca/analytical

RUSH

SRC Group # 2020-1703

Feb 13, 2020

Analytical, SRC 143-111 Research Drive Saskatoon, SK S7N 3R2 Attn: Dave Chorney, 11526

Date Samples Received: Feb-12-2020

Client P.O.:

8221 02/12/2020 CHIPS OF C3 REACTOR POOL *CONCRETE* 8222 02/12/2020 RESIN FROM RM 145 "RESIN"

Analyte	Units	8221	8222	
Lab Section 4				
Europium-152	Eq.ig	0.64	<0.02	
Europium-154	Eq/g	<0.008	0.05	
Scandium-46	Eq:g	0.04	<0.009	
Cesium-134	Бф'д	0.04	<0.007	
Cesium-137	Eq/g	0.02	70	
Cobait-60	Eq/g	0.43	0.02	
Iron-5i9	Bq/g	<0.02	<0.01	
Manganese-54	Bq'g	0.09	<0.007	
Zinc-85	Bq/g	<0.03	<0.01	
Pocassium-40	Bq/g	0.5	<0.04	

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

Candu Energy Inc. and SNC-Lavalin Nuclear Inc.

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Nuclear Project#: 655352 Contract#: 255095 Page: 115 of 201

Customer Doc#: Customer: Saskatchewan Research Council (SRC)

Title: END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2 FACILITY

Canadian Nuclear Laboratories SECTION 2 - INVENTORY LIST SECTION 3 - CONTAINER DETAILS Ot silling to a street White Stolle O. 1 A3H SOO WH ODDINGS 006 WASTE CONTAINER BUVENTORY HORIZ Mush Labora Canadian Nuclear Laboratories NA Consumer Type Container ID: 5-25 Manage 00 20 0 400 30 S 840 Artsa of Origin CAN UP 1 D CO. 0 Lastages Weight Imply SECTION 3 - RADIATION PROTECTION 3 1000 Kg 209800 0.6 0000 Man Hill Wallett 036 PASS AN COMON OFFICIAL USE ONLY
Page 1 of 2
Page 1 of 2 42279 300-181300 TMP-011 REV 3 8

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DEFICIAL USE ONLY

Nuclear Project# 655352 Contract#: 255095 Page: 116 of 201

Customer Doc#: Customer: Saskatchewan Research Council (SRC)

Title: END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2
FACILITY

Canadians Nuclear Exhapters Nucleares

WASTE CONTAINER INVENTORY FORM

900-SOSMOLFIA-005 REV 1

900-SOSMOLFIA-005 REV 1

SECTION 1 - CONTAINER DETAILS

VALUE Frankage ID: RAMENTORY LIST

Waste Frankage ID: Limitation Typin 8-25

Limitation Typin 8-25

SECTION 2 - INVENTORY LIST

Waste Description

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© Canadim Nuclear Laboratories \$ A3# \$10 64NE 00\$ 7 \$5 206

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END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2 FACILITY

Customer

Contract#

P-KMP (for LOFs): LOC id: F-KMP (407) Measurement Basis (459): Internal/Receiver Company 1029

INVENTORY CHANGE DOCUMENT (ICD)

Internal/Receiver

MBA 3775 CNAT

Internal/Received Date |412

Holding Account Code troops

Batch Name (445)

Facility Code (172) IC Type (411)

Isotope Weight

(Units g)

[840,860,670]

0,010000

Country Code (372) CN

Company Name: Canadian Nuclear Laboratories

Contact Name (First): David Contact Name (Last): Koopmar

Ant.#:

Civic #: 25 PÓ Box:

Dept. Chark River Laboratories

Building:
Street: Plant Road
City: Chalk River Laboratories

Country: Carada Postal Cude: KOJ tJD

Unique Identifier

(Batch of Hems)

[1025]

Source

Nuclear Material Description

Country of Origin Code (2003)

Remarks [1084]:

Country Code [2004]

Date: Jan 29/20

Obligated Material

Element Weight

|Units kgig|

Isotope Weight

(Units g)

(2007)

PROTECTED 8 (when complete t)

Form must be submitted in Excel version 2003 error rCNSC cannot accept, xixx files!

Signature (if required):

Number of Items

14701

Shipped Date (412) Hef Source

Holding Account Code page

Report Type:

C Internal

© Domestic

© Import

© Export

© Retransler

© Erom Holding Account

Country Code 3

Measurement Basis (489): N

Facility Code (170)

P KMP (for LOFs)

Canadian Nuclear Safety Commission

Shipper

MBA DIFF CHU

LOC Id:

Shipper Company (8027)

Street: Research Orize City: Saskarbon Province: Sk Country: Canada Postal Code: STN 392

Company Name: Saskatchewan Research Council

Dept: Environmental Analytical Labs

Element

Weight

[CCO-630]

700,800,1032

48346

Units

(kg/g)

11023

Isotope

Code

110241

F-KMP [407]

Contact Name (First): David

Contact Name (Last). Chomey Apt. #: 143 Civic #: 111

Element

Code

[1000II]

PO Box

Licensee Reference lea:

Entry Status (100)

Saleguards Status (1020): F 1A C 2 C Exempt U C Exempt Q

Chemical and Physical 10 mg of U-235 meta-

Correction [1021

Fracking Identifier:

Description (436):

Licence [2001.2002]

Material Description Code (430): QSC

Directions of Security and Sanguards. Corontino Visional Ballety Commission

MANAGEMENT OF THE BOTH OF THE PARTY OF THE

P.O. Buy 1046, Station 6. Ottomo, Orderto, KIP ASS. Fax: (013) 995-5089

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655352

Nuclear Project#

Customer Doc#

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Nuclear Project#: 655352 Contract#: 255095 Page: 118 of 201

Customer Doc#: Customer: Saskatchewan Research Council (SRC)

Title: END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2
FACILITY

SECTION 1 - GENERAL DETAILS SECTION 2 - WASTE PACKAGE DETAILS 900-508600-PM-004 REV 2 () Consdian Nuclear Laboratories AND INSCRIBING MAIN Waste Profes ID: WSS Form # WASTE PACKAGE DATA FORM Destination to the heat of my knowledge, all SECTION 4 - CERTIFICATION Waste Man (Fred in comment) = Canadian Niirlear Laboratories Waxie Pkg ID has a constitutor analis 100 Sec camments progress wassa Opsilas 22223 11111 sections I through 5 of this form and the applicable 7 5 211 Type T 2077777 74 Container ID 16593 Sovietabon Ports OPPETITE ANTAN ***** vo as further Characters Metal-alumin ppE&C, resm u3 sample Saskatchewan Waste Descrip 1 D Police Bick Atilly/Shatzad kun eachange, prostic, Cobah will be required for fire of 33, 6, 50,18, 40 Malerial Code 2000 File No. Water frai 2,305 2.55m3 5 Ainsched S VL deta/Gumma SECTION 3 - RP ASSESSMENT 500600 25282 O28674.0005 Algha 198 Reference 900 508600 FID 003 San K 016 906 506600 FM DS4 REV. 2 Page 1 of Z NIA NA franc) SHA S NO 8 0

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Nuclear Project#:	655352	Contract#:	255095	Page:	119 of 201
Customer Doc#.		Customer:	Saskatchewan	Research Cou	ncil (SRC)
Title:	END STATE DI	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPO	OKE-2

Does fire wante contem fissionable Material? Sing Tits, illadove before un fissional levels then provide either a fiscillation Materials Transfer Document v e.g. 7:12345 b. Safeguard Everyttion Memorphismes. e.g. 6:12345 Ather Esception Memo. Attached List at land on-uclide constituents present in the waste puccesse (if Fissionable Material) present, include FM grantifally weight olong with the nuclide activity in the Activity Muclide Activity Muclide (isolang) Nuclide (isolang) Nuclide (isolang) Nuclide (isolang) Eur 152 Eur 154 Eur 154 Eur 155 Eur 155 Eur 156 Eur 157 Eur 158 Eur 158 Eur 158 Eur 158 Eur 159 Eur 159 Eur 159 Eur 159 Eur 150	00 S08600 FM 604		enter:					Page 2
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Canadian Nuclear Laboratories

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Page. 120 of 201 655352 255095 Nuclear Project#. Contract# Customer Doc# Customer Saskatchewan Research Council (SRC) END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2 Title **FACILITY**

SECTION 2 - WASTE PACHAGE DETAILS SECTION 1 - GENERAL DETAILS bade Management Man. THE POST IN LUDGING OFFI WASTEPACKAGE DATA FORM SECTION 4 - CURTIFICATION Waste management Plant 147 01522 REFT 002 Borytium same berytium PASSES. N'.N Lansadian Nuclear 111111 Canadions Nucleares 5 7 7 17 Wash factable = 1-144 Se-1919-1919-2 SRC, Saskuspon Beryllium in a shielding containe [] Mixed, soctions 1 FIG MIR Shahzad Alica Cape FIR NO. 2,100 lioc. 2.55 m3 West. dividatili 图书 PARTITION. SECTION 9 - RP ASSESSABINE 25282.008674.0005

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Candu Energy Inc. and SNC-Lavalin Nuclear Inc.

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Customer Doc#: Customer: Saskatchewan Research Council (SRC)

Title: END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2
FACILITY

Does the waste contain Fischolable Material? \$\overline{\text{Min}} \sqrt{\text{WIS.}}\$ if above Safeguard Exception levels their per a. Nutries Materials Transfer Document? A.g. T-12345 II. Safeguard Exception Memoinelements. A.g. E-12345 Attach Exception list current present in the waste package. (If flavorable Material present, include flat grampisky enight along with the cuclide Activity in the Activity Nuclide Relief Page 1 Page 1 Page 1 Page 1 Page 2 P	ed must be completed for all
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Peuropay (teuscribus Constituent	Concentration
	(specify units)
	1

C Canadian Nuclear Laboratories

Candu Energy Inc. and SNC-Lavalin Nuclear Inc.

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Nuclear Project#: 655352 Contract#: 255095 Page. 122 of 201

Customer Doc#: Customer Saskatchewan Research Council (SRC)

Title: END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2
FACILITY

SECTION 2 - WASTI PACKAGE DETAILS SECTION 1 - GENERAL DETAILS WASTE PACKAGE DATA FORM O Canadian Nuclear Laboratories Comments WSS form # TATH NEW W. DOSKES - UNI SECTION 4 - CERTIFICATION Clearable, jumph in we lains 1 - 4 0565998 3/2 Del managen 24 NAMA 29805 9MAN PS 114141 n sections. I through but this form in one of the form is 1111111 the form and the applicable Conspiner ID Wwar Parkage Sepresertative U 135 Source verified as described wenn life to district family property contains WASTE PACEAGE MERCHINENTATIVE Code Code Shahi ad Alim \simeq 0.037 Attached 00 48 SECTION 3 - RF ASSESSMENT Beta/Gumma (com) 100 Birk Cuts 016 900 S08600 FM-004 REV 7 DEFICIAL USE ONLY
Page 1 of 2
of 900 Subbot FID 003 99,80 (com) STAL 25 900 (speed

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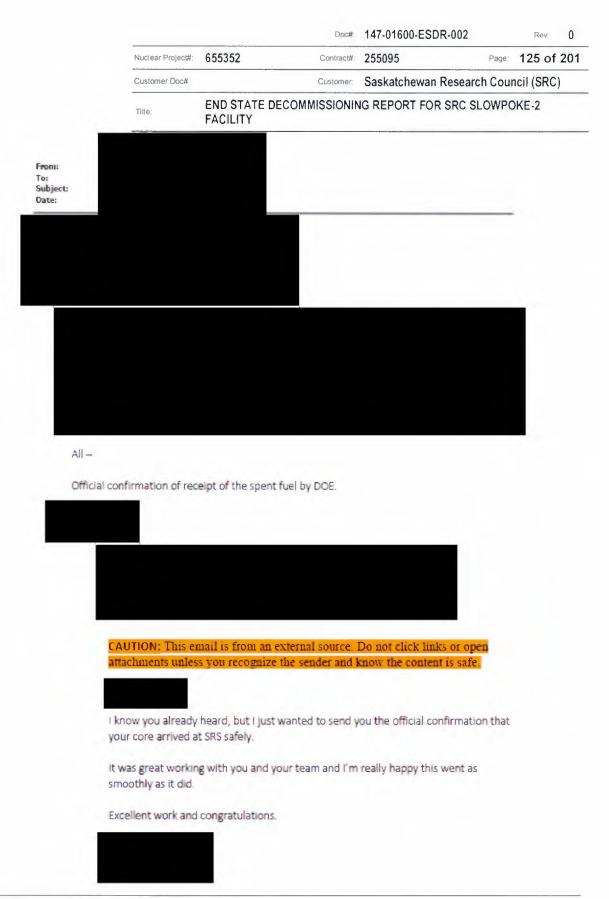
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 Nuclear Project#:
 655352
 Contract#:
 255095
 Page:
 124 of 201

 Customer Doc#:
 Customer:
 Saskatchewan Research Council (SRC)

 Title:
 END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2 FACILITY

Appendix F IRRADIATED FUEL BILL OF LADING AND RECEIPT OF DELIVERY



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Nuclear Project#:	655352	Contract#:	255095	Page:	126 of 201
Customer Doc#:		Customer:	Saskatchewan	Research Cour	ncil (SRC)
Title:	END STATE D	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPO	KE-2

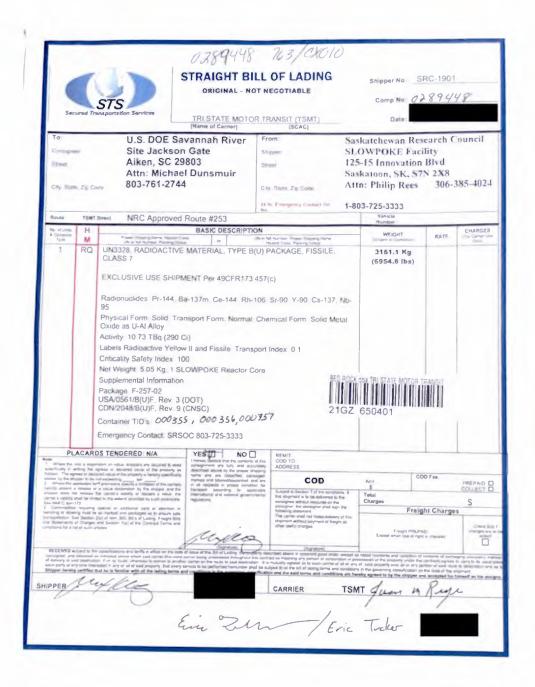
Doc#: 147-01600-FSDR-002

Office of Nuclear Material Removal National Nuclear Security Administration P.O. Box A Aiken, SC 29802-0900 (803) 952-7639 ofc (240) 388-5438 cell

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Nuclear Project#:	655352	Contract#:	255095	Page:	127 of 201
Customer Doc#:		Customer:	Saskatchewan	Research Cou	ncil (SRC)
Title:	END STATE D	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPO	OKE-2



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 Nuclear Project#:
 655352
 Contract#:
 255095
 Page:
 128 of 201

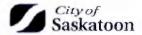
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 Saskatchewan Research Council (SRC)

 Title:
 END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2 FACILITY

Appendix G POOL WATER SAMPLE DATA & APPROVALS

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Nuclear Project#:	655352	Contract#:	255095	Page:	129 of 201
Customer Doc#.		Customer.	Saskatchewan	Research Cou	ncil (SRC)
Title:	END STATE DI FACILITY	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPO	OKE-2

447 04C00 FCDD 003



Community Standards/Community Services vxww.saskatoon.ca 222 Third Ave N tel (306) 657.8766 Saskatoon SK S7K 0J5

Saskatchewan Research Council 422 Downey Rd Saskatoon SK S7N 2X8

Re: Saskatchewan Research Council – Special Discharge Permit Application

I acknowledge receipt of your Special Discharge Permit Application received on January 10, 2020. Having reviewed the information provided, we have determined to issue a conditional permit to discharge into the City sanitary system.

In addition to the terms and conditions attached to this letter, conditions of the permit are as follows:

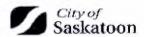
- Discharge into the sanitary system should be discontinued in the event any radionuclide in the reactor pool water is above the limit permitted by SRC's Canadian Nuclear Safety Commission amended licence.
- SRC is responsible for making sure that the sanitary system inside the University of Saskatchewan is able to handle the proposed flow rate indicated in their application.

Please be advised that a permit to discharge is hereby granted until February 28, 2020.



CC: Trent Schmidt, Water & Sewer Manager Terry Freimark, Operations Superintendent Terry Enns, Claims and Technical Operations Supervisor Mike Sadowski, Acting Plant Manager Sudhir Pandey, Environmental Laboratory Coordinator

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Terms and Conditions Related to the Application

- The applicant agrees to provide such additional information the City may require to consider this permit application.
- The applicant must obtain written right-of-way permission to cross all private land and access private infrastructure.
- The applicant must obtain site specific traffic control authorization to cross any City owned street with hoses or to temporarily block traffic.
- 4. Without limiting any other right, remedy or enforcement power under Sewer Use Bylaw No. 9466, if the applicant makes any false, misleading or inaccurate representations in this application, as determined by the General Manager, the General Manager may reject this application or cancel or terminate any Permit or Agreement arising from this application. It is an offence to make any false, misleading or inaccurate representations in this application.

Conditions Which Attach to All Permits

- The applicant must agree to accept and abide by the Terms and Conditions identified in the permit and the permit approval letter;
- The applicant must agree to assume all responsibility and liability whatsoever in respect to any fees, interest, costs, expenses, damage or loss, arising directly or indirectly from the issuance of this permit.
- The applicant must at all times, retain a copy of the permit at the location specified in the address indicated in this application.
- Issuance of a permit is specific to the conditions listed and shall in no way be construed or be deemed to be a broad approval, authorization or acceptance of any discharge to the City's sanitary sewage system.
- The applicant understands authorization to discharge to the City's sanitary sewer system shall occur and take effect only to the extent stated in a fully and validly executed permit.
- The applicant is responsible for ensuring discharge into the sanitary sewer system will not cause an adverse effect.
- 11. The applicant must notify the City immediately of any spill, breach of condition, or expansion or alteration to process which may impact the conditions stated within the permit.
- The applicant must not add, cause or permit the addition of any matter to sewage for the purpose of dilution to achieve compliance with any limits specified by the City.
- 13. The applicant is responsible for ensuring the discharge pursuant to issuance of a permit meets all applicable legislation and the operation is conducted in a safe manner, Issuance of a permit does not relieve duties to comply with any other law, including public health legislation, environmental protection legislation, and any other bylaw of the City.
- 14. An Environmental Protection Officer or other personnel authorized under the Sanitary Sewer Bylaw No. 9466 may inspect any property for the purpose of ensuring compliance with the Conditions associated with an issued permit.

Candu Energy Inc. and SNC-Lavalin Nuclear Inc.

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Nuclear Project#.	655352	Contract#:	255095	Page:	131 of 201
Customer Doc#		Customer:	Saskatchewan	Research Cou	ncil (SRC)
Title:	END STATE D	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPO	OKE-2



Commission canadienne de súreté nucléaire



Directorate of Nuclear Cycle and Facilities Regulation

File No.: 4.03.02 e-Doc: 6097275

Telephone: 613-992-3870

E-mail: ismail.erdebil@canada.ea

January 20, 2020

Mr. Philip Rees Facilities Manager & CSO, Organizational Effectiveness Saskatchewan Research Council 125-15 Innovation Blvd, Saskatchewan, Saskatoon SK S7N 2X8

Subject: Saskatchewan Research Council (SRC) Pool Water Analyses

Dear Mr. Rees,

Canadian Nuclear Safety Commission (CNSC) staff reviewed [1] Saskatchewan Research Council's (SRC) analyses of radionuclides in the SRC SLOWPOKE-2 Reactor pool (SRC pool) water [2 & 3], and compared them against the conditional clearance levels in appendix R of CNSC REGDOC-1.6.1 [4], as well as the exposure-based release limit derived using the methodology in CSA N288.1-14 [5]. Furthermore, assuming that the activity of the radionuclide is equal to the detection limit, the activities would still be below the conservative conditional clearance levels.

CNSC staff also reviewed the results of the hazardous substances and compared them against the limits in schedule "B" of the City of Saskatoon's sewer use bylaw [6].

CNSC staff conclude that releasing the pool water to the sewer does not present unreasonable risk and can be discharged to the sewer. CNSC staff note that SRC would still need to obtain the required permissions from the City of Saskatoon.

280 Stater Street, Post Office Box 1046, Station B Ottawa, Ontario K1P 5S9 Canada Fax: 613-995-5086 nuclearsalety gc.ca



280 rue Siater, Case postale 1046, Succursale E Ottawa (Ontario) K1P 5S9 Canada Mr. Philip Rees

-2-

January 20, 2020

Should you require further information or clarification, please do not hesitate to contact the undersigned.

Sincerely,

Ismail Erdebil

Senior Project Officer

Canadian Nuclear Safety Commission Nuclear Processing Facilities Division

c.c.:

- D. Chomey (SRC)
- A. Shahzad (CANDU Energy)
- C. Ducros, P. Tanguay, S. Eaton, J. Lam, K. Sauvé (CNSC)

References:

- Memo, J. Lam to P. Tanguay, HSECD memo on the results of the SRC Pool Water Analysis. January 16, 2020. (e-Doc: 6096576)
- Saskatchewan Research Council (SRC). SRC Pool Water Analysis results Performed by an Independent Lab. (e-Doc: 6091871)
- Saskatchewan Research Council (SRC), SRC Pool Water Analysis results Performed by SRC's lab (e-Doc: 6093584)
- Canadian Nuclear Safety Commission (CNSC). REGDOC-1.6.1: Licence Application Guide: Nuclear Substances and Radiation Devices (https://nuclearsafety.gc.ca/eng/acts-and-regulations/regulatory-documents/published/html/regdoc1-6-1/index.cfm)
- CSA Group. CSA N288.1-14 Guidelines for calculating derived release limits for radioactive material in airborne and liquid effluents for normal operation of nuclear facilities
- City of Saskatoon. Bylaw No. 9466 The Sewer Use Bylaw, 2017 (https://www.saskatoon.ca/sites/default/files/documents/city-clerk/bylaws/9466.pdf)

e-Doc 6097275

		Doc#:	147-01600-ESD	R-002	Rev:	U
Nuclear Project#:	655352	Contract#:	255095	Page:	133 of	201
Customer Doc#:		Customer:	Saskatchewan	Research Cour	ncil (SRC)
Title	END STATE DE	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPO	KE-2	



Your Project #: 11526 Your C.O.C. #: M031665

Attention: KEITH GIPMAN

Saskatchewan Research Council
143 - 111 Research Drive
Saskatoon, SK

CANADA S7N 3R2

Report Date: 2020/01/07 Report #: R2831227 Version: 1 - Final

CERTIFICATE OF ANALYSIS

8V LABS 10B #: 89AB342 Received: 2019/12/17, 14:08 Sample Matrix: Water # Samples Received: 1

		Date	Onte		
Analyses	Quantity	Extracted	Analyzed	Laboratory Method	Analytical Method
Biochemical Oxygen Demand	1	2019/12/19	2019/12/24	AB SOP-00017	SM 23 52108 m
Cadmium - low level CCME (Total)	1	N/A	2019/12/20		Auto Calc
Chloride/Sulphate by Auto Colourimetr,	1	N/A	2019/12/24	AB 50P-00020 / AB 50P- 00018	SM23-4500-CI/504-E m
COD by Colorimeter	1	N/A	2019/12/21	AB 50 P-00016	5M 23 52200 m
Sulphide (as H2S)	1	N/A	2019/12/23		Auto Calc
Mercury (Total) by CV (1)	1	2019/12/23	2019/12/23	B8Y750P-00015	BCMOE BCLM Oct 2013 n
Elements by ICP - Total	1	2019/12/19	2019/12/20	AB SOP-00014 / AB SOP- 00042	EPA 6010d R4 m
Elements by ICPMS - Total	1	2019/12/19	2019/12/19	AB 50P-00014 / AB 50P- 00043	EPA 60206 R2 m
Oil and Grease by IR	1	2019/12/19	2019/12/20	CAL SOP-00096	SM 23 5520C m
Benzo(a) pyrene Equivalency (4)	1	N/A	2019/12/20		Auto Calc
PAH in Water by GC/MS	1	2019/12/19	2019/12/20	AB 50P-00037 / AB 50P- 00003	EPA 3510C/B270E m
Total LMW, HMW, Total PAH Calc	1	N/A	2019/12/20		Auto Caic
Phenois (4-AAP)	1	N/A	2019/12/23	AB 50 P-00008	EPA 9066 RO m
Total Sulphide	1	N/A	2019/12/23	AB 50 P-00000	SM 23 4500 S2-A D Fm
Cyanice (Total) Low level	1	2019/12/19	2019/12/19	CAL 50P-00270	SM 23 4500-CN m
Total Trihalomethanes Calculation	1	N/A	2019/12/23		Auto Calc
Total Kjeldohl Nitrogen	1	2019/12/27	2019/12/27	AB 50 P-00008	EPA 351.1 R1978 m
Total Phosphorus	1	2019/12/27	2019/12/27	AB 50 P-00024	5M 23 4500-P A.B.F m
Hydrocarbon by IR (Mineral oil & grease)	1	2019/12/19	2019/12/20	CAL SOP-00096	SM 23 5520C,F m
Total Suspended Solids (NFR)	1	2019/12/24	2019/12/24	AB 50P-00061	SM 23 2540 D m
VOCs in Water by HS GC/MS (Std List)	1	N/A	2019/12/21	AB SOP-00056	EPA 5021=/3260d m
Total Nonylphenol in Liquids by HPLC (2)	1	2019/12/27	2019/12/20	CAM 50 P-00313	In-house Method
Nony phenol Ethoxylates in Liquids: HPLC (2)	1	2019/12/27	2019/12/25	CAM 50P-00313	Maxxam Method
Artificial Isotone Group Aralysis (3)	1	N/A	2019/12/27	BQL 50P-00007	Garmma Spectrometry
NORM Group Analysis (3)	1	N/A	2020/01/01	BQL50P-00007	Gamma Spectrometry

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or U5 method compendia such as CCME, MELCC, EPA, APHA.

Page 1 of 22

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		Doc#	147-01600-ESDR-002		Rev: 0
Nuclear Project#	655352	Contract#:	255095	Page	134 of 201
Customer Doc#:		Customer	Saskatchewan Resear	rch Cou	ncil (SRC)
Title.	END STATE D	ECOMMISSIONIN	NG REPORT FOR SRC	SLOWPO	OKE-2



Your Project #: 11506 Your C.D.C.F: M081665

Attention: KETH GIPMAN Saskatchewer Research Council 143 - 111 Research Drive

Saskatoom, SK CANADA 57N 382

> Report Date: MIZU/OL/CO Report 4: (C8/1227 Version: 1 - Final

CERTIFICATE OF ANALYSIS

BY LARS JUB IN BURNEYE Received: 2019/12/17, 14:08

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in 5V Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Lats in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted. Measurement Uncertainty has not been economical for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Ellent using the feating methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by 80 Late, unless otherwise agreed in writing. BV take is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except birts, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for hotope dilution methods.

Besults relate to samples tested. When sampling is not conducted by 5V Lebs, results relate to the supplied samples tested.

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Reference Wethod suffix "m" includes test methods incorporate validated modifications from specific reference methods to improve performance.

- * RPDs calculated using new data. The rounding of final results may result in the apparent difference.
- I II This sect was performed by EV labs Vencouver
- [3] This test was performed by EV Labs Genario (From Calgary)
- (3) This terr was performed by SV labs Shimse (From Calgary)

 [4] Stalf TPC is calculated using UC of the SDI for non-detect results at per Alberta Environment instructions. This protocol may not apply in other jurisdictions.

Encryption Key



Please direct all puestions regarding this Certificate of Analysis to your Project Manager. Curromer Solutions, Western Canada Curromer Sperience Team

Email: customenolationsweet@bulacis.com

Phone# (#03) 291-3077

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Total Cover Pages : 2 Page 3 of 33

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Nuclear Project#:	655352	Contract#.	255095	Page:	135 of 201
Customer Doc#:		Customer	Saskatchewan	Research Cou	ncil (SRC)
Title ⁻	END STATE DI	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPO	OKE-2



PAH IN WATER BY GC/MS (WATER)

BV Labs ID		XD4197		
Sampling Date		2019/12/17		
COC Number		M081665		
	UNITS	SLOWPOKE POOL	RDL	QC Batch
Polycyclic Argmatics				
Low Molecular Weight PAH's	ug/L	<0.20	0.20	9714116
High Molecular Weight PAH's	ug/L	⊲0.050	0.050	9714116
Tetal PAH	ug/L	<0.20	0.20	9714116
8[a]P TPE Total Potency Equivalents	ug/L	<0.010	0.010	9713881
Acenaphthene	ug/L	<0.10	0.10	9714646
Acenaphthylene	ug/L	<0.10	0.10	9714546
Acridine	ug/L	<0.040	0.040	9714546
Anthracene	ug/L	⊲0.010	0.010	9714546
Benzo(a)anthracene	ug/L	<0.0085	0.0065	9714546
Benzo(b&j)fluoranthene	ug/L	<0.0085	0.0085	9714546
Benzo(k)fluoranthene	ug/L	<0.0085	0.0085	9714546
Benzo(g,h,i)perylene	ug/L	<0.0085	0.0065	9714646
Benzo(c)phemanthrene	ug/L	40.050	0.050	9714646
Benzo(a)pyrene	ug/L	<0.0075	0.0075	9714546
Senzo(e)pyrene	ug/L	⊲0.050	0.050	9714646
Chrysene	ug/L	<0.0085	0.0065	9714646
Disenzja hjanthracene	ug/L	<0.0075	0.0075	9714546
Fluoranthene	ug/L	⊲0.010	0.010	9714646
Fluorene	ug/L	<0.050	0.050	9714646
Indeno(1,2,3-cd)pyrene	ug/L	<0.0085	0.0065	9714646
2-Methylnaphthaiere	ug/L	⊲0.10	0.10	9714545
2-Methylnaphthalene	ug/L	⊲0.10	0.10	9714646
Naphthalene	ug/L	⊲0.10	0.10	9714646
Phenanthrerie	ug/L	⊲0.050	0.050	9714646
Perylene	ug/L	<0.050	0.050	9714646
Pyrene	ug/L	⊲0.020	0.020	9714646
Quinoline	ug/L	⊲0.20	0.20	9714646
Surrogate Recovery (%)	-			
D10-ANTHRACENE (sur.)	%	101		9714646
DB-ACENAPHTHYLENE (sur.)	%	97		9714646
DS-NAPHTHALENE (zur.)	%	\$2		9714646
TERPHENYL-D14 (sur.)	%	123		9714646

Page 3 of 22

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Page: 136 of 201 255095 Nuclear Project#. 655352 Contract#: Saskatchewan Research Council (SRC) Customer Doc# Customer: END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2 Tille: **FACILITY**



Saskatchewan Research Council Client Project #: 1.1526 Sampler Initials: DC

REGULATED METALS (CCME/AT1) - TOTAL

BV Labs ID		XD4197		
Sampling Date		2019/12/17		
COC Number		M081665		
	UNITS	SLOWPOKE POOL	RDL	QC Batch
Low Level Elements				
Total Cadmium (Cd)	ug/L	-d0.020	0.020	9712892
Elements				
Total Aluminum (Al)	mg/L	0.0049	0.0030	9713053
Total Antimony (Sb)	mg/L	÷0.00060	0.00060	9713053
Total Amenic (As)	mg/L	<0.00020	0.00020	9713053
Total Barium (Ba)	mg/L	-0.010	0.010	9713860
Total Beryllium (Be)	mg/L	⊲0.0010	0.0010	9713053
Total Boron (B)	mg/L	-0.020	0.020	9713860
Total Calcium (Ca)	mg/L	-0.30	0.30	9713860
Total Chromium (Cr)	mg/L	<0.0010	0.0010	9713053
Total Consit (Co)	mg/L	<0.00030	0.00030	9713053
Total Cosper (Cu)	mg/L	-:0.00020	0.00020	9713053
Total Iron (Fe)	mg/L	-:0.060	0.060	9713860
Total Lead (Pb)	mg/L	0.00031	0.00020	9713853
Total Lithium (Li)	mg/L	⊲0.020	0.020	9713860
Total Magnesium (Mg)	mg/L	+:D.20	0.20	9713860
Total Manganese (Min)	mg/L	0.0040	0.0040	9713860
Total Molybdenum (Mo)	mg/L	÷0.00020	0.00020	9713053
Total Nickel (Ni)	mg/L	:0.00050	0.00050	9713853
Total Phaspharus (P)	mg/L	10.10	0.10	9713060
Total Potassium (K)	mg/L	rD.30	0.30	9713860
Total Selenium (Se)	mg/L	0.000083	0.00020	9713053
Total Silicon (Si)	mg/L	d0.10	0.10	9713060
Total Silver (Ag)	mg/L	0.00012	0.00010	9713653
Total Sodium (Na)	mg/L	-:0.50	0.50	9713860
Total Strontium (Sr)	mg/L	<0.020	0.020	9713860
Total Sulphur (5)	mg/L	0.43	0.20	9713860
Total Thallium (Ti)	mg/L	10.00020	0.00020	9713553
Total Tin (Sn)	mg/L	⊲0.0010	0.0010	9713053
Total Titanium (Ti)	mg/L	⊲0.0010	0.0010	9713853
Total Uranium (U)	mg/L	-:0.00010	0.00010	9713053
Total Vanadium (V)	mg/L	40.0010	0.0010	9713853
Total Zinc (Zn)	mg/L	-0.0030	0.0030	9713053

Page 4 of 22

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END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2



Saskatchewan Research Council Client Project #: 11526 Sampler Initials: DC

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		XD4197		
Sampling Date		2019/12/17		
COC Number		MD81665		
	UNITS	SLOWPOKE POOL	RDL	QC Batch
Calculated Parameters				
Sulphide (as H25)	mg/L	<0.0020	0.0020	9713020
Demand Parameters				
Blochemical Oxygen Demand	mg/L	<2.0 (1)	2.0	9714648
Chemical Oxygen Bemand	mg/L	<10	10	9717834
Misc Inorganics				
Strong Acid Dissoc. Cyanide (CN)	mg/L	<0.0020	0.0020	9708137
Total Suspended Solids	mg/L	<1.0	1.0	9719561
Anions				
Total Sulphide	mg/L	<0.0018	0.0018	9718621
Distolved Sulphate (SO4)	mg/L	<1.0	1.0	9719690
Nutrients				
Total Phosphorus (P)	mg/L	-0.0030	0.0030	9721399
Total Total Kjeldahl Nitrogen	mg/L	<0.050	0.050	9721299
Misc. Organics				
Oil and grease	mg/L	<2.0	2.0	9712328
Phenols	mg/L	<0.0015	0.0015	9716458
Total Petroleum Hydrocarbon	mg/L	<2.0	2.0	9713990
RADIONUCLIDE				
Cesium-134	Bq/I	d	1	9727685
Cesium-137	Bq/I	<1	1	9727685
Cobalt-60	Bq/I	d	1	9727685
lodine-131	Bq/I	4	1	9727685
Manganese-54	Bq/I	<1	1	9727685
Radium 226	Bq/I	<1.0	1.0	9727686
Uranium-235	Bo/I	·:0.50	0.50	9727686
	Bq/I	<1	1	9727605

Page 5 of 22

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Doc#	147 *UTDUU*ESDE*U	117

Doom	147-01000-E3DK-002		1104.
Contract#:	255095	Page:	138 of 201
Customer	Saskatchewan Research	ch Cour	ncil (SRC)

END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2 FACILITY



Nuclear Project#:

Customer Doc#

655352

Saskatchewan Research Council Client Project #: 11526 Sampler Initials: DC

NONYL PHENOL AND NONYL PHENOL ETHOXYLATE (WATER)

BV Labs ID		XD4197		
Sampling Date		2019/12/17		
COC Number		M081665		
	UNITS	SLOWPOKE POOL	RDL	QC Batch
MISCELLANEOUS				
	mg/L	±0.025	0.025	9723115
Nonylphenol Ethoxylate (Total)	mg/L	.0.02.3		
	mg/L	10.023		
Nonylphenol Ethoxylate (Total) Phenols Nonylphenol (Total)	mg/L		0.0010	

Page 6 of 22

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		Doc#:	147-01600-ESDR-002		Rev:	0
Nuclear Project#:	655352	Contract#:	255095	Page:	139 of	201
Customer Doc#:		Customer:	Saskatchewan Research	ch Cour	ncil (SRC)
Title.	END STATE D	ECOMMISSIONIN	NG REPORT FOR SRC S	LOWPO	KE-2	



MERCURY BY COLD VAPOR (WATER)

Total Mercury (Hg)	ug/L	⊲0.0020	0.0020	9718156
Elements				
	UNITS	SLOWPOKE POOL	RDL	QC Batch
COC Number		M051665		
Sampling Date		2019/12/17		
8V Labs ID		XD4197		

Page 7 of 22

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Nuclear Project#:	655352	Contract#:	255095	Page	140 of 201
Customer Doc#		Customer:	Saskatchewan	Research Cou	ncil (SRC)
Title.	END STATE DI	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWP	OKE-2



VOLATILE ORGANICS BY GC-MS (WATER)

BV Labs ID		XD4197		
Sampling Date:		2019/12/17		
COC Number		1/10/01/665		
	UNITS	SLOWPOKE POOL	RDL	QC Batcl
Volatiles				
Total Trihalomethanes	ug/L	<1.3	1.3	9714011
Benzene	ug/L	⊲0.40	0.40	971674
Bromodichloromethane	ug/L	⊲0.50	0.50	971674
Bromoform	ug/L	<0.50	0.50	9716741
Bromomethane	ug/L	<2.0	2.0	971674
Carbon tetrachloride	ug/L	<0.50	0.50	9716741
Chlorobenzene	ug/L	⊲0.50	0.50	9716743
Chlorodibromomethane	ug/L	<1.0	1.0	9716743
Chloroethane	ug/L	<1.0	1.0	9716743
Chloroform	ug/L	⊲0.50	0.50	9716741
Chloromethane	ug/L	<2.0	2.0	9716741
1,2-dibromoethane	ug/L	<0.20	020	9716743
1,2-dichlorobenzene	ug/L	<0.50	0.50	9716743
1,3-dichloroberzene	ug/L	⊲0.50	0.50	9716741
1,4-dichlorobenzene	ug/L	<0.50	0.50	971674
1,1-dichloroethane	ug/L	<0.50	0.50	9716741
1,2-dichloroethane	ug/L	⊲0.50	0.50	9716745
1,1-dichloroethene	ug/L	⊲0.50	0.50	9716741
dis-1,2-dichloroethene	ug/L	⊲0.50	0.50	9716741
trans-1,2-dichloroethene	ug/L	<0.50	0.50	9716743
Dichloromethane	ug/L	<2.0	2.0	9716741
1,2-dichloropropane	ug/L	⊲0.50	0.50	9716741
dis-1.3-dichloropropene	ug/L	⊲0.50	0.50	9716741
trans-1,3-dichloropropene	ug/L	d0.50	0.50	9716741
Ethylbensene	ug/L	e0.40	0.40	9716743
Methyl methacry late	ug/L	×0.50	0.50	9716741
Methyl-tere-burylether (MTBE)	ug/L	⊲0.50	0.50	9716741
Styrene	ug/L	<0.50	0.50	9716743
1,1,1,2-tetrachloroethane	ug/L	<1.0	1.0	9716743
1,1,2,2-tetrachloroethane	ug/L	<2.0	2.0	9716741
Tetrachloroeshene	ug/L	⊲0.50	0.50	9716741
Toluene	ug/L	<0.40	0.40	971674:
1.2.3-trichlorobenzene	ug/L	<1.0	1.0	9716741

Page 8 of 22

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Nuclear Project#:	655352	Contract#:	255095	Р	age.	141	of 201
Customer Doc#:		Customer:	Saskatchewan	Research C	Coun	cil (S	RC)
Title:	END STATE DI	ECOMMISSIONIN	IG REPORT FOR	SRC SLOV	WPO	⟨E-2	



VOLATILE ORGANICS BY GC-MS (WATER)

BV Labs ID		XD4197		
Sampling Date		2019/12/17		
COC Number		N081665		
	UNITS	SLOWPOKE POOL	RDL	QC Betch
1,2.4-trichlorobenzene	ug/L	<1.0	1.0	9716741
1,3,5-trichlorobenzene	ug/L	⊲0.50	0.50	9716741
1.1.1-trichloroethane	ug/L	⊲0.50	0.50	9716741
1,12-trichloroethane	ug/L	<0.50	0.50	9716741
Trichloroetherie	ug/L	<0.50	0.50	9716741
Trichlorofluoromethane	ug/L	≈0.50	0.50	9716741
1,2,4-trimethylbenzene	ug/L	<0.50	0.50	9715741
1,3,5-trimethylbenzene	ug/L	⊴0.50	0.50	9716741
Vinyl chloride	ug/L	⊲0.50	0.50	9716741
Xylenes (Total)	ug/L	c0.30	0.80	9716741
m & p-Xylene	ug/L	⊲D.S0	0.00	9716741
o-Xylene	ug/L	⊲0.40	0.40	9716741
Surrogate Recovery (%)				
1,4-Difluorobenzene (zur.)	%	98		9716741
4-Bromofluorobenzene sur.)	%	96		9716741
D4-1,2-Dichloroethane (sur.)	%	100		9716741

Page 9 of 22

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		DOC#:	147-01000-ESDI	R-002	Rev. U
Nuclear Project#:	655352	Contract#	255095	Page:	142 of 201
Customer Doc#		Customer	Saskatchewan	Research Cour	ncil (SRC)
Title:	END STATE DI FACILITY	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPO	OKE-2



GENERAL COMMENTS

Each :	emperature is the	average of up to	o three cooler temperatures taken at receipt
	Package 1	17.0°C	
Resul	ts relate only to th	e items tested.	

Page 10 of 22

Bureau Vertini laboratories Calgazy: 2003 -40st Avenue N.E. T2C 573 Telephone (405) 290-3077 Fau (405) 223-0468

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255095 Page: 143 of 201 Nuclear Project#: 655352 Contract#: Saskatchewan Research Council (SRC) Customer Doc#: Customer: END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2

FACILITY

Title.



Saskatchewan Research Council Client Project #: 11526 Sampler Initials: DC

QUALITY ASSURANCE REPORT

Setch	mit	QCType	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limit
9708137	TMU	Matrix Spike	Strong Acid Distor. Cyanide (CN)	2019/12/19		NC	3	80 - 120
9703137	TMU	Spiked Blank	Strong Acid Discos. Cyanide (CN)	2019/12/19		101	3	80 - 120
9708137	TMU	Method Blank	Strong Axid Dissoc. Cyanide (CN)	2019/12/19	-0.0020		mg/L	
708137	TMU	RFO	Etrong Acid Dissos, Cyanide (CN)	2019/12/19	18		35	20
9712328	110	Matrix Spike DID4197-19]	Oil and grease	2019/12/20		57	3	70 - 130
9712325	LLO	Spiked Blank	Oil and grease	2019/12/20		96	35	70 - 130
9712328	LLO	Method Blank	Oil and grease	2019/12/20	<2.0		mg/L	
9713973	FC3	Matrix Spike	Total Aluminum (Al)	2019/12/19		205	35	80 - 120
			Total Antimony (50)	1019/12/19		:20	3	E0 - 120
			Total Arsenic (As)	2019/12/19		101	35	80-12
			Total Beryllium [Be)	2019/12/19		50	3	80 - 12
			Total Chromium (Cr)	2019/12/19		104	3	80 - 12
			Total Cossit (Ca)	2019/12/19		105	3	SD - 12
			Total Copper Cul	2019/12/19		NC	3	ED - 12
			Total Leed (Fo)	2019/12/19		107	3	20 - 120
			Total Malybdenum (Mo)	2019/12/19		109	35	80 - 13
			Total Hicker (NT)	2019/12/19		102	5	80 - 12
			Total Selenium (Se)	2019/12/19		100	5	ED - 12/
			Total Silver (Az)	2019/12/19		:04	3	E0 - 12/
			Total Theilium [7]	2019/12/19		108		80-12
			Total Tin (2n)	2019/12/19		113	3	20-12
			Total Titanium (Ti)	2019/12/19		101	5	20 - 12
			Total Uranium (U)	2019/12/19		105	3	ED - 12
				2019/12/19		105	5	ED - 12
			Total Vanadium (V)	2019/12/19		115	5	20-12
713823	PC3	Spiked Blank	Total Zinc (Zn) Total Aluminum (Al)	2019/12/19		109	5	ED - 12
/13835	10	Spined Blank		2015/12/19			5	80 - 12
			Total Antimony (So)			126 (1)		
			Total Arsen c [As]	2019/12/19		110	5	80 - 12
			Total Beryllium (Be)	2019/12/19		92	5	80 - 12 80 - 12
			Total Chromium (Cr)	2015/12/19		109		
			Total Copat (Co)	2019/12/19		110	5	80 - 12
			Total Cooper (Cu)	2019/12/19		110		80 - 12
			Total Lead (F3)	2019/12/19			3	ED - 12
			Total Melybdenum (Mo)	2019/12/19		113	3	80 - 12
			Total Nickel [N]	2019/12/19		108	5	20 - 12
			Total Scienium (Se)	2019/12/19		105	5	80 - 12
			Total Silver (Ag)	2019/12/19		9.9.1	3	20 - 12
			Total Thallium (TI)	2019/12/19		114	5	20 - 13
			Total Tin (3n)	2019/12/19		119	35	80 - 12
			Total Titanium (Ti)	2019/12/19		109	15	80-12
			[U] muinanU leseT	2019/12/19		107	35	20 - 12
			Total vanatium (V)	2019/12/19		• 9 3	3	20 - 12
			Total Zinc (2n)	2019/12/19		108	35	20 - 12
715923	PCS	Method Blank	Total Aluminus (All)	2019/12/20	0.0030		mg/L	
			Total Antimony (55)	2019/12/20	<0.000EB		mg/L	
			Total Arsenic (As)	2019/12/20	0 00028		mg/L	
			Total Renyllium (Be)	2019/12/20	<0.0010		/mg/L	
			Total Chromium (Cr)	2019/12/20	<0.0010		mg/L	
			Total Coset (Co)	2019/12/20	<0.00030		mg/L	
			Total Cooper (Cu)	2019/12/20	40.00020		mg/L	
			Total Lead (Fo)	2019/12/20	<0.0CC20		mg/L	
			Total Malybderum (Mo)	2019/12/20	<0.00020		mg/L	
			Total Nicke (Ni)	2013/12/20	<0.00000		mg/L	
			Total Selenium (Se)	2019/12/20	#0.00020		mg/L	

Page 11 of 22

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Title

Saskatchewan Research Council (SRC) Customer:

END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2 **FACILITY**



Saskatchewan Research Council Client Project # 11526 Sampler Initials: DC

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC	min	CITTURA	Enminater	Bate teature	10	F	-	ne diam's
Satch	nit	Q'E Type	Peremeter	Date Analyzed	Value	Recovery	UNITS	QE'Limit
			Total Silver (Ag)	2015/12/20	0.00010 0.00020		mg/L	
			Total Thallium (71) Total Tin (5n)	2015/12/20	·0.8010		mg/L	
				2015/12/20			mg/L	
			Total Titanium [7]	2015/12/20	40.0010 40.00010		mg/L	
			Total Uranium (U)		0.0010		mg/L	
			Total Venadium (V)	2015/12/20			mg/L	
			Total Zinc (Zn)	2015/12/20	08.0030		mg/L	**
713935	PCS	RFC	Total Aluminum [Al]	2015/12/19	NE		79	20
			Total Antimony (50)	2019/12/19	17		76	20
			Total Arsenic (As)	2015/12/19	6.4		79	2.0
			Total Eeryllium (Se)	2015/12/19	NC		%	20
			Total Chromium (Cr)	2013/12/19	NC.		19	2.0
			Total Cobalt (CD)	2013/12/19	NC		16	20
			Total Copper (Cu)	2015/12/19	0.68		35	20
			Total Lead (Po)	2015/12/19	195		76	2.0
			Total Malybdenum (Mo)	2019/12/19	1.2		76	20
			Total Nice 2 (N.)	2019/12/19	1.2		%	20
			Total Selenium (Se	2015/12/15	3.8		76	20
			Total Silver (Ag	2019/12/19	4.6		3,	2.0
			Total Thallium (TI)	2013/12/19	NC		16	20
			Total Tin (In)	2019/12/19	NC		5	20
			Total Titanium [Ti]	2019/12/15	NC.		36	20
			Total Uranium (U)	2019/12/19	6.0		25	20
			Total Variatium (V)	2019/12/19	NC		3,	2.0
			Total Zinc (Zn)	2019/12/19	15		35	20
713960	MAP	Matrix Spike	Total Barium (Ba)	2019/12/20		5-5	35	80 - 13
			Total Boron (B)	2019/12/20		95	36	80-12
			Total Calcium (Ca)	2019/12/20		NC	a _è	20-12
			Total Iran (Fe)	2015/12/20		101	36	80 - 12
			Total Lithium (Li)	2015/12/20		95	16	80 - 13
			Total Magnesium [Mg]	2019/12/20		101	35	20 - 12
			Total Manganese (Mn)	2013/12/20		95	5	8D - 13
			Total Phosphorus [P]	2013/12/20		98	*5	20 - 12
			Total Potassium (K)	2019/12/20		96	3	80 - 17
			Total Silient (Si)	2019/12/20		105	- 19	80 - 12
			Total Sodium (Na)	2019/12/20		NC	36	80-1
			Total Strontium (Er)	2015/12/20		5.0	36	20 - 13
			Total Sulphur [5]	2019/12/20		94	36	80-13
713860		Sp ed Blan	Total Earlum (Ea)	2013/12/20		59	5	80 - 13
LTZSEÓ	MAT	ph co sist.	Total Boron (B)	2019/12/20		57	34	80-13
			Total Calcium (Ca)	2015/12/20		102	3	20-12
			Total Iron (Fe')	2019/12/20		104	3	80-17
			Total Lithium (Lil	2015/12/20		97	3	20-12
			Total Magnesium (Mg)	2019/12/20		103	3	80-17
				2013/12/20		98	34	20-12
			Total Manganese (Mn)				5	
			Total Phosphorus (P)	2013/12/20		58		20-12
			Total Fotessium [K]	2015/12/20		97	% %	80-12
			Total Silican (Si)	2019/12/20		109	5	20-12
			Total Socium (Na)	2015/12/20		59		80-17
			Total Strontium (Sr)	2019/12/20		97	36	EØ - 17
			Total Sulphur [5]	2019/12/20		56	8	£0 - 13
713860	MAP	Method 3 bn	Total Barium (Ea)	2015/12/20	<0.010		mg/L	
			Total Boron (B)	2019/12/20	10.020		mg/L	
			Total Calcium (Cal	2015/12/20	<0.30		mg/L	

Page 12 of 22

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145 of 201 Nuclear Project#. 655352 Contract#: 255095 Page: Customer Doc#: Customer: Saskatchewan Research Council (SRC) END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2 Title:



Saskatchewan Research Council Client Project #: 11526 Sampler Initials: DC

QUALITY ASSURANCE REPORT(CONT'D)

IA/QC						-0.0		
Setch	mit	QСТуре	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limi
			Total Iron (Ft)	2019/12/20	3.060		mg/L	
			Total Lithium (Li)	2019/12/20	10.020		mg/L	
			Total Magnesium [Mg]	2015/12/20	≪D.2i0		mg/L	
			Total Mangamese (Min)	2019/12/20	<0.0040		mg/L	
			Total Phasphorus [?]	2015/12/20	<8_10		mg/L	
			Total Fotassium (K)	2019/12/20	€8.30		mg/L	
			Total Silican (Si)	2015/12/20	<0.10		mg/L	
			Total Socium (Na)	2019/12/20	<0.30		mg/L	
			Total Strontium (3r)	2019/12/20	<0.020		mg/L	
			Total Sulphur (S)	2019/12/20	×0.20		mg/L	
713860	MAP	RPC	Total Barium (Ba)	2019/12/20	19		5	20
			Tatal Eoran (B)	2019/12/20	1.3		36	20
			Total Calcium (Ca)	2019/12/20	1.5		3	20
			Total Iron (Fe)	2015/12/20	NE		5	20
			Total Lith um Li	2019/12/20	0.32		26	20
			Total Magnesium [Mg]	2015/12/20	1.5		- 5	20
			Total Mangamese (Mn)	2019/12/20	NC		35	2.0
			Total Phosphorus [P]	2013/12/20	NC		35	20
			Total Potassium (x)	2019/12/20	2.2		3,	20
			Total Silicen (Si)	2019/12/20	1.6		5	20
			Total Sodium (Na)	2015/12/20	1.0		25	20
			Total Strontium (Sr)	2019/12/20	3.1		35	20
			Total Sulphur [S]	2015/12/20	1.6		5	20
11958	LLO	Matrix Spike D/D4197-121	Total Petro eum Hydrocarcon	2015/12/20	4.0	99	5	70 - 1
13958	LLO	Spiked Blank	Total Petraleum Hydrocardon	2019/12/20		9.5	5	70 - 1
713998	LLO	Method Blank	Total Petra eum Hydrocarpon	2015/12/20	42.0	2-3		10 1
14645		Method sishs Matrix Spike	D10-ANTHRACENE (sur.)	2019/12/19	.2.0	100	mg/L	10-1
14646	NKS	Macrix spike						
			DB-ACENAPHTHYLENE (SUT)	2019/12/19		100	5	30-1
			DE-NAPHTHALENE (SUT.)	2015/12/19		84	5	10-1
			TERFHENYL-D14 (sur.)	2019/12/19		125		30 - 1
			Acenaphthene	2019/12/19		2.3	3	20 - 1
			Asenzanthylene	2019/12/19		6.3	24	30 - 1
			Acrisice	2019/12/19		2.3	2,	30-1
			Anthracene	2019/12/19		2.3	- 8	20 - 1
			Berzo a enthracene	2019/12/19		101	36	30 - 1
			Bergo b Si fluoranth ane	2019/12/13		50	35	10-1
			Berzo k fluoranthene	2013/12/19		103	35	20 - 1
			Benzoig, full perylene	2019/12/19		53	35	20-1
			Bergo coheranthrene	2019/12/19		110	35	10-1
			Berga a pyrene	2019/12/19		58	75	20-1
			Benco e pyrene	2015/12/19		515	35	30-1
			Chrysene	2019/12/19		100	3.	50 - 1
			Dipercial anthracene	2013/12/19		91	3	20 - 1
			Fugranthene	2015/12/19		109	3	20 - 1
			Fluorene	2019/12/19		2.3	3	20 - 1
			indenol1,2,3-adjourence	2013/12/19		23	35	30-1
			1-Methylnaphthalene	2015/12/19		86	25	20 - 1
			2-Methylnachthalene	2015/12/19		8.0	5	10-1
			Nachthalene	2019/12/19		50	8	10-1
				2015/12/19		57	25	20 - 1
			Phenanthrene Perylane	2015/12/19		90	35	20-1
			Pyrene	2019/12/19		105	3	20-1
							35	30-1
			Quingine	2019/12/19		101	- 3	20-1

Page 13 of 22

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Doc#: 147-01600-ESDR-002

Rev:

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Nuclear Project#: 655352 Contract# 255095 Page: 146 of 201

Customer Doc#:

Customer

Saskatchewan Research Council (SRC)

Title:

END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2 FACILITY



Saskatchewan Research Council Client Project #: 11526 Sampler Initials: DC

QUALITY ASSURANCE REPORT(CONT'D)

Betich	Init QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QE Limit
		DB-ACENAPHTHYLENE (our.)	2013/12/19		5-9	3	10 - 13
		DE-NAPHTHALENE (SUL.)	2013/12/19		80	3	10 - 13
		TERPHEN VL-D14 (sur.)	2013/12/19		127	33	30 - 13
		Acensohihene	2013/12/19		50	3	20 - 13
		Atenaphthy ene	2019/12/19		51	3	20-13
		Acridine	2019/12/19		51	35	10-13
		Anthracene	2015/12/19		8.7	34	20 - 13
		Sergo a anthracene	2015/12/19		103	36	20 - 13
		Serco b Si Muoranthene	2019/12/19		51	5	30 - 13
		Serco(k)fluorenthene	2019/12/19		105	3	30 - 13
		Seracia, hilper, tene	2013/12/19		54	5	20 - 13
		Seras c pherenthrene	2019/12/19		110	3	20 - 13
		Benco (a) pyrene	2019/12/19		59	5	20-13
		Benzo e pyrene	2019/12/19		58	3	20-13
		Chrysene	2013/12/19		104	3	30 - 13
		Dipenzia hienthracene	2013/12/19		92	5	30-13
		Fugranthene	2015/12/19		109	3	30-13
		Fluorene	2015/12/19		209	5	20 - 13
		inceno)1, 2,3-cc/pyrene	2015/12/19		E3	3	30-13
		40.0					-
		1-Mathylnaphthalere	2013/12/19		2.3	5	30 - 13
		2-Methylnaphthalene	2013/12/19		77	3	30-13
		Naphthalere	2015/12/19		87	3,0	50 - 13
		Phenanchrene	2013/12/19		97	35	30 - 13
		Perylene	2013/12/19		95	3	30 - 13
		Pynene	2013/12/19		105	*	30 - 13
		Quinsine	2013/12/19		101	39	30 - 13
17:646	NK3 Method Blank	DIG-ANTHRACENE (SUL.)	2013/12/20		112	75	30 - 13
		DB-ACENAPHTHYLENE (1LT)	2013/12/20		106	5	30 - 13
		DE-NAPHTHALENE bur.	2019/12/20		2.4	3	20 - 13
		TERPHEN VL-D14 (sur.)	2019/12/20		150 (1)	35	30 - 13
		Acereanthene	2019/12/20	0.10		ug/L	
		Acenephthylene	2015/12/20	<0.10		TP.T	
		Acritine	2019/12/20	40.040		LE/L	
		Anthracene	2019/12/20	<0.010		ug/L	
		Benzo a enthracene	2019/12/20	<0.0085		LE'L	
		Bened 5 Muoranthene	2019/12/20	<0.0085		ug/L	
		Benco k fluoranthene	2013/12/20	<0.0085		ug/L	
		Benzoig, hi iperylene	2013/12/20	<0.0085		ug/L	
		Benza [c] phenanthrene	2015/12/20	<0.000		ug/L	
		Bergo a pyrene	2013/12/20	<0.0075		ug/L	
		Beroo e pyrene	2013/12/20	**** 0.650		ug/L	
		Chrysene	2013/12/20	<0.0085		ug/L	
		Diberal a hianthracene	2019/12/20	€0.0075		ug/L	
		Fluorenthene	2019/12/20	-0.010		ugil	
		Fluorene	2019/12/20	40,030		ug/L	
		indeno 1,23-cd pyrene	2019/12/20	×0.0085		UE/L	
		1-Methylnaphthalene	2019/12/20	c0.10		ug/L	
		Z-Methylnaphthalene	2015/12/20	±0.10		ug/L	
		Naphthalene	2015/12/20	CB.10		ug/L	
		Phenanthrene	2/019/12/20	<0.030		ug/L	
		Perylene	2015/12/20	<0.030		-	
		Pyrene	2015/12/20	40.020		ug/L	
		Quingine	2019/12/20	<0.20 <0.20		ug/L ug/L	

Page 14 of 22

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Saskatchewan Research Council Client Project #: 11526 Sampler Initials: DC

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC								
Setch	Init	QCType	Persmeter	Date Analyzed	Value	Resovery	UNITS	QC L mi
			Acerephthy ene	2019/12/20	NC		25	30
			Acridine	2019/12/20	NC.		35	30
			Anthracene	2019/12/20	NC		5	50
			Bergo anthracene	2019/12/20	NC:		35	30
			Benze cal fluoranthene	2019/12/20	WC		*	50
			Benzo k fluoranthene	2019/12/20	NC		5	30
			Senzo g.h. perylene	2019/12/20	NE		3	30
			Benzo (c) phenenthrene	2019/12/20	NC.		3	30
			Benzo(s) pyrene	2019/12/20	NC.		55	50
			Benzo e pyrene	2019/12/20	NC		10	30
			Chrypene	2019/12/20	NC.		35	30
			Dibera a hianthracene	2019/12/20	NC		26	30
			Fuoranthene	2019/12/20	IVC		3	30
			Fluorene	2019/12/20	NC		3	30
			indeno(1,2,3-cd/pyrene	2019/12/20	NC		5	30
			1-Methylnaphthalene	2019/12/20	NC		3	30
			2-4 stry reporthaler e	2019/12/20	NC		35	30
			Naphthalene	2013/12/20	NC		3	3.0
			Phenanthrene	2019/12/20	NS		5	30
			Perviene	2019/12/20	NE		5	50
			Pyrene	2019/12/20	NC.		5	30
			Quina fine	2013/12/20	NC.		%	30
14648	PER	Spilled Slank	Biochemical Daygen Demand	2019/12/24		122 (1)	%	25-
14645	9=2	Method Blank	Biochemical Daygen Demand	2019/12/24	<2.0	140 [4]	mg/L	-
14648	FKS	RED	Biochemical Daygen Demand	2019/12/24	3.1		5	20
16438	TMU	Matrix Spike	Phenois	2019/12/23		93	35	80 - 1
15438	TMU	Spileo Blant	Phenois	2019/12/25		9.2	5	80 - 1
15438	TMU	Method Blank	Phenois	2015/12/23	#0.0015		mg/L	
15438	TMU	RFD	Phenois	2013/12/23	NG.0023		P.	20
15741	MZ	Matrix Spike	1,4-Dif ucropenzene (pur.)	2013/12/21	100	9-3	3	20-1
10/41	THE C	Matrix spiec	4-Srama fluoracenzene (sur)	2019/12/21		93	3	20 - 1
				2019/12/21		113	3	30 - 1
			D4-1,2-Dichloroethane (sur) Sergene			NC	3	20 - 1
				2019/12/21			35	
			Bra modichlaromethane	2019/12/21		96	5	20 - 1
			Bramoform	2019/12/21		55	5	30 - 1
			Bramomethane	2015/12/21		29		
			Carpon tetrachlorice	2019/12/21		29	15	30-1
			Ch orgoenzene	2019/12/21		8.3	**	30 - 1
			Chiorod promomethane	2019/12/21		9.3	3	30 - 1
			Chiorpethane	2019/12/21		23	3	30 - 1
			Ch loreform	2019/12/21		81	3	30 - 1
			Chioromethane	2019/12/21		99	35	30 - 1
			1,2-dibromoethane	2019/12/21		93	5	30 - 1
			1,2-aichlorobenzere	2019/12/21		91	15	20 - 1
			1,3-gichlorotenzene	2019/12/21		92	35	30 - 1
			1,4-dichlorobensens	2019/12/21		91	%	20 - 1
			1,1-dichloroethane	2013/12/21		87	3	30 - 1
			1,2-cichloroethane	2019/12/21		52	3	30 - 1
			1,1-cichlaroethene	2019/12/21		8.4	3	10-1
			cit-1,2-o'ch croethene	2019/12/21		29	35	30 - 1
			trans-1,2-dich proethene	2015/12/21		TS	5	30 - 1
			Dichloromethane	2019/12/21		83	35	30-1
			1,2-dichloropropane	2019/12/21		97	%	30 - 1
			cis-1_3-dichloropropene	2019/12/21		1 D.S	3	30-1

Page 13 of 22

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148 of 201 Nuclear Project#: 655352 Contract# 255095 Page: Saskatchewan Research Council (SRC) Customer Doc# Customer: END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2 Title: **FACILITY**



Saskatchewan Research Council Client Project #: 11526 Sampler Initials: DC

QUALITY ASSURANCE REPORT(CONT'D)

Setich	Imit	QСТуре	Parameter	Date Analyzed	Value	Retovery	UNITS	QCLimit
			trans-1.3-dichloropropene	2015/12/21		135	3	20 - 14
			Ethylpergens	2015/12/21		NC	3	20 - 14
			Methyl methacrylate	2013/12/21		101	35	20-14
			Methyl-tert-butylether [MTBE]	2013/12/21		2.3	35	30-14
			Styrene	2015/12/21		95	35	30-14
			1,1,1,2-tetrachioroethane	2019/12/21		EB	3	50-14
			1,1,2.2-tetrachlorpethane	2013/12/21		103	3	10 - 14
			Tetrachiordethene	2015/12/21		73	35	20-14
			Toluene	2019/12/21		NC	35	20 - 14
			1.2,3-trichlors pensene	2019/12/21		110	3	20 - 14
			1,2,4-trichloropenzene	2019/12/21		107	29	10 - 14
			1,3,5-crichlorspenzene	2019/12/21		100	39	20-14
			1.1.1-trichloroethane	2019/12/21		54	36	20 - 14
			1,1,2-trichlorgethane	2019/12/21		135	3	20 - 14
			Trichioroethere	2013/12/21		93	36	10-14
			Trich loroffuorom ethan e	2013/12/21		23	35	20-14
			1,2,4-crimethylbenzene	2019/12/21		NC	%	30-14
			1,3,2-trimethy benzene	2019/12/21		NC	36	30-14
			Viry chloride	2019/12/21		87	8	50 - 14
			m & p-Xylene	2015/12/21		NC	25	30-14
			o-K-ene	2019/12/21		NC	3	30-14
716741	MZ	Spiked Blank	1,4-Difusropenzene (sur)	2015/12/21		1.00	36	30-14
			4-6 romofiuorobensene (sur.)	2019/12/21		105	36	30 - 14
			D4-1,2-Dithloroethane (sur.)	2015/12/21		E.S	25	10 - 14
			Benzene	2015/12/21		90	5	60 - 13
			Brt modichloro methane	2019/12/21		99	35	60 - 13
			Bram oform	2019/12/21		101	35	60 - 13
			Brz momethane	2015/12/21		95	25	60 - 13
			Carpon tetrachiorida	2015/12/21		93	5	60 - 13
			Chiorabenzene	2015/12/21		93	35	60 - 13
			Chilorod promomethane	2015/12/21		101	26	60 - 13
			Chiorpethane	2019/12/21		92	3	60 - 13
			Chioroform	2019/12/21		27	35	60 - 13
			Chioramethane	2015/12/21		104	3	€0 - 13
			1,2-ditrompethane	2019/12/21		95	35	60 - 13
			1,2-dichlorobergere	2019/12/21		101	35	€0 - 13
			1.3-dichloropensere	2015/12/21		57	25	€0 - 13
			1,4-dichlorobensene	2019/12/21		34	5	60-13
			1,1-cichloroethane	2015/12/21		93	36	60 - 13
			1,2-dichloroethane	2015/12/21		91	29	60 - 13
			1,1-dichlorosther a	2015/12/21		90	5	60 - 13
			cis-1,2-cith orbethene	2015/12/21		94	35	60 - 13
			trans-1.2-dichloroethene	2015/12/21		23	36	60-13
			Dichigramethane	2019/12/21		2.5	3	€0 - 13
			1,2-sichloropropane	2013/12/21		103	35	60 - 13
			cit-1,3-dichloropropene	2015/12/21		110	36	€0 - 13
			trans-1,3-zichioropropene	2015/12/21		113	35	€0 - 13
			Ethylpenzene	2015/12/21		94	5	€0 - 13
			Methyl methacrylate	2019/12/21		107	- %	60 - 13
			Methyl-tert-putylether (MTSE)	2019/12/21		96	5	60 - 13
			Styrene	2015/12/21		102	36	60-13
			1.1.1.1-tetrachlorpethane	2019/12/21		96	5	€0 - 13
			1.1.2 I-retrachioroethane	2015/12/21		99	35	60-13
			Tetrachiorueshene	2015/12/21		8.8	5	60 - 13

Page 16 of 22

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Nuclear Project#:	655352	Contract#:	255095	Page:	149 of 201
Customer Doc#:		Customer	Saskatchewan	Research Cour	ncil (SRC)
Title:	END STATE D	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPO	OKE-2



QUALITY ASSURANCE REPORT(CONT'D)

QAIDC				Same Property			LIKE COMP	or the h
Estch	nit	QСТуре	Farameter	Date Analyzed	Value	Recovery	UNITS	QC Limit
			Toluene	2019/12/21		55	16	60 - 130
			1,2,3-trichloropenzene	2019/12/21		5-3	8	60 - 13
			1,2,4-trichlorspensene	2015/12/21		50	*	60 - 13
			1,3,5-trichlorspensene	2019/12/21		E 9	5	60 - 13
			1,1,1-trich lorgethane	2019/12/21		5-9	3	60 - 13
			1,1,2-trichlorgethane	2015/12/21		59	22	60-13
			Trichlorgethene	2015/12/21		59	25	60 - 13
			Trichlorafluoyomethane	2019/12/21		90	76	60 - 13
			1.2,4-trimethylbergene	2019/12/21		103	35	60 - 13
			1.3,3-trimethy benzene	2019/12/21		100	35	€0 - 13
			Vinylichloride	2019/12/21		52	35	60-13
			m & p-Xylene	2015/12/21		51	5	€0 - 13
			o-Kylene	2019/12/21		89	5	60 - 13
715741	M2	Method Blan	1,4-Diffuoropenzene (sur.)	2019/12/21		93	29	30-14
			4-Sramofluorobenzene (sur.)	2019/12/21		57	25	30-14
			D4-1,2-Dichloroethane (sur.)	2019/12/21		53	3	20-14
			Benzene	2013/12/21	€0 40		ug/L	
			3ro modichloro methane	2013/12/21	CB.30		ug/L	
			Bre motorm	2019/12/21	€8.20		ug/L	
			3rd momethane	2019/12/21	<2.0		Ug/L	
			Carbon tetrachloride	2019/12/21	€0.20		ug/L	
			Chiorobenzene.	2013/12/21	<0.30		ug/L	
			Chlored promomethane	2019/12/21	c1.0		ug/L	
			Chioroethane	2015/12/21	c1.0		ug/L	
			Ch orgfarm	2019/12/21	<0.30		ug/L	
			Chioromethane	2015/12/21	42.0		ug/L	
			1,2-sibromoethane	2013/12/21	<0.20		ug/L	
			1,2-dichlorobenzene	2019/12/21	<8.30		ug/L	
			1,3-sichlprobenzene	2019/12/21	€8.20		ug/L	
			1,4-sichlprobenzene	2015/12/21	€0.30		ug/L	
			1.1-sichloroethane	2019/12/21	<0.30		UZ/L	
			1.2-dichloroethane	2019/12/21	<0.20		ug/L	
			1,1-gichlproethere	2019/12/21	<0.20		UE/L	
			gis-1,2-dichloroenhene	2019/12/21	48.30		Ug/L	
			trans-1.2-dichleroethene	2019/12/21	€0.50		Ug/L	
			Dichlorgmethans	2019/12/21	<2.0		ug/L	
			1,2-dichlarogropane	2019/12/21	<0.30		ug/L	
			cis-1,3-dichloropropene	2019/12/21	<0.20		ug/L	
			trans-1,3-dich propropene	2019/12/21	0.20		Ug/L	
			Ethylpenzene	2019/12/21	<0.40		ug/L	
			Methyl methachilate	2019/12/21	<0.30		ug/L	
			Methyl-tert-butylether (MTBE)	2019/12/21	<0.30		ug/L	
			Styrene	2019/12/21	<0.20		ug/L	
			1,1,1,2-tetrachioroethane	2019/12/21	<1.0		ug/L	
			1.1.2 2-tetrachioroethane	2019/12/21	<2.0		ug/L	
			Tetrach programene	2015/12/21	<0.30		ug/L	
			Toluene	2019/12/21	<0.40		ug/L	
			1,2,3-trichloropenzene	2019/12/21	<1.0		ug/L	
					d.0		ug/L	
			1,2,4-trichlorobenzene	2019/12/21	<0.30		-	
			1,3,3-trichloropenzene	2019/11/21			ug/L	
			1,1,1-trichlorgethane	2019/12/21	<0.30		ug/L	
			1,1,2-trichloroethane	2019/12/21	0.30		ug/L	
			Trichloroethene	2019/12/21	<0.30		ug/L	
			Trichlorofluoromethane	2019/12/21	0.30		ug/L	

Page 17 of 22

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Nuclear Project#. 655352 Contract#: 255095 Page. 150 of 201

Customer Doc#: Customer: Saskatchewan Research Council (SRC)

Title: END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2
FACILITY



Saskatchewan Research Council Client Project #: 11526 Sampler Initials: DC

QUALITY ASSURANCE REPORT(CONT'D)

DA/QC								
Betch	mit	QСТуре	Parameter	Date Analyzed	Value	Retovery	UNITS	QC Limit
			1.2,4-trimethy benzene	2013/12/21	*0.30		ug/L	
			1,3 3-trimethy benzene	2019/12/21	0.30		ug/L	
			viny) chlorida	2019/12/21	<0.30		WEST L	
			Ayenes (Total)	2019/12/21	<0.20		UE/L	
			m & p-xylene	2013/12/21	€0.80		ug/L	
			o-Kylene	2013/12/21	0.40		ug/L	
715741	MZ	RPD	3rd modichigromethane	2019/12/21	NC		35	30
			פרם חסיכרח	2015/12/21	NE		8	30
			3m momethane	2015/12/21	NC		35	50
			Carbon tetrachisride	2015/12/21	NC		35	50
			Chlorapenzene	2013/12/21	NC		16	30
			Chiorodiaramo mechane	2019/12/21	NC		35	30
			Ch oroethane	2019/12/21	NC.		34	30
			Chioreform	2019/12/21	NC		15	30
			Chloromethane	2019/12/21	0.26		35	50
			1.2-dibromoethene	2015/12/21	NC.		35	20
			1.Z-dichloropenzenie	2013/12/21	NC		3	50
			1.3-michlprobensene	2019/12/21	NC		3	30
			1,4-cichlorocenzene	2013/12/21	NC		3	30
			1.1-sichloroetheræ	2019/12/21	NC		35	30
			1,2-cicnic roethane	2013/12/21	NC		2,5	3.0
			1,1-signis roethene	2015/12/21	NC		2,0	30
			cis-1 1-c shipmethene	2013/12/21	NE		35	50
			trans-1,2-dichloroethene	2019/12/21	NE		3	30
			Dichloromethane	2019/12/21	NC		3.	50
			1.2-dichlerogropene	2019/12/21	NC		15	.30
			cis-1,3-c thloropropene	2019/12/21	NE		25	30
			trans-1,3-signipropropere	2019/12/21	NC		- %	30
			Methyl methacrilate	2019/12/21	NE		3	30
			Methyl-tert-butylether [MTSE]	2013/12/21	NE		25	30
			Styrene	2019/12/21	NG		25	3.0
			1.1.1 2-tetrachiomethane	2019/12/21	NG		3	30
			1.1.2 2-terachloroethane	2013/12/21	NC		3	50
			Tetrach proethene	2019/12/21	NC		3	30
			1.2.3-trich lors pensene	2015/12/21	NC		3	
								50
			1.2,4-trich orn benzene	2019/12/21	NC		36	3.0
			1.3,5-trichtoropenzene	2015/12/21	NC		35	30
			1.1.1-trichlormethane	2019/12/21	NC		74	3.0
			1,1,2-trichloroethane	2019/12/21	ME		3	33
			Trishloraethene	2013/12/21	NC		35	50
			7 chiorofluoromethane	2019/12/21	NC		35	30
			1,2,4-trim sthylbenzene	2015/12/21	3.4		25	30
			1.3,3-trimethy benzene	2019/12/21	2.4		35	30
			Viny I chloride	2013/12/21	NC		35	30
717934	FRE	Matrix Spika (ND4197-05)	Chemical Oxygen Demand	2019/12/21		104	3	20 - 120
717834	FRE	Spiked Blank	Chemical Daygen Gemand	2015/12/21		98	25	80 - 120
717534	FRE	Method Blank	Chemical Daygen Gemand	2019/12/21	<10		mg/L	
717934	FRE	RPC (XD4157-06)	Chemical Oxygen Gemand	2015/12/21	NE		3	20
718185	CIY	Matrix Spike	Total Mercury (Hg)	2013/12/23		82	5	80 - 126
715155	CIV	Spiked Blank	Total Mercury (Hg)	2013/12/23		100	15	80 - 120
718185	CIY	Method Blank	Total Mercury (Hg)	2015/12/23	<0.0020	100		CU - 12)
718185	CIY	APC	Total Mercury (Hz)	2019/12/23	NC.		ug/L	7.0
18621	PKS	Matrix Spike	. ,		PAIL			20
			Total Sulphide	2015/12/23		NC	15	80-110
718621	FK2	Spiked Blank	Total Sulphise	2019/12/23		95	35	80 - 12

Page 18 of 22

Survey Vector (aborronder Cagasy) 2021 - 4 or 44 mile N.C. 120 SFC 174 April 1962 (291-2077) | Feb (400) (291-2446)

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Nuclear Project#: 655352 Contract#: 255095 Page: 151 of 201

Customer Doc#: Customer: Saskatchewan Research Council (SRC)

Title: END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2 FACILITY



Saskatchewan Research Council Client Project #: 11526 Sampler Initials: DC

QUALITY ASSURANCE REPORT(CONTD)

dw/dc								
Beach	Init	QСТуре	Perameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
9718621	PKS	Methed Blank	Total Sulphide	2019/12/23	0.0018		mg/L	
9718621	PER	APD	Total Sulphide	2013/12/23	1.2		25	20
9719561	EH2	Matrix Spike	Total Suspended Solids	2019/12/24		27	3	80 - 120
9719361	EH2	Spikec B ar i	Total Suspended Solids	2019/12/24		92	35	80 - 120
9719361	EH2	Method Blank	Total Suspendes Solids	2019/12/24	<1.0		mg/L	
9719561	EH2	RPD	Total Suspendez Solids	2019/12/24	19		3	20
9719690	21	Matrix Spike	Distolved Sulphate (SO4)	2019/12/24		103	3	80 - 120
9719690	21	Spiked Blank	Distoived Sulphate (SO4)	2019/12/24		59	3	80 - 120
9719650	2)	Method Blank	Disto ved Sulphate SO4	2019/12/24	<1.0		mg/L	
9719690	21	RFC	Dissolved Sulphate SO4	2019/12/24	NC		3	20
9721259	ILD	Matrix Spike [XD4257-05]	Total Total Kie dahi Nitrogen	2019/12/27		102	35	20-120
9721293	JLD	QC Standard	Total Total Kjeldahi Nitrogen	2015/12/27		94	3	80 - 120
9721253	JLD	Spiked Blank	Total Total Kjeldahi Nitrogen	2019/12/27		55	35	80-120
9721259	JLD	Method Slank	Total Total Kjeldahl Nitrogen	2019/12/27	40.050		ms/L	
9721259	ILD.	RPD (ND4157-DE)	Total Tatal Kje dahl Nitrogen	2015/12/27	NC		25	20
9721359	JLD	Matrix Spike	Total Phosphorus [2]	2019/12/30		NC	35	80-120
9721399	ILO	QC Standard	Total Phospherus (?)	2015/12/27		96	35	80 - 120
9721399	JLD	Spiked Blank	Total Phosphorus (?)	2019/12/27		58	3	80-120
5721359	0	Method Blank	Total Phosphorus [P]	2019/12/27	∜0.0050		mg/L	
9721399	JUD	RPO	Total Phosphorus [2]	2015/12/30	6.1 (2)		36	20
9723114	TJC	Metrix Spike	Nonyiphens (Total)	2019/12/27		* * *	3	10 - 130
9723114	TJC	Spiked Blank	Nony oheng (Total)	2019/12/27		106	35	30 - 130
9723114	TIC	Method Blank	Nonyphena (Total)	2013/12/27	40.0010		mg/L	
9723115	TJC	Matrix Spike	Nonyipheno Ethoxy ate (Total)	2019/12/27		54	5	10 - 130
9723115	TJC	Spilled Blank	Nony phenoi Ethory ate (Total)	2019/12/27		53	35	20 - 130
9723115	TJC	Method Bank	Nonyloheno Ethor, ate (Total)	2015/12/27	00.025		mg/L	
9723115	TJC	RFO [ND4197-14]	Nonyipheno Ethony ate (Total)	2015/12/28	NC		35	40
9727625	ė#K	OC Standard	Cesium-134	2013/12/27		:03	35	N/A
			Cesium-237	2019/12/27		107	hi.	76/A
			Co omit-€0	2013/12/27		102	35	NA
			oc ne-13:	2013/12/27		25	36	N/A
9727685	é#K	Method Blank	Cesium-13A	2013/12/30	<1		Bq/I	
			Cesium-137	2019/12/30	cd.		Eq/I	
			Caratreo	2015/12/30	<1		Bq/I	
			loc ne-131	2015/12/30	<1		Big/I	
			Manganese-34	2019/12/30	<1		Eq/I	
			Zinc 63	2019/12/30	4.5		Bq/I	
9727685	-	QC Standard	Radium 226	2019/12/24		94	3	74 - 125
		7	Uranium-235	2019/12/24		101	35	74 - 125
9727685	éFK	Method Blank	Radium 226	2019/12/25	d.0		Bq/I	

Page 15 of 22

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	END STATE D	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPO)KF-2
Customer Doc#:		Research Cour	ncil (SRC)		
Nuclear Project#:	655352	Contract#.	255095	Page ⁻	152 of 201
		Doc#:	147-01600-ESDR	K-UU2	Rev: U



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC								
Satich	Init	Q:C Type	Farameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Uranium-235	2019/12/26	<0.20		Bq/I	

Ouplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

FACILITY

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent sheck of method occuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A clank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Sumogete: A pure or accopically laceled compound whose behavior mimors the analytes of interest. Used to evaluate a struction efficiency.

NC [Matrix Spike]. The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RFD): The duplicate RFD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RFD calculation (account difference = 2x ROL

- (1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.
- (2) Detection limits raised due to dilution to bring analyte within the calibrated range.

Page 20 of 22

Survey Vertice Laboratories Calgary: 2001 - 4 Let Avenue N.C. T20 S70 Telegrape (403) 253-2077 Fax (405) 253-2465

Candu Energy Inc. and SNC-Lavalin Nuclear Inc.

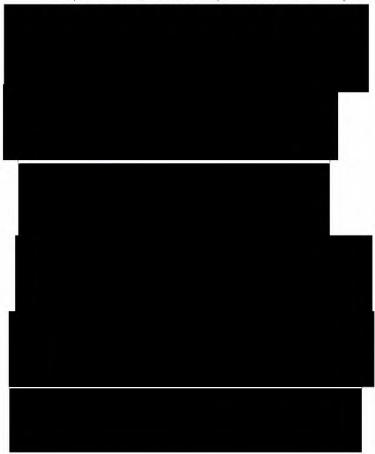
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		Doc#.	147-01600-ESDR-002	2	Rev:	0
Nuclear Project#:	655352	Contract#:	255095	Page:	153 of 2	01
Customer Doc#		Customer:	Saskatchewan Research Council (SRC)			
Title:	END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2 FACILITY					



VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please rater to the Validation Signature Page.

Page 21 of 22.

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Nuclear Project#:	655352	Contract#:	255095	Page:	154 of 201
Customer Doc#:		Customer	Saskatchewan	Research Cour	ncil (SRC)
Title:	END STATE D	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPO	KE-2

Temp: Temp:	Impace telegration	Rej	out information	(W differ	n from i	nvoice	1				Po	yject	brefigie	math	in.						Turn	meur	d Time	TATI Requir	red.
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Page 22 of 22

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Page: 155 of 201 Contract#: 255095 Nuclear Project#: 655352 Customer: Saskatchewan Research Council (SRC) Customer Doc#: END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2 Title

REACTOR POOL 19-12-17. RDT

```
ORTEC g v - i (1215) Env32 G53W4.25 1/10/2020 11:58:39 AM Page Spectrum name: REACTOR POOL 19-12-17.An1
 Sample description
 Spectrum Filename: C:\User\Reactor Samples\REACTOR POOL 19-12-17.An1
 Acquisition information
          Start time:
                                               12/17/2019 2:36:30 PM
          Live time:
Real time:
Dead time:
                                           9293
                                          10184
                                               8.74 %
          Detector ID:
                                                    1
 Detector system
GAMMASPEC MCB 129 det 1
 Calibration
          Filename:
                                               DET 1 MARN 2008-43-6 19-12-23.Clb
        DET 1 2019 DEC MARN
          Energy Calibration
Created:
                                               12/23/2019 11:59:27 AM
                                               0.201 keV
0.250 keV/channel
                 Zero offset:
                 Gain:
                                              -4.328E-09 keV/channel^2
                 Quadratic:
          Efficiency Calibration
                                               12/23/2019 11:59:52 AM
                 created:
                 Knee Energy:
                                             383.75 keV
                Above the Knee:
Log(Eff):
                                                                      Uncertainty =
                                               Quadratic
                                              Quadratic Uncertainty = 1.87 %

1.043489E+01 + (-3.502056E+00*Log(E) ) +

(1.893361E-01*Log(E)^2 )

Quadratic Uncertainty = 1.88 %

-1.219382E+01 + (4.101557E+00*Log(E) ) +

(-4.493891E-01*Log(E)^2 )
                 Below the Knee:
                 Log(Eff):
 Library Files

Main analysis library:
Library Match Width:
Peak stripping:
                                               reactor water.Lib
                                               0.500
                                               Library based
 Analysis parameters
                                               Env32 G53W4.25
50 ( 12.68keV )
          Analysis engine:
Start channel:
                                           50 ( 12.68keV )
8000 ( 1996.35keV )
           Stop channel:
          Peak rejection level:
                                             100.000%
          Peak search sensitivity:
          Sample Size:
                                                5.0000E-01
          Activity scaling factor:
                                                1.0000E+00/( 1.0000E+00= 5.0000E-01) =
                                                2.0000E+00
          Detection limit method:
                                               Reg. Guide 4.16 Method
Ç.
        ORTEC g v - i (1215) Env32 G53W4.25 1/10/2020 11:58:39 AM Page Spectrum name: REACTOR POOL 19-12-17.Anl
                                               1,0000000E+00
          Random error:
          Systematic error:
                                                1,0000000E+00
           Fraction Limit:
                                                0.000%
          Background width:
                                               best method (based on spectrum).
          Half lives decay limit:
                                              12.000
                                                          Page 1
```

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Nuclear Project# 655352 Contract#: 255095 Page: 156 of 201

Customer Doc#: Customer: Saskatchewan Research Council (SRC)

Title: END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2
FACILITY

REACTOR POOL 19-12-17.Rpt

Activity range factor: Min. step backg. energy Multiplet shift channel 2.000 0.000 2.000

Status

YES

YES NO

YES

NO

NO

NO

Corrections

Decay correct to date: Decay during acquisition: Decay during collection: True coincidence correction: Peaked background correction: Comments 12/17/2019 11:50:00 AM

12/17/2019 11:30:00 74

Det 1 Nat Bkg 19-10-11.Pbc 10/15/2019 11:30:43 AM

Absorption (Internal): Geometry correction: Random summing:

total peaks alloc. 47 cutoff: 2.00E+01 %

Energy Calibration Normalized diff:

1,0000

----SUMMARY 0 F PEAKS IN RANGE Peak Area Uncert FWHM Corrctn Nuclide Brnch. Act. Energy Factor Energy Ratio Bq/L 13.28 87. 17.27 0.80 1.013E-02 13,38 50.000 3.646E+00 SR85 1.430 8.700 67.530 1.206E+02 BA140 16.24 75. 23.47 0.80 1.423E-02 15.80 1.362E+01 YSS M090 16.60 2.691E+00 36.12 24. 57.93 3.795E-02 PBC<MDA XE133 0.82 35.80 1.650 36.40 1.040 1.298E+01 CS137 36.03 4.800 2.839E+00 CE144 2.500 5.516E+00 CE144 2.382E+00 SB125 35.55 46.65 84. 20.20 1.19 4.649E-02 46.60 2.100 1.853E+01 EU152 87.87 5.360E-02 61.20 16. 0.85 61.14 13,000 PRC<MDA W187 63.45 5.437E-02 85. 1.15 67.29 29. 44.83 0.53 5.549E-02 66.91 12.500 9.070E-01 CS136 75.1L 77.07 27.14 5.715E-02 5.746E-02 63. 0.86 59. 0.86 81.60 5.803E-02 81.00 2.935E-01 XE133 29. 50.66 0.75 37,100 81.80 1.000 1.063E+01 SB125 89.65 16. 80.04 0.62 5.860E-02 89.96 1.500 PBC<MDA U235 21. 143.98 163.44 91.72 0.27 5.455E-02 143.76 4.700 PBC<MDA U235 3.957E+00 U235 0.68 45. 5.168E-02 163.35 5.991 162.93 5.148E+00 M090 163.93 1.960 9.569E+00 XE131M 163.89 4.630 4.048E+00 CS136 185.58 49. 28.68 0.97 4.825F-02 185.72 54,000 4,006E-01 U235 185.99 3.280 PRC<MDA RAZZ6 254.60 11. 63.49 0.25 3.826E-02 295.59 22.14 0.61 3.323E-02 2.747E-02 71. 101. 42.10 479.54 20. 0.25 1.890E-02 479.57 23.400 PBC<MDA W187 661.57 72. 19.32 0.73 1.325E-02 84.620 1.391E+00 C5137 661.62 684.24 864.34 19. 22.94 27.55 0.28 1.277E-02 1.017E-02 685.74 29.200 1.238E+00 W187 1460.50 24.02 0.81 6.535E-03 1460.75 10.700 PBC<MDA K40 ********* UNIDENTIFIED PFAK S U M M A R Y *******

Intensity Uncert Peak Centroid Background Net Area nannel Energy Counts Counts FWHM Suspected kev Nuclide Channel 52.40 13.28 91. 94. 0.010 41.59 0.551 TH-234 5 64.27 16.24 126. 0.740 Y-91M 66. 0.007 62.87 ç

ORTEC g v - i (1215) Env32 G53W4.25 1/10/2020 11:58:39 AM Page 3 Spectrum name: REACTOR POOL 19-12-17.An1 Page 2

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Nuclear Project#.	655352	Contract#.	255095	Page:	157 of 201
Customer Doc#:		Customer:	Saskatchewan	Research Cou	ncil (SRC)
Title:	END STATE DE	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPO	OKE-2

REACTOR POOL 19-12-17.Rpt

Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM Suspecto	ed
186.13	46.65	68.	84.	0.009	40.41	1.192 EU-152	5
253.43	63.45	121.	85.	0.009	51.15	1.154 PA-234	SM
269.09	67.29	74.	28.	0.003	94.13	0.852 TA-182	D
300.16	75.06	116.	63.	0.007	54.29	0.860 PB-214	D
308.04	77.03	133.	59.	0.006	61.41	0.862 PB-214	D
654.11	163.44	72.	45.	0.005	75.69	0.680 U-235	SM
1019.43	254.60	19.	11.	0.001	126.98	0.250 SN-113	5
1183.71	295.59	48.	71.	0.008	44.27	0.606 PB-214	S
1409.45	351.92	22.	101.	0.011	25.59	1.224 PB-214	S
3462.94	864.34	7.	28.	0.003	55.10	0.437 -	SM

- s Peak fails shape tests. D Peak area deconvoluted. L Peak written from unknown list. C Area < Critical level. M Peak is close to a library peak.

This section based on library: reactor water.Lib

Nucli de	Peak	Centroid	Background	Net Area	Intensit		
	Channel	Energy	Counts	Counts	Cts/Sec	2 Sigma 5	k kev
XE-133	142.65	35.80	86.	24.	0.003	115.86	0.8210
CS-137	0.00	36.40	0.	0.	0.000	0.00	0.000
W-187	244.19	61.14	93.	16.	0.002	175.74	0.8460
XE-133	326.19	81,60	68.	29.	0.003	101.32	0.746
U-235	358.43	89.65	65.	16.	0.002	160.07	0.6245
U-235	0.00	93.35	0.	0.	0.000	0.00	0.000
U-235	0.00	105.00	0.	0.	0.000	0.00	0.000
U-235	576.14	143.98	105.	21.	0.002	183.44	0.2725
U-235	0.00	163.35	0.	0.	0.000	0.00	0.000
U-235	743.41	185.72	85.	49.	0.005	57.35	0.9660
U-235	0.00	205.31	0.	0.	0.000	0.00	0.000
W-187	1920.84	479.54	13.	20.	0.002	84.20	0.2509
W-187	0.00	618.28	0.	0.	0.000	0.00	0.000
W-187	0.00	625.54	0.	0.	0.000	0.00	0.000
CS-137	2650.34	661.57	22.	72.	0.008	38.65	0.7335
W-187	2741.17	684.24	0.	19.	0.002	45.88	0.2815
AR-41	0.00	1293.60	0.	0.	0.000	0.00	0.000

s - Peak fails shape tests.

D - Peak area deconvoluted. A Derived peak area.

0

ORTEC g v - i (1215) Env32 G53W4.25 1/10/2020 11:58:39 AM Page Spectrum name: REACTOR POOL 19-12-17.Anl Page 4

- Nuclide - Name Code	Average Activity Bq/L	Energy keV	1				MENTS
AR-41	0.0000E+00	1293.60	0.000E+00		1.696E+00	0.00E+00	G
XE-131M	0.0000E+00	29.46 33.60 163.93	0.000E+00 0.000E+00 0.000E+00 0.000E+00	% % &		1.00E+03 1.00E+03 1.00E+03	G G
		34.40	0.000E+00	* Page		1.00E+03	G

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Nuclear Project#:	655352	Contract#:	255095	Page:	158 of 201
Customer Doc#:		Customer.	Saskatchewan	Research Cou	ncil (SRC)
Title:	END STATE DI	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPO	OKE-2

		REACTOR	R POOL	19-12-17.Rpt	
XE-133	6.4276E-01				
NE 233	0112102 02	81.00 2.935E-	01 &(4.222E-01 5.07E+01 G	
		30.97 1.199E-			
		30.63 0.000E+		2.062E+00 1.09E+03 G	
		35.00 0.000E+ 35.80 8.495E+			
		33.00 8.4332	00 (1.01-2.01 3.732.01 0	
XE-133M	0.0000E+00				
		29.78 0.000E		1.286E+00 1.00E+03 G	
		29,46 0.000E+ 233,20 0.000E+		1.959E+00 1.00E+03 G 1.173E+00 1.00E+03 G	
		33.60 0.000E		2.948E+00 1.00E+03 G	
				1.497E+01 1.00E+03 G	
XE-135	0.0000E+00				
XE-135	0.00000	249.79 0.000F	00 %	1.938E-01 1.00E+03 G	
		608.18 0.000E		1.414E+01 1.00E+03 G	
		30.97 0.000E+	00 %	1.897E+01 1.00E+03 G	
		30.63 0.000E+	00 %	2.679E+01 1.00E+03 G	
NA-24	0.0000E+00				
144 21	0.00002100	1368.55 0.000E	-00 %	3.534E-01 1.00E+03 G	
		2754.10 0.000E+		0.000E+00 0.00E+00 G	
PF 7	0.00005+00				
BE-7	0.0000E+00	477.56 0.000E	00 %	1.657E+00 1.00E+03 G	
		477.30 O.GOGE	00 A	1.03/6/00 1.002/03 0	
CR-51	0.0000E+00				
2		320.07 0.000E+	W 00	2.203E#00 1.00E+03 G	
ORTE	C g v - i (121	Env32 G53W4.2	5 1/1	10/2020 11:58:39 AM Page	
7.1	3 - (REACTOR POOL 19-12-17.Ani	L
Nuclide	Ave activity	Energy Activi	ty Co	ode Peak MDA Comments	
W-187	1.1676E+00				
		685.74 1.238E+	00 &(4.801E-01 2.29E+01 G	
		479.57 1.080E+	00 ?(1.083E+00 4.21E+01 G	
		61.14 5.637E- 72.00 0.000E-		1.660E+00 8.79E+01 G 1.649E+00 1.93E+02 G	
		134.25 0.000E+		1.757E+00 1.95E+02 G	
		59.72 0.000E		2.335E+00 2.31E+02 G	
		618.28 0.000E		1.877E+00 0.00E+00 G	
		551.52 0.000E+		2.037E+00 1.00E+03 G	
		69.20 0.000E# 772.91 0.000E#		4.863E+00 4.56E+02 G 3.586E+00 1.00E+03 G	
		625.54 0.000E		1.088E+01 0.00E+00 G	
		71.20 0.000E+		2.026E+01 4.56E+02 G	
MN-54	0.0000E+00				
MN-54	0.0000E+00	834.81 0.000E+	00 %	4.128E-01 1.00E+03 G	
		031102 0100021	00 14	112202 02 21002123	
MO-99	0.0000E+00				
		140.51 0.000E+ 739.47 0.000E+		2.584E-01 1.00E+03 G 1.759E+00 1.00E+03 G	
		18.30 0.000E+		3.387E+00 1.00E+03 G	
		181.09 0.000E		3.965E÷00 1.00E+03 G	
		777.88 0.000E+		4.253E+00 1.00E+03 G	
		20.60 0.000E+		2.330E#01 1.00E+03 G	
		366.44 0.000E+ 40.58 0.000E+	00 %	1.812E+01 1.00E+03 G 1.966E+01 1.00E+03 G	
		40.30 0.000ET	JU 0	1.500E-01 1.00E-03 G	
TC-99M	0.0000E+00	Day of the second		5	
		140.51 0.000E+			
		20.55 0.000E	00 &	1.020E+01 1.00E+03 G 6.144E+01 1.00E+03 G	
		20.00 0.0002		21006100	
FE-59	0.0000E+00				
			Pag		

Candu Energy Inc. and SNC-Lavalin Nuclear Inc.

Page 4

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Nuclear Project#:	655352	Contract#:	255095	Page:	159 of 201
Customer Doc#:		Customer.	Saskatchewan I	Research Cou	ncil (SRC)
Title:	END STATE DE	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPO	OKE-2

```
REACTOR POOL 19-12-17.Rpt
                                                        6.112E-01 1.00E+03 G
7.492E-01 1.00E+03 G
                              1099.22 0.000E+00 %
                              1291.56 0.000E+00 &
                               192.34 0.000E+00 %
142.65 0.000E+00 %
                                                        3.678E+00 1.00E+03 G
                                                        9.773F+00 1.00F+03 G
CO-57
               0.0000E+00
                               122.07 0.000E+00 %
                                                        2.158E-01 1.00E+03 G
                               136.43 0.000E+00 %
                                                        1.352E+00 1.00E+03 G
                                14.41 0.000E+00 %
                                                        8.561E+00 1.00E+03 G
CO-58
               0.0000E+00
                               810.75 0.000E+00 &
                                                      4.507E-01 1.00E+03 G
      ORTEC g v - i (1215) Env32 G53W4.25 1/10/2020 11:58:39 AM Page Spectrum name: REACTOR POOL 19-12-17.An1
                                                                               Page 6
Nuclide Ave activity
                             Energy
                                        Activity Code Peak MDA Comments
CO-60
               0.0000E+00
                              1332.51 0.000E+00 %
1173.23 0.000E+00 %
                                                        2.264E-01 1.00E+03 G
2.994E-01 1.00E+03 G
ZN-65
               0.0000E+00
                                                        9.142E-01 1.00E+03 G
0.000E+00 0.00E+00 G
                              1115.52 0.000E+00 %
                                 8.13 0.000E+00 =
NR-94
               0.0000F+00
                               871.10 0.000E+00 %
                                                        2.800E-01 1.00E+03 G
                               702.50 0.000E+00 %
                                                        2.078E-01 1.00E+03 G
ZR-95
               0.0000E+00
                               756.72 0.000E+00 %
724.18 0.000E+00 &
                                                        4.466E-01 1.00E+03 G
5.700E-01 1.00E+03 G
NB-95
               0.0000E+00
                               765.82 0.000E+00 &
                                                       4.491E-01 1.00E+03 G
3-131
               0.0000F+00
                               364.48 0.000E+00 &
                                                        3.008E-01 1.00E+03 G
                               636.97 0.000E+00 %
                                                        2.622E+00 1.00E+03 G
                               284.29 0.000E+00 W
                                                        1.822E+00 1.00E+03 G
                                                        4.843E+00 1.00E+03 G
                                80.18 0.000F+00 %
                                29.78 0.000E+00 %
                                                        1.461E+01
                                                                   1.00E+03
                               722.89 0.000E+00 %
                                                        9.306E+00 1.00E+03 G
                                29.46 0.000E+00 %
                                                        2.219E+01 1.00E+03 G
J-132
               0.0000E+00
                               667.69 0.000E+00 %
                                                        4.032E-01 1.00E+03 G
                               772.61 0.000E+00 %
954.55 0.000E+00 %
                                                        1.160E+00 1.00E+03 G
                                                        3.111E+00 1.00E+03 G
                               522.65 0.000E+00 %
                                                        3.375E+00 1.00E+03 G
                               630.22 0.000E+00 %
                                                        4.462E+00 1.00E+03 G
                              1398.57 0.000E+00 %
                                                        1.090E+01 1.00E+03 G
                               812.20 0.000E+00 %
                                                        1.412E+01 1.00E+03 G
                               671.60 0.000E+00 & 669.80 0.000E+00 %
                                                        2.618E+01 1.00E+03 G
1.168E+01 1.00E+03 G
                               505.90 0.000E+00 %
                                                        1.267E+01 1.00E+03 G
                               727.20 0.000E+00 %
                                                        1.712E+01 1.00E+03 G
                              1136.03 0.000E+00 %
                                                        2.184E+01 1.00E+03 G
                               809.80 0.000E+00 &
                                                        5.079E+01 1.00E+03 G
                               650.60 0.000E+00 %
                                                        2.556E+01 1.00E+03
                                                        3.050E+01 1.00E+03
                              1372.07 0.000E+00 %
                               728.10 0.000E+00 %
                                                        5.055E+01 1.00E+03 G
                              727.00 0.000E+00 %
1295.30 0.000E+00 &
                                                        2.490E+01 1.00E+03 G
                                                        1.027E+02 1.00E+03 G
```

ORTEC g v - i (1215) Env32 G53W4.25 1/10/2020 11:58:39 AM Page Spectrum name: REACTOR POOL 19-12-17.An1 Page 5

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Nuclear Project#	655352	Contract#:	255095	Page:	160 of 201
Customer Doc#:		Customer:	Saskatchewan	Research Cour	ncil (SRC)
Title:	END STATE DI	ECOMMISSIONIN	IG REPORT FOR	R SRC SLOWPO	KE-2

REACTOR POOL 19-12-17.Rpt

```
Energy
 Nuclide Ave activity
                                             Activity
                                                          Code Peak MDA Comments
                                   621.20 0.000E+00 %
262.70 0.000E+00 %
                                                              3.372E+01 1.00E+03 G
4.306E+01 1.00E+03 G
                                  1442.56 0.000E+00 %
                                                              5.577E+01 1.00E+03
                                  1143.40 0.000E+00 %
                                                              9.019E+01 1.00E+03 G
                                   547.10 0.000E+00 %
                                                              9.691E+01 1.00E+03 G
                                   780.20 0.000E+00 %
                                                              4.778E+01 1.00E+03 G
                                  1921.08 0.000E+00 %
                                                              8.186E+01 1.00E+03
                                  1290.70 0.000E+00 &
                                                              8.048E+01 1.00E+03
                                  2002.30 0.000E+00 = 1173.20 0.000E+00 %
                                                              0.000E+00 0.00E+00 G
8.951E+01 1.00E+03 G
                                   876.80 0.000E+00 &
                                                              7.871E+01 1.00E+03 G
1-133
                 0.0000E+00
                                   529.50 0.000E+00 %
                                                              2.374E-01 1.00E+03 G
                                   875.30 0.000E+00 %
                                                              4.002E+00 1.00E+03 G
                                  1298.90 0.000E+00 %
                                                              1.169E+01 1.00E+03 G
                                  1237.50 0.000E+00 %
707.40 0.000E+00 %
                                                              1.972E+01 1.00E+03 G
1.185E+01 1.00E+03 G
                                   510.40 0.000E+00 %
856.10 0.000E+00 %
                                                              6.238E+01 1.00E+03 G
4.330E+01 1.00E+03 G
3-135
                 0.0000E+00
                                  1260.41 0.000E+00 &
                                                              3.658E+00 1.00E+03 G
                                  1131.51 0.000E+00 %
                                                              1.362E+00 1.00E+03 G
                                  526.56 0.000E+00 %
1678.03 0.000E+00 %
                                                              3.138E+00 1.00E+03 G
4.351E+00 1.00E+03 G
                                  1457.56 0.000E+00 %
                                                              8.850E+00 1.00E+03 G
                                  1038.76 0.000E+00 %
1791.20 0.000E+00 %
                                                              8.514E+00 1.00E+03 G
5.630E+00 1.00E+03 G
                                   546.56 0.000E+00 %
                                                              4.788E+00 1.00E+03 G
                                  836.80 0.000E+00 %
1706.46 0.000E+00 %
                                                              3.510E+00 1.00E+03 G
                                                              1.025E+01 1.00E+03
                                  1124.00 0.000E+00 %
                                                              2.450E+01 1.00E+03
                                   417.63 0.000E+00 %
                                                              6.381E+00 1.00E+03 G
                                   288.45 0.000E+00 &
                                                              1.388E+01 1.00E+03 G
                                   220.50 0.000E+00 &
                                                              2.003E+01 1.00E+03 G
                                  1101.58 0.000E+00 %
                                                              1.871E+01
                                                                           1.00E+03
                                  1566.41 0.000E+00 %
                                                              3.068E+01 1.00E+03 G
                                  972.61 0.000E+00 &
1502.79 0.000E+00 %
                                                              3.988E+01 1.00E+03 G
3.574E+01 1.00E+03 G
SR-91
                 0.0000E+00
                                   555.57 0.000E+00 %
                                                              6.020E-01 1.00E+03 G
                                  1024.30 0.000E+00 &
                                                              2.033E+00 1.00E+03 G
                                   749.80 0.000E+00 %
                                                              2.679E+00 1.00E+03 G
                                   652.90 0.000E+00 %
                                                              2.096E+00 1.00E+03 G
                                   925.80 0.000E+00 %
652.30 0.000E+00 %
                                                              7.197E+00 1.00E+03 G
                                                              1.560E+01 1.00E+03 G
2
       ORTEC g v - i (1215) Env32 G53W4.25 1/10/2020 11:58:39 AM Page Spectrum name: REACTOR POOL 19-12-17.An1
                                                                                       Page
 Nuclide Ave activity
                                 Energy Activity 6
620.10 0.000E+00 %
                                                          Code Peak MDA Comments
                                                              1.430E+01 1.00E+03 G
5.150E+01 1.00E+03 G
                                    14.90 0.000E+00 %
                                   274.70 0.000E+00 %
                                                              2.727E+01 1.00E+03 G
                 0.0000E+00
Y-88
                                  1836.01 0.000E+00 %
898.02 0.000E+00 %
14.15 0.000E+00 &
                                                              2.868E-01 1.00E+03 G
1.721E-01 1.00E+03 G
2.395E+00 1.00E+03 G
                                     15.80 0.000E+00 %
                                                              1.224E+01 1.00E+03 G
Y-91M
                 0.0000E+00
                                                              8.073E+00 1.00E+03 G
6.356E+02 1.00E+03 G
                                   557.57 0.000E+00 &
14.90 0.000E+00 %
```

Page 6

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Nuclear Project#:	655352	Contract#:	255095	Page:	161 of 201
Customer Doc#:		Customer	Saskatchewan	Research Cour	ncil (SRC)
Title:	END STATE DI FACILITY	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPO	OKE-2

```
REACTOR POOL 19-12-17. Rpt
RU-103
               0.0000E+00
                                497.08 0.000E+00 %
                                                        2.401E-01 1.00E+03 G
4.918E+00 1.00E+03 G
                                610.33 0.000E+00 %
CS-134
               0.0000E+00
                                604.66 0.000E+00 %
                                                        1.631E-01 1.00E+03 G
                               795.76 0.000E+00 %
569.29 0.000E+00 %
                                                        2.130E-01 1.00E+03 G
                                                        1.078E+00 1.00E+03 G
                                801.84 0.000E+00 %
                                                        3.395E+00 1.00E+03
                                                        3.575E+00 1.00E+03 G
                                563.26 0.000E+00 %
                                                        7.586E+00 1.00E+03 G
                               1365.13 0.000E+00 %
                                                        1.427E÷01 1.00E+03 G
                               1167.86 0.000E+00 %
                                475.35 0.000E+00 %
                                                        2.212E+01 1.00E+03 G
                               1038.50 0.000E+00 %
                                                        1.843E+01 1.00E+03 G
CS-136
               0.0000E+00
                               818.50 0.000E+00 %
                                                        3.375E-01 1.00E+03 G
                              1048.07 0.000E+00 %
                                                        2.336E-01 1.00E+03 G
                                340.57 0.000E+00 %
                                                        3.725E-01 1.00E+03 G
                               1235.34 0.000E+00 %
                                                        1.585E+00 1.00E+03 G
                               176.56 0.000E+00 & 273.65 0.000E+00 &
                                                        1.588E+00 1.00E+03 G
1.789E+00 1.00E+03 G
                                 66.91 0.000E+00 %
                                                        1.007E+00 1.00E+03 G
                                153.22 0.000E+00 %
                                                        1.335E+00 1.00E+03 G
                                                        1.496E+00 1.00E+03 G
3.141E+00 1.00E+03 G
                                 86.29 0.000E+00 %
                                163.89 0.000E+00 &
                                 32.19 0.000E+00 %
31.82 0.000E+00 %
                                                        9.629E+00 1.00E+03
                                                        1.873E+01 1.00E+03 G
CS-137
               1.3912E+00
                                661.62 1.39LE+00 @(
                                                        4.762E-01 1.93E+01 G
                                 32.19 4.384E-01 }
31.82 3.089E-01 }
36.40 0.000E+00
                                                        7.425E+00 2.87E+02 G
                                                        1.452E+01 1.07E+03 G
3.961E+00 0.00E+00 G
9
       ORTEC g v - i (1215) Env32 G53W4.25 1/10/2020 11:58:39 AM Page Spectrum name: REACTOR POOL 19-12-17.An1
 Nuclide Ave activity
                             Energy
                                        Activity Code Peak MDA Comments
               0.0000F+00
BA-140
                                537.38 0.000E+00 &
                                                        1.906E+00 1.00E+03 G
                                 29.96 0.000E+00 &
                                                        2.608E+00 1.00E+03 G
                                162.64 0.000E+00 &
                                                        4.272E+00 1.00E+03 G
                                304.82 0.000E+00 %
                                                        6.387E+00 1.00E+03 G
                                423.69 0.000E+00 %
                                                        6.752E+00 1.00E+03 G
                                437.55 0.000E+00 %
                                                        9.973E+00 1.00E+03 G
                                 13.85 0.000E+00 %
                                                        6.614E+01 1.00E+03 G
                                                        1.800E+01 1.00E+03 G
                                 33.44 0.000E+00 %
LA-140
               0.0000E+00
                              1596.20 0.000E+00 %
487.03 0.000E+00 %
                                                        5.946E-01 1.00E+03 G
5.652E-01 1.00E+03 G
                                815.80 0.000E+00 M
                                                        8.971E-01 1.00E+03 G
                                328.75 0.000E+00 %
925.25 0.000E+00 %
                                                        1.401E+00 1.00E+03 G
3.257E+00 1.00E+03 G
                                                        3.962E+00 1.00E+03 G
                                867.86 0.000E+00 %
                                751.79 0.000E+00 %
                                                        3.496E+00 1.00E+03 G
                               2521.83 0.000E+00 =
                                                        0.000E+00 0.00E+00 G
                                432.55 0.000E+00 &
                                                        8.743E+00 1.00E+03 G
                                919.60 0.000E+00 %
                                                        6.805E+00 1.00E+03 G
CE-144
               0.0000E+00
                                133.53 0.000E+00 %
                                                        2.263E+00 1.00E+03 G
                                 36.03 0.000E+00 %
                                                        6.775E+00 1.00E+03 G
                                                        1.312E+01 1.00E+03 G
                                 35.55 0.000E+00 %
                                 80.12 0.000E+00
                                                        7.817E+00
                                                                    1.00E+03
                                 40.70 0.000E+00 &
                                                        1.569E+01 1.00E+03 G
```

Page 7

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Nuclear Project#:	655352	Contract#.	255095	Page:	162 of 201
Customer Doc#:		Customer	Saskatchewan	Research Cou	ncil (SRC)
Title:	END STATE DI	ECOMMISSIONIN	G REPORT FOR	SRC SLOWPO	OKE-2

			REACTOR P	OOL	19-12-17.F	tpt	
CD-109	0.0000E+00						
			0.000E+00			1.00E+03	
			0.000E+00			1.00E+03	
			0.000E+00			1.00E+03	
		25.50	0.000E+00	76	1.354E+01	1.00E+03	6
CE-139	0.0000E+00						
02 233	0.00002100	165.85	0.000E+00	94	1.2898-01	1.00E+03	G
			0.000E+00		5.528E-01	1.00E+03	G
			0.000E+00		7.603E-01	1.00E+03	G
		37.80	0.000E+00	96		1.00E+03	
		38.70	0.000E+00	96	6.034E+00	1.00E+03	G
HG-203	0.0000E+00						
rig-203	0.00002700	279.17	0.000E+00	94	2.365E-01	1.00E+03	6
		72.87	0.000E+00	%	3.422E+00	1.00E+03 1.00E+03	G
			0.000E+00			0.00E+00	
		70.83	0.000E+00	&	5.020E+00	1.00E+03	G
9							
ORT	EC g v - i (12)	(5) Env32	G53W4.25	1/1	0/2020 11:	58:39 AM	Page 1
			Spectrum n	ame:	REACTOR P	OOL 19-12	-17.Anı
Nuclide	Ave activity	Energy			de Peak MD		
		82.50	0.000E+00	%	4.384E+00	1.00E+03	G
K-40	0.0000E+00	1460 76	0 0005-00	N: 0	0 0105400	2 105+01	6
		1460.75	0.000E=00	36 1	8.948E+00	2.40E+01	G
SB-124	0.0000E+00						
20 20.	0.00002100	602.71	0.000E+00	96	3.762E-01	1.00E+03	G
			0.000E+00			1.00E+03	
			0.000E+00			1.00E+03	
			0.000E+00		3.820E+00		
			0.000E+00			0.00E+00	
			0.000E+00		9.071E+00		
			0.000E+00			1.00E+03	
			0.000E+00			1.00E+03	
			0.000E-00			1.00E+03	
			0.000E+00			1.00E+03	
		1436.60	0.000E+00	96	2.804E+01	1.00E+03	G
58-125	0.0000E+00	437.05	0.0005.00	2	1 22.55.00		_
			0.000E+00 0.000E+00			1.00E+03 1.00E+03	
			0.000E+00			1.00E+03	
			0.000E#00			1.00E+03	
			0.000E#00			1.00E+03	
			0.000E+00			1.00E+03	
		606.82	0.000E+00	%		1.00E+03	
			0.000E+00			1.00E+03	
			0.000E+00			1.00E+03	
		81.80	0.000E+00	26	1.802E+01	1.00E+03	G
SE-75	0.0000E+00						
	0.00001.00	264.65	0.000E+00	96	3.237E-01	1.00E+03	G
		136.00	0.000E+00	96	2.556E-01	1.00E+03	G
			0.000E+00			0.00E+00	
			0.000E#00			1.00E+03	
			0.000E+00			1.00E+03	
			0.000E+00 0.000E+00			1.00E+03 0.00E+00	
			0.000E+00			1.00E+03	
			0.000E+00			1.00E+03	
			0.000E000			1.00E+03	
				-7			
EU-152	0.0000E+00						_
			0.000E+00			1.00E+03	
		121.78	0.000E+00			1.00E+03	G
				Page	. 0		

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Nuclear Project#	655352	Contract#:	255095	Page:	163 of 201	
Customer Doc#:		Customer:	Saskatchewan Research Council (SRC)			
Title:	END STATE DE	ECOMMISSIONIN	IG REPORT FOR	R SRC SLOWPO	KE-2	

```
REACTOR POOL 19-12-17.Rpt
                                 344.30 0.000E+00 %
                                                          4.495E-01 1.00E+03 G
                               1408.08 0.000E+00 %
                                                          2,272E+00 1,00E+03 G
      ORTEC g v - i (1215) Env32 G53W4.25 1/10/2020 11:58:39 AM Page 11 
Spectrum name: REACTOR POOL 19-12-17.An1
 Nuclide Ave activity
                                           Activity
                              Energy
                                                      Code Peak MDA
                                                                        Comments
                                 39.52 0.000E+00 %
964.00 0.000E+00 %
                                                          1.661E+00 1.00E+03 G
3.520E+00 1.00E+03 G
                                1112.07 0.000E+00 &
                                                          3.547E+00 1.00E+03 G
                                778,90 0.000E+00 %
                                                          1.590E+00
                                                                      1.00F+03 G
                                1085.80 0.000E+00 &
                                                          3.038E+00
                                                                      1.00E+03 G
                                  45.40 0.000E+00 %
                                                          1.177E+00
                                                                       1.00E+03 G
                                 244.67 0.0005+00 &
867.39 0.0005+00 %
                                                          3.055E+00
9.588E+00
                                                                      1.00E+03 G
1.00E+03 G
                                 444.00 0.000E+00 %
                                                          1.064E+01
                                                                      1.00E+03 G
                                 411.09 0.000E+00 %
                                                          7.600E+00
                                                                      1.00E+03 G
                                  46.60 0.000E+00 %
                                                          1.327E+01 | 1.00E+03 G
                                1089.82 0.000E+00 %
                                                          1.117E+01 1.00E+03 G
                               1299.19 0.000E+00 %
1212.89 0.000E+00 %
                                                          1.301E+01 1.00E+03 G
3.129E+01 1.00E+03 G
RA-226
                0.0000E+00
                                                                         Derived Ave Activity
                                185.99 0.000E+00 } P 8.638E+00 1.00E+03 G
11-235
               1.1699F+00
                                185.72 4.006E-01 }
143.76 7.891E-01 ?(
                                                          3.781E-01 2.87E+01 G
                                                          1.896E+00 9.17E+01 G
                                 205.31 0.000E+00
                                                          7.457E-01 0.00E+00 G
                                                          6.529E-01 0.00E+00 G
                                 163.35 0.0005+00
                                                           1.081E+00 0.00E+00 G
                                  93.35 0.000E+00
                                109.14 0.000E+00 %
89.96 3.835E+00 ?(
                                                          1.099E+01 1.46E+02 G
9.885E+00 8.00E+01 G
                                 202.12 0.000E+00 %
                                                          1.267E+01 2.52E+02
                                 105.00 0.000E+00
                                                          2.711E+00 0.00E+00 G
TE-132
                0.0000E+00
                                228.16 0.000E+00 & 28.50 0.000E+00 %
                                                          2.188E-01 1.00E+03 G
                                                          3.488E-01 1.00E+03 G
                                  49.72 0.000E+00 &
                                                          1.372E+00
                                                                      1.00E+03 G
                                  32.30 0.000E+00 %
                                                          2.097E+00 1.00E+03 G
                                 116.30 0.000E+00 %
111.76 0.000E+00 %
                                                          7.075E+00 1.00E+03 G
                                                          1.034E+01 1.00E+03 G
MO-90
                0.0000F+00
                                 257.34 0.000E+00 &
                                                          5.088E-01 1.00E+03 G
                                  16.60 0.000E+00 %
                                                          2.417E+00 1.00E+03 G
                                 122.37 0.000E+00 %
18.60 0.000E+00 &
                                                          4.492F-01 1.00F+03 G
                                                          9.615E+00
                                                                      1.00E+03
                                 203.13 0.000E+00 %
                                                          2.144E+00 1.00E+03 G
                                 323.20 0.000E+00 %
445.37 0.000E+00 %
                                                          6.102E+00
                                                                      1.00E+03 G
                                                          4.827E+00
                                                                      1.00E+03
                                 162.93 0.000E+00 &
                                                          6.122E+00 1.00E+03 G
                                 941.50 0.000E+00 %
                                                          5.076E+00 1.00E+03 G
       ORTEC g v - i (1215) Env32 G53W4.25 1/10/2020 11:58:39 AM Page :
Spectrum name: REACTOR POOL 19-12-17.Anl
                                                                                  Page 12
                                                      Code Peak MDA Comments
1.285E+01 1.00E+03 G
1.595E+01 1.00E+03 G
 Nuclide Ave activity
                              Energy Activity (
1271.30 0.000E+00 %
                                  42.70 0.000E+00 &
                                1454.60 0.000E+00 %
                                                          2.152E+01 1.00E+03 G
                                1387.40 0.000F+00 %
                                                          2.077E+01 1.00E+03 G
                                 472.24 0.000E+00 %
                                                          4.196E#01 1.00E+03 G
                                 990.20 0.000E+00 %
                                                          2.902E+01 1.00E+03 G
                0.0000E+00
ZR-97
                                                     Page 9
```

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Customer Doc#: Customer: Saskatchewan Research Council (SRC)

Nuclear Project#.

Title

655352

END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2 FACILITY

```
REACTOR POOL 19-12-17.Rpt
                                                                       2.062E-01 1.00E+03 G
4.726E+00 1.00E+03 G
                                        743.36 0.000E+00 %
                                        507.63 0.000E+00 %
                                      1147.95 0.000E+00 &
355.39 0.000E+00 %
                                                                       2.414E+01 1.00E+03 G
1.613E+01 1.00E+03 G
                                       1021.30 0.000E+00 %
                                                                       1.945E+01 1.00E+03
                                        602.41 0.000E÷00 %
                                                                       2.082E+01 1.00E+03 G
                                       1750.46 0.000E+00 %
                                                                       2.428E+01 1.00E+03 G
                                       1362.66 0.000E+00 %
                                                                       2.026E+01 1.00E+03 G
                                      254.15 0.000E+00 %
1276.09 0.000E+00 &
                                                                       1.091E+01 1.00E+03 G
4.981E+01 1.00E+03 G
NB-97
                   0.0000E+00
                                        657.92 0.000E+00 &
                                                                       3.598E+00 1.00E+03 G
                                      1024.53 0.000E+00 &
                                                                       4.301E+02 1.00E+03 G
SR-RS
                   0.0000E+00
                                                                       2.655E-01 1.00E+03 G
                                        513.99 0.000F+00 %
                                         13.38 0.000E+00 %
                                                                       2.774E+00 1.00E+03 G
                                          15.00 0.000E+00 %
                                                                       6.522E+00 1.00E+03 G
RH-106
                   0.0000F+00
                                        621.80 0.000E+00 %
                                                                       2.037E+00 1.00E+03 G
                                      1050.10 0.000E+00 %
                                                                       3.583E+01 1.00E+03 G
SN-113
                   0.0000E+00
                                        391.71 0.000E+00 &
                                                                       4.046E-01 1.00E+03 G
                                                                       1.347E+00 1.00E+03 G
2.867E+00 1.00E+03 G
3.097E+00 1.00E+03 G
                                         24.21 0.000E+00 %
24.00 0.000E+00 %
                                          27.30 0.000E+00 %
                                          27.90 0.000E+00 &
                                                                       1.583E+01 1.00E+03 G
                                        255.04 0.000E+00 %
                                                                       5.653E+00 1.00E+03 G
Cd-113M I
                   0.0000E+00
                                        263.70 0.000E+00 &
                                                                      8.573E+04 1.00E+03 G
    ( - This peak used in the nuclide activity average.
       - Peak is too wide, but only one peak in library.
- Peak is part of a multiplet and this area went
          negative during deconvolution.
        ORTEC g v - i (1215) Env32 G53W4.25 1/10/2020 11:58:39 AM Page 13
                                                 Spectrum name: REACTOR POOL 19-12-17.An1
      - Peak is too narrow.

7 - Peak is too narrow.
6 - Peak is too wide at Fw25M, but ok at FwHM.
8 - Peak fails sensitivity test.
5 - Peak identified, but first peak of this nuclide failed one or more qualification tests.
+ Peak activity higher than counting uncertainty range.
- Peak activity lower than counting uncertainty range.
- Peak outside analysis energy range.
- Calculated peak centroid is not close enough to the

    Calculated peak centroid is not close enough to the
library energy centroid for positive identification.
    Peakbackground subtraction

          Peak is too close to another for the activity to be found directly.
    Nuclide Codes:
                                                          Peak Codes:
    T - Thermal Neutron Activation
F - Fast Neutron Activation
                                                         G - Gamma Ray
X - X-Ray
      - Fission Product
- Naturally Occurring Isotope
- Photon Reaction
                                                               Positron Decay
                                                         S - Single-Escape
D - Double-Escape
          Charged Particle Reaction
                                                               Key Line
Not in Average
    M - No MDA Calculation
    R - Coincidence Corrected
                                                          C - Coincidence Peak
    H - Halflife limit exceeded
```

Page 10

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Nuclear Project#:	655352	Contract#.	255095	Page:	165 of 201
Customer Doc#:		Customer:	Saskatchewan	Research Cou	ncil (SRC)
Title:	END STATE DI FACILITY	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPO	KE-2

REACTOR POOL 19-12-17.Rpt

AR-41	5.9297E-01 1.2995E+00 6.3310E-01 1.2409E+00 1.5683E-01 3.1098E-01 1.6540E+00 2.1964E+00 1.0773E+00 4.1272E-01 2.5104E-01 2.9502E-01	1.6963E+00 1.3083E+00 6.4276E-01 1.2857E+00 1.9382E-01 3.5344E-01 1.6565E+00 2.2028E+00 1.1676E+00	4.9465E-01	4.9645E-01	4.222E-0J
XE-133 XE-1335 < NA-24 < BE-7 < CR-51 < W-187 MN-54 < MO-99 < TC-99M < TC-99M < CO-57 <	6.3310E-01 1.2409E+00 1.5683E-01 3.1098E-01 1.6540E+00 2.1964E+00 1.0773E+00 4.1272E-01 2.5104E-01	6.4276E-01 1.2857E+00 1.9382E-01 3.5344E-01 1.6565E+00 2.2028E+00 1.1676E+00	4.9465E-01	4.9645E-01	4.222E-0
XE-133M < XE-135 < NA-24 < BE-7 < CR-51 < W-187 MN-54 < M0-99 < TC-99M < FE-59 < CO-57 <	1.2409E+00 1.5683E-01 3.1098E-01 1.6540E+00 2.1964E+00 1.0773E+00 4.1272E-01 2.5104E-01	1.2857E+00 1.9382E-01 3.5344E-01 1.6565E+00 2.2028E+00 1.1676E+00	4.9465E-01	4.9645E-01	4.222E-01
XE-135 < NA-24 < BE-7 < CR-51 < W-187 MN-54 < MO-99 < TC-99M < FE-59 < CO-57 <	1.5683E-01 3.1098E-01 1.6540E+00 2.1964E+00 1.0773E+00 4.1272E-01 2.5104E-01	1.9382E-01 3.5344E-01 1.6565E+00 2.2028E+00 1.1676E+00			
NA-24	3.1098E-01 1.6540E+00 2.1964E+00 1.0773E+00 4.1272E-01 2.5104E-01	3.5344E-01 1.6565E+00 2.2028E+00 1.1676E+00			
BE-7 < CR-51 < W-187 MN-54 < M0-99 < TC-99M < FE-59 < CO-57 <	1.6540E+00 2.1964E+00 1.0773E+00 4.1272E-01 2.5104E-01	1.6565E+00 2.2028E+00 1.1676E+00			
CR-51 < W-187 MN-54 < MO-99 < TC-99M < FE-59 < CO-57 <	2.1964E+00 1.0773E+00 4.1272E-01 2.5104E-01	2.2028E+00 1.1676E+00			
W-187 MN-54 < MO-99 < TC-99M < FE-59 < CO-57 <	1.0773E+00 4.1272E-01 2.5104E-01	1.1676E+00			
MN-54 < MO-99 < TC-99M < FE-59 < CO-57 <	4.1272E-01 2.5104E-01		5.3574E-01	5.4097E-01	4.SOLE-01
MO-99 < TC-99M < FE-59 < CO-57 <	2.5104E-01	4.1283E-01			
FE-59 < CO-57 <	2.9502E-01	2.5844E-01			
CO-57 <		4.0608E-01			
	6.1016E-01	6.1124E-01			
CO-58 <	2.1571E-01	2.1578E-01			
	4.5017E-01	4.5068E-01			
CO-60 <	2.2637E-01	2.2638E-01			
ZN-65 <	9.1392E-01	9.1422E-01			
NB-94 <	2.7998E-01	2.7998E-01			
ZR-95 <	4.4601E-01	4.4657E-01			
NB-95 <	4.4808E-01 2.9780E-01	4.4910E-01 3.0078E-01			
		Env32 G53W4		11:58:39 AM	Page 14
J-132 <	1.7968E-01	Spectri 4.0317E-01	ım name: REACT	OR POOL 19-12	-17.An1
J-133 <	2.1595E-01	2.3741E-01			
J-135 <	2.7342E+00	3.6577E+00			
SR-91 <	4.9340E-01	6.0198E-01			
Y-88 <	2.8662E-01	2.8684E-01			
Y-91M <	7.9209E-01	8.0733E+00			
RU-103 < CS-134 <	2.3961E-01 1.6305E-01	2.4010E-01 1.6307E-01			
CS-136 <	3.3544E-01	3.3752E-01			
CS-137 #	1,3912E+00	1.3912E+00			
BA-140 <			5 27649-01	5 4496E-01	4 762F-0
	1 8940E+00	1.9060F+00	5.3764E-01	5.4496E-01	4.762E-0
	1.8940E+00 5.6682E-01	1.9060E+00 5.9455E-01	5.3764E-01	5.4496E-01	4.762E-0.
LA-140 <	5.6682E-01	5.9455E-01	5.3764E-01	5.4496E-01	4.762E-0.
LA-140 < CE-144 <			5.3764E-01	5.4496E-01	4.762E-0.
LA-140 < CE-144 < CD-109 <	5.6682E-01 2.2627E+00	5.9455E-01 2.2634E+00	5.3764E-01	5.4496E-01	4.762E-0.
LA-140 < CE-144 < CD-109 < CE-139 <	5.6682E-01 2.2627E+00 3.0469E-01	5.9455E-01 2.2634E+00 3.0474E-01	5.3764E~01	5.4496E-01	4.762E-0.
LA-140	5.6682E-01 2.2627E+00 3.0469E-01 1.2880E-01	5.9455E-01 2.2634E+00 3.0474E-01 1.2888E-01	5.3764E-01	5.4496E-01	4.762E-0
LA-140	5.6682E-01 2.2627E+00 3.0469E-01 1.2880E-01 2.3613E-01	5.9455E-01 2.2634E+00 3.0474E-01 1.2888E-01 2.3654E-01	5.3764E-01	5.4496E-01	4.762E-0
LA-140 < CE-144 < CD-109 < CE-139 < HG-203 < K-40 < SB-124 < SB-125 <	5.6682E-01 2.2627E+00 3.0469E-01 1.2880E-01 2.3613E-01 8.9477E+00 3.7572E-01 1.3239E+00	5.9455E-01 2.2634E+00 3.0474E-01 1.2888E-01 2.3654E-01 8.9477E+00 3.7622E-01 1.3240E+00	5.3764E-01	5.4496E-01	4.762E-0
LA-140 < CE-144 < CD-109 < CE-139 < HG-203 < K-40 < SB-124 < SB-125 < SE-75 <	5.6682E-01 2.2627E+00 3.0469E-01 1.2880E-01 2.3613E-01 8.9477E+00 3.7572E-01 1.3239E+00 3.2345E-01	5.9455E-01 2.2634E+00 3.0474E-01 1.2888E-01 2.3654E-01 8.9477E+00 3.7622E-01 1.3240E+00 3.2366E-01	5.3764E-01	5.4496E-01	4.762E-0
LA-140 < CE-144 < CD-109 < CE-139 < HG-203 < K-40 < SB-124 < SB-125 < SE-75 < EU-152 <	5.6682E-01 2.2627E+00 3.0469E-01 1.2880E-01 2.3613E-01 8.9477E+00 3.7572E-01 1.3239E+00 3.2345E-01 1.0211E+00	5.9455E-01 2.2634E+00 3.0474E-01 1.2888E-01 2.3654E-01 8.9477E+00 3.7622E-01 1.3240E+00 3.2366E-01 1.0211E+00	5.3764E-01	5.4496E-01	4.762E-0
LA-140 < CE-144 < CD-109 < CE-139 < CHG-203 < K-40 < SB-124 < SB-125 < SE-75 < EU-152 < RA-226 <	5.6682E-01 2.2627E+00 3.0469E-01 1.2880E-01 2.3613E-01 8.9477E+00 3.7572E-01 1.3239E+00 3.2345E-01 1.0211E+00 8.6385E+00	5.9455E-01 2.2634E+00 3.0474E-01 1.2888E-01 2.3654E-01 8.9477E+00 3.7622E-01 1.3240E+00 3.2366E-01 1.0211E+00 8.6385E+00			
LA-140 < CE-144 < CD-109 < CE-139 < HG-203 < K-40 < SB-124 < SB-125 < SE-75 < EU-152 < RA-226 < U-235 A	5.6682E-01 2.2627E+00 3.0469E-01 1.2880E-01 2.3613E-01 8.9477E+00 3.7572E-01 1.3239E+00 3.2345E-01 1.0211E+00 8.6385E+00 1.1699E+00	5.9455E-01 2.2634E+00 3.0474E-01 1.2888E-01 2.3654E-01 8.9477E+00 3.7622E-01 1.3240E+00 3.2366E-01 1.0211E+00 8.6385E+00 1.1699E+00	1.4241E+00	5.4496E-01	
LA-140 < CE-144 < CD-109 < CE-139 < HG-203 < K-40 < SBB-124 < SBB-125 < SE-75 < EU-152 < RA-226 < TU-235 A TE-132 <	5.6682E-01 2.2627E+00 3.0469E-01 1.2880E-01 2.3613E-01 8.9477E+00 3.7572E-01 1.3239E+00 3.2345E-01 1.0211E+00 8.6385E+00 1.1699E+00 2.1344E-01	5.9455E-01 2.2634E+00 3.0474E-01 1.2888E-01 2.3654E-01 8.9477E+00 3.7622E-01 1.3240E+00 3.2366E-01 1.0211E+00 8.6385E+00 1.1699E+00 2.1877E-01			
LA-140 < CE-144 < CD-109 < CE-139 < HG-203 < K-40 < SB-124 < SB-125 < SE-75 < EU-152 < EU-152 < RA-226 < U-235 A TTE-132 < MO-90 <	5.6682E-01 2.2627E+00 3.0469E-01 1.2880E-01 2.3613E-01 8.9477E+00 3.7572E-01 1.3239E+00 3.2345E-01 1.0211E+00 8.6385E+00 1.1699E+00 2.1344E-01 3.6239E-01	5.9455E-01 2.2634E+00 3.0474E-01 1.2888E-01 2.3654E-01 8.9477E+00 3.7622E-01 1.3240E+00 3.2366E-01 1.0211E+00 8.6385E+00 1.1699E+00 2.1877E-01 5.0876E-01			
LA-140 < CE-144 < CD-109 < CE-L39 < HG-203 < K-40 < SB-124 < SB-125 < SE-T5 < EU-L52 < RA-226 < U-235 A TE-132 < TE-132 < ZR-97 <	5.6682E-01 2.2627E+00 3.0469E-01 1.2880E-01 2.3613E-01 8.9477E+00 3.7572E-01 1.3239E+00 3.2345E-01 1.0211E+00 8.6385E+00 1.1699E+00 2.1344E-01 3.6239E-01 1.8388E-01	5.9455E-01 2.2634E+00 3.0474E-01 1.2888E-01 2.3654E-01 8.9477E+00 3.7622E-01 1.3240E+00 3.2366E-01 1.0211E+00 8.6385E+00 1.1699E+00 2.1877E-01 2.0618E-01			
LA-140 < CE-144 < CD-109 < CE-139 < HG-203 < K-40 < SB-125 < SB-125 < SE-75 < EU-152 < RA-226 < U-235 A TE-132 < MC-90 < ZR-97 < NB-97 <	5.6682E-01 2.2627E+00 3.0469E-01 1.2880E-01 2.3613E-01 8.9477E+00 3.7572E-01 1.3239E+00 3.2345E-01 1.0211E+00 8.6385E+00 1.1699E+00 2.1344E-01 3.6239E-01 1.8388E-01 7.5599E-01	5.9455E-01 2.2634E+00 3.0474E-01 1.2888E-01 2.3654E-01 8.9477E+00 3.7622E-01 1.3240E+00 3.2366E-01 1.0211E+00 8.6385E+00 1.1699E+00 2.1877E-01 5.0876E-01 2.0618E-01 3.5976E+00			
LA-140 < CE-144 < CD-109 < CE-139 < HG-203 < K-40 < SB-124 < SB-125 < SE-75 < SEU-152 < CEU-152	5.6682E-01 2.2627E+00 3.0469E-01 1.2880E-01 2.3613E-01 8.9477E+00 3.7572E-01 1.3239E+00 3.2345E-01 1.0211E+00 8.6385E+00 1.1699E+00 2.1344E-01 3.6239E-01 1.8388E-01 7.5599E-01 2.6515E-01	5.9455E-01 2.2634E+00 3.0474E-01 1.2888E-01 2.3654E-01 8.9477E+00 3.7622E-01 1.3240E+00 3.2366E-01 1.0211E+00 8.6385E+00 1.1699E+00 2.1877E-01 5.0876E-01 2.0618E-01 3.5976E+00 2.6547E-01			
LA-140 < CE-144 < CD-109 < CE-139 < HG-203 < K-40 < SB-124 < SB-125 < EU-152 < RA-226 < AU-235 AUE-132 < CM-20	5.6682E-01 2.2627E+00 3.0469E-01 1.2880E-01 2.3613E-01 8.9477E+00 3.7572E-01 1.3239E+00 3.2345E-01 1.0211E+00 8.6385E+00 1.1699E+00 2.1344E-01 3.6239E-01 1.8388E-01 7.5599E-01 2.6515E-01 2.0365E+00	5.9455E-01 2.2634E+00 3.0474E-01 1.2888E-01 2.3654E-01 8.9477E+00 3.7622E-01 1.3240E+00 3.2366E-01 1.0211E+00 8.6385E+00 1.1699E+00 2.1877E-01 5.0876E-01 2.0618E-01 3.5976E+00 2.6547E-01 2.0369E+00			
LA-140 < CE-144 < CC-144 < CC-139 < HG-203 < K-40 < SB-124 < SB-125 < SE-75 < EU-152 < RA-226 < MU-235 A < MU-235 A < MU-90 < ZR-97 NB-97 < SR-85 <	5.6682E-01 2.2627E+00 3.0469E-01 1.2880E-01 2.3613E-01 8.9477E+00 3.7572E-01 1.3239E+00 3.2345E-01 1.0211E+00 8.6385E+00 1.1699E+00 2.1344E-01 3.6239E-01 1.8388E-01 7.5599E-01 2.6515E-01	5.9455E-01 2.2634E+00 3.0474E-01 1.2888E-01 2.3654E-01 8.9477E+00 3.7622E-01 1.3240E+00 3.2366E-01 1.0211E+00 8.6385E+00 1.1699E+00 2.1877E-01 5.0876E-01 2.0618E-01 3.5976E+00 2.6547E-01			

Page 11

^{8 -} Activity printed, but activity < MDA. 8 - Activity < MDA and failed test.

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Nuclear Project#: 655352 Contract#: 255095 Page: 166 of 201 Customer: Saskatchewan Research Council (SRC) Customer Doc#: END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2 Title: **FACILITY**

REACTOR POOL 19-12-17.Rpt

C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

S U M M A R Y

Total Activity (202.1 to 1996.4 keV) 4.272E+00 Bq/L

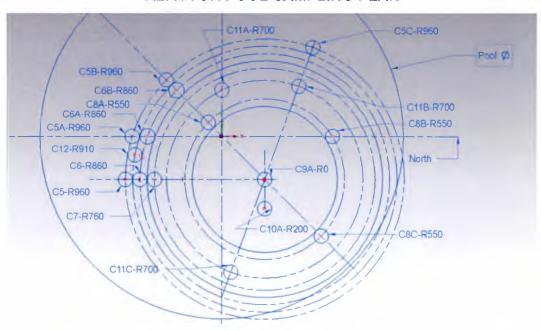
Total Decayed Activity (202.1 to 1996.4 keV) 4.3714867E+00 Bq/L

Analyzed by:

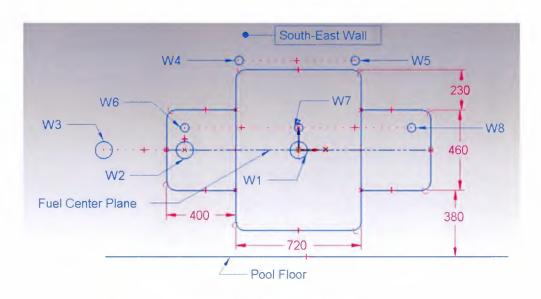
Reviewed by:

Laboratory:

Appendix H REACTOR POOL SAMPLING PLAN



Pool Floor Sampling Plan



Pool Wall Sampling Plan

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147-01600-ESDR-002

Rev:

0

168 of 201 Page:

255095 Nuclear Project#: 655352 Contract#: Customer: Saskatchewan Research Council (SRC) Customer Doc#: END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2 Title: **FACILITY**

Appendix I IRRADIATED CONCRETE IN DRUMS – GAMMA SPEC

From: Rees, Philip

To: Tanguay, Pierre (CNSC/CCSN): Erdebil, Ismail (CNSC/CCSN)

Cc Alim, Shahzad; Chorney, Dave

Subject: RE: Decommissioning Inspection of the SRC SLOWPOKE-2 Facility Held July 8-10, 2020

Date: Thursday, October 1, 2020 10:36:49 AM

Attachments: Concrete Waste Barrels - Revised Report 2020-9657.pdf

Good Morning Pierre & Ismail -

Related to the non-compliance noted in the decommissioning inspection report, SRC did characterize and measure the concrete waste in the barrels in anticipation of disposal through CNL. The table below provides the readings of the barrels on contact and at a distance of 1 meter.

		RP Readings (nireni/hr)
	Weight (kg)	Near Contact	@ 1m
Drum 1	325	0.01	0.01
Drum 2	325	0.01	0.01
Drum 3	325	0.01	0.01
Drum 4	325	0.02	0.00
Drum 5	325	0.01	0.01
Drum 6	325	0.02	0.01

In addition, samples were taken from the concrete waste and analyzed via gamma spectroscopy, and these results indicate the various radionuclides present in the waste. The report is attached for reference.

The waste is being prepared for shipment and disposal with CNL, with an anticipated ship date no later than 30 OCT 2020.

Once the shipment has been approved and completed, a final email will be sent indicating the completion of remediation activities related to the non-compliance.

Kind regards,

Philip

From: Holbrook, Ailan (CNSC/CCSN) <ailan.holbrook@canada.ca>

Sent: Tuesday, September 22, 2020 2:25 PM

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		Doc#:	147-01600-ESDR-0	002	Rev	0
Nuclear Project#:	655352	Contract#:	255095	Page:	170 of 2	01
Customer Doc#:		Customer:	Saskatchewan Research Council (SRC)			
Title:	END STATE D	ECOMMISSIONIN	IG REPORT FOR SE	RC SLOWPO	KE-2	

To: Chorney, Dave <Dave.Chorney@src.sk.ca>

Cc: Ducros, Caroline (CNSC/CCSN) <caroline.ducros@canada.ca>; Tanguay, Pierre (CNSC/CCSN) <pierre.tanguay@canada.ca>; Erdebil, Ismail (CNSC/CCSN) <ismail.erdebil@canada.ca>; Alim, Shahzad <Shahzad.Alim@snclavalin.com>; Rees, Philip <Philip.Rees@src.sk.ca>

Subject: Decommissioning Inspection of the SRC SLOWPOKE-2 Facility Held July 8-10, 2020

CAUTION: This email is from an external source. Do not click links or open attachments unless you recognize the sender and know the content is safe.

2020-09-22

Subject: Decommissioning Inspection of the SRC SLOWPOKE-2 Facility Held July 8-10, 2020

Dear Mr. Chorney,

Please find attached a letter and report from Mr. Erdebil (CNSC) concerning the subject line above. Kindly note that no paper copy will follow.

Thank you,

Ailan Holbrook

Administrative Assistant | Adjointe administrative Nuclear Processing Facilities Division | Division des installations de traitement nucléaires Canadian Nuclear Safety Commission | Commission canadienne de sûreté nucléaire ailan.holbrook@canada.ca

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Candu Energy Inc. and SNC-Lavalin Nuclear Inc.

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		Doc#	147-01600-ESD	R-002	Rev: 0
Nuclear Project#:	655352	Contract#:	255095	Page:	171 of 201
Customer Doc#:	Customer: Saskatchewan Research Council (SRC)				ncil (SRC)
Title:	END STATE DI FACILITY	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPO	KE-2



Environmental Analytical Laboratories 143-111 Research Drive, Saskatoon, SK, Canada S7N 3R2 T: 306-933-6932 F: 306-933-7922 Toll-free: 1-800-240-8808 E: analytical@src.sk.ca

www.src.sk.ca/analytical

Revised

SRC Group # 2020-9657

Oct 05, 2020

Analytical. SRC 143-111 Research Drive Saskatoon. SK S7N 3R2 Attn: Dave Chorney. 11526

Date Samples Received: Aug-19-2020

Client PO

All results have been reviewed and approved by a Qualified Person in accordance with the Saskatchewan Environmental Code. Corrective Action Plan Chapter, for the purposes of certifying a laboratory analysis

Results from Lab Section 4 authorized by Vicky Snook, Supervisor

- * Test methods and data are validated by the laboratory's Quality Assurance Program.
- * Routine methods follow recognized procedures from sources such as
 - * Standard Methods for the Examination of Water and Wastewater APHA AWWA WEF
 - * Environment Canada
 - * US EPA
 - * CANMET
- * The results reported relate only to the test samples as provided by the client.
- * Samples will be kept for 30 days after the final report is sent. Please contact the lab if you have any special requirements.
- * Additional information is available upon request.
- * Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

This is a final report.

Candu Energy Inc. and SNC-Lavalin Nuclear Inc.

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Nuclear Project#. 655352 Contract#: 255095 172 of 201 Saskatchewan Research Council (SRC) Customer Doc# Customer: END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2 Title **FACILITY**



Environmental Analytical Laboratories 143-111 Research Drive, Saskatoon, SK, Canada S7N 3R2 T: 306-933-6932 F: 306-933-7922 Toll-free: 1-800-240-8808 E: analytical@src.sk.ca

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Revised

SRC Group # 2020-9657

Oct 05, 2020

Analytical, SRC

143-111 Research Drive Saskatoon, SK S7N 3R2 Attn: Dave Chorney, 11526

Date Samples Received: Aug-19-2020

Client P.O.:

40037	08/19/2020 BARREL 5 CONCRETE #1 *CONCRETE	V
40038	08/19/2020 BARREL 5 CONCRETE #2 *CONCRETE	•
40039	08/19/2020 BARREL 5 CONCRETE #3 *CONCRETE	₩

Analyte	Units	40037	40038	40039
Lab Section 4				
Europium-152	Balg	0.019	0.27	0.10
Europium-154	Bq/g	0.003	0.03	0.011
Scandium-48	Bq/g	0.003	0.005	0.005
Cesium-134	Bq. gi	<0.0009	0.009	0.004
Cesium-137	Bq/g	0.004	0.003	0.022
Cobalt-60	Bq/g	0.015	0.17	0.068
Iron-59	Bq/g	<0.002	0.006	0.003
Manganese-54	Bq√gı	0.002	<0.003	0.014
Zino-65	Bq/g	<0.003	< 0.005	<0.003
Potassium-40	Bq/gi	0.48	0.62	0.81

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

Note for Sample # 40039

Revised report to correct the Europium 152 result. Sept 1/20 VS

The temperature of the cooler was 24.4 °C upon receipt.

Results are reported on an as received basis. Gamma spectroscopy detection limits are influenced by several factors. "Less than" values reported above represent the lowest detection limits achievable for the sample.

Candu Energy Inc. and SNC-Lavalin Nuclear Inc.

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www.src.sk.ca/analytical

Revised

SRC Group # 2020-9657

Oct 05, 2020

Analytical, SRC

40040

08/19/2020 BARREL 1 CONCRETE SLURRY #6 *CONCRETE*

Analyte	Units	40040	
Lab Section 4			
Europium-152	Bq/g	0.095	
Europium-154	Bq/g	0.01	
Scandium-46	Bq/g	<0.002	
Cesium-134	Bq/g	0.004	
Cesium-137	Bq/g	0.048	
Cobalt-80	Bq/g	0.071	
Iron-59	Bq/g	<0.004	
Manganese-54	B ç/g	0.012	
Zînc-65	Bq/g	<0.002	
Potassium-40	Bq/g	0.47	

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

Note for Sample # 40040

Revised sample description. 10/5/20 TG

The temperature of the cooler was 24.4 °C upon receipt.

Results are reported on an as received basis.

Gamma spectroscopy detection limits are influenced by several factors.

"Less than" values reported above represent the lowest detection limits achievable for the sample.

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Doc# 147-01600-ESDR-002

Rev.

0

Nuclear Project#: 655352 Contract#: 255095 Page: 174 of 201

Customer Doc#: Customer Saskatchewan Research Council (SRC)

Title: END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2
FACILITY



Environmental Analytical Laboratories 143-111 Research Drive, Saskatoon, SK Canada S7N 3R2 T: 306-933-6932 F: 306-933-7922 Toll-free: 1-800-240-8808 E: analytical@src.sk.ca

www.src.sk.ca/analytical

Revised

SRC Group # 2020-9657

Oct 05, 2020

Analytical, SRC

Analyte Methods

Name	Units	Method	
Cobalt-80	Sq/g	Rad-300	
Cesium-134	Bq/g	Rad-300	
Cesium-137	Bq/g	Rad-300	
Europium-152	Ba/g	Rad-300	
Europium-154	Bq/g	Rad-300	
Iron-59	Bq/g	Rad-300	
Potassium-40	Bq/g	Rad-300	
Manganese-54	Bq/g	Rad-300	
Scandium-46	Bq/g	Rad-300	
Zino-65	Bq/g	Rad-300	

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0 147-01600-ESDR-002 Page: 175 of 201 Nuclear Project#: 655352 255095 Contract#: Customer Doc#: Customer: Saskatchewan Research Council (SRC) **END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2 FACILITY**

Appendix J UNCONDITIONAL RELEASED ITEMS

Title:

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Nuclear Project#:	655352	Contract#:	255095	Page	176 of 201		
Customer Doc#:		Customer.	Customer: Saskatchewan Research Council (SF				
Title:	END STATE D	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPO)KE-2		

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Unconditional Release Form

NU-810011-FM-001 Ray 4

Page 1 of 2

Ref Frocedure NU 910011-PRO-009

	File No	NU-910011-035-000	
Section A: Validity Information		1	٩
1. Description of Equipment or Material: 2 CAPSULE RECEIVERS 2 IRRADIATION CONTROLL	1	I SERVICE BOX	

2. REASON FOR REQUEST TREADIATION CONTROLLER & CAPSULE RECEIVER
FOR RMCL - TRAADIATION CONTROLLER & CAPSULE RECEIVER
FOR THEA - 1 SERVICE BOX FOR RECYCLE / LANDFILL

1. Last Known Location of Equipment or Material (brief history):

SEC SLOWPOKE FACILITY

Section B: Radio	logical Assessmen									
To the best of your l	mowler ge, has the eq	ulpment or mal	erial	at any	Time b	cen				
Cuntur	niruted?			Yes	28	No				
Used o	Used or stored in a contaminated area?		Used or stored in a contaminated area?		B	Yes	[]	No		
Been ti	hrough a decontamin	ition process?		Yes	×	No				
Loose Contamination	Survey Instrument	Backgrou (cpm)			Mas Contan ab	e Area silan nination ove round?	If Yes, 100 cm/ sample: Survey Instrument	Net Counts = Gross-Harkground (cpm)		
3/y emiliters	2929	88			Yes	No No		Ø		
a emiliters	2929	0		. [Yes	X No	-	Ø		

Fixed	Survey Instrument	Background (cpm)	NET Counts = Gross-Background (cpm)
β/γ emitters	4293	228	50
a emitters	4393	D	Z.

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		Doc#:	147-01600-ESD	R-002	Rev:	U
Nuclear Project#.	655352	Contract#:	255095	Page:	177 of	201
Customer Doc#:	, , , , , , , , , , , , , , , , , , , ,	Customer:	Saskatchewan	Research Cour	ncil (SRC)
Title:	END STATE DI	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPO	KE-2	

Unconditional	Release	Form

Page 2 of 2

ounting?							
(Yes, give details or att	ach results of analy	rses.					_
Were all of the exterior			, ,	Yes	M No		
f No, provide details: A	of pradia	tion contro	Per-Si	aside ca	PERMA!	parts of pa	ds
or items fit in the Sm	all Article Monitor	(SAM)	box no	H ACCES	51614		
or Item(s) placed in SA	M, did it "Clear" the	e SAM? Yes	₩ No	If No. prov	ide details: n/a	a (no SAM on site)	
or Items do not fit in	the Small Article M	Monitor (SAM)					
Old large area Masslinn	s) cleared the SAM	7 TYCS	№ No	If No. prov	lde details n/:	a (no SAM on site)	
Was the gamma dose ra	te measured below	background? Yes	□ No	If No. prov	lde details:		
roup 1 Radiation							
Protection Surveyor Once surveys are completed in Radiation Area in Section Dr. Health P	nediately after the	item(s) have been app	roved for ren	leval		Date	
entection Surveyor Once surveys are compl rom Radiation Area im ection D: Health P Table 1: Maximi	nediately after the hysicist and Rad am Surveyed Values Surfa	item(s) have been app fation Protection P s for Unrestricted Use ce Activity	royed for ren rogram Aut Tuble 2:	hority Appr Maximum Val	roval lues for Unrest Maxim		
entection Surveyor once surveys are compl rom Radiation Area im ection Dr. Health P	nediately after the hysicist and Rad am Surveyed Values Surfa	item(s) have been app lation Protection P s for Unrestricted Use	royed for ren rogram Aut Tuble 2:	hority Appr	roval lues for Unrest Maxim	ricted lise.	
entection Surveyor Race surveys are completed Radiation Area im Cotton Dr. Health P Table 1: Maximi Radionuclide	nediately after the hysicist and Rad am Surveyed Values Surfa	item(s) have been app fation Protection P s for Unrestricted Use ce Activity	royed for ren rogram Aut Table 2:	hority App Maximum Val	rovel lues for Unrest Maxim (Bo Total	um Value /cm² Removable	
entection Surveyor Once surveys are compl rom Radiation Area im ection D: Health P Table 1: Maximi	nediately after the hysicist and Rad am Surveyed Values Surfa (B	item(s) have been application Protection Profession Protection Profession Protection Profession Pro	royed for ren rogram Aut Table 2:	hority Appr Maximum Val	royal lues for Unrest Maxim (Bo	ricted lise.	
Protection Surveyor Once surveys are completed Radiation Area im Section Dr. Health P Table 1: Maximi Radionuclide	nediately after the hysicist and Rad am Surveyed Values Surfa (B	item(s) have been app intion Protection P is for Unrestricted Use ace Activity (cq/tm²)	royeam Aut Table 2: Rads	hority App Maximum Val	rovel lues for Unrest Maxim (Bo Total	um Value /cm² Removable	
Protection Surveyor Once surveys are completed Radiation Area im Section D: Health P Table 1: Maximi Radionuclide B/y emitters a emitters	hysicist and Radian Surveyed Values Surfa (B Total Removable Total Removable	item(s) have been application Protection Profession Protection Profession Unrestricted Use (ce Activity (cq/cm²)) 0.063	royed for ren rogram Aut Table 2: Rads P/Y	hority App Maximum Val unuclide emitters	roval lues for Unrest Maxim (Bo Total 3.0	ricted lise. num Value /cm² Removable	
Protection Surveyor Once surveys are completed and adjustion Area im Section D: Health P Table 1: Maximi Radionuclide B/y emitters a emitters Are the results from Table 1: Are the results from Table 1: Area the res	hysicist and Radian Surveyed Values Surfa (B Total Removable Total Removable	item(s) have been application Protection Profession Protection Profession Unrestricted Use (ce Activity (cq/cm²)) 0.063	royed for ren rogram Aut Table 2: Radi I/Y n e	hority App Maximum Val unuclide emitters mitters	roval lues for Unrest Maxim (Bo Total 3.0 0.3	ricted Use. um Value //cm²} Removable 0.3	
Protection Surveyor Citice surveys are completed and adjustion Area im Section D: Health P Table 1: Maximi Radionuclide B/y emitters a emitters Are the results from Tagiven in	nediately after the hysicist and Radian Surveyed Values Surfa (B Total Removable Total Removable thic 1 Less than the harde 2?	item(s) have been application Protection Position Protection Position Protection Position Position Protection Position Protection Position Protection Position Protection Position Protection royed for ren rogram Aut Table 2: Radi I/Y n e	hority App Maximum Val unuclide emitters mitters	roval lues for Unrest Maxim (Bo Total 3.0 0.3	ricted lise. num Value /cm² Removable		
Protection Surveyor Once surveys are completed and adjustion Area im Section D: Health P Table 1: Maximi Radionuclide B/y emitters a emitters Are the results from Table 1: Are the results from Table 1: Area the res	nediately after the hysicist and Radian Surveyed Values Surfa (B Total Removable Total Removable thic 1 Less than the harde 2?	item(s) have been application Protection Position Protection Position Protection Position Position Protection Position Protection Position Protection Position Protection Position Protection royed for ren rogram Aut Table 2: Radi I/Y n e	hority App Maximum Val unuclide emitters mitters	roval lues for Unrest Maxim (Bo Total 3.0 0.3	ricted Use. um Value //cm²} Removable 0.3		

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		Doc#:	147-01600-ESDR	-002	Rev.	0	
Nuclear Project#:	655352	Contract#:	255095	Page:	178 of	201	
Customer Doc#		Customer:	Saskatchewan Research Council (SRC)				
Title:	END STATE DE	ECOMMISSIONIN	G REPORT FOR	SRC SLOWPO	KE-2		

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Uncondition:	al Release Fo	rm						Page 1 of
WARRED OF THE COLUMN	v. 4			en v T			_	edure NU S10011-PRO-03
Section A: Validi	ty Information	-		File No.:			NU-910011-0	35-000
. Description of Ed	quipment or Material iling coil + control ro	d mator cover		Identifi	ation Nu	nber (crat	e or tool): N/A	A
Reason for Requ	est: For disposal of its	ems						
poling coil sat in ch	ntion of Equipment or ean side of reactor po over sat over control cd by:	Hol.	Stur	у):		1 and the second		
	ogical Assessmen							
	mowledge, has the eq finated?	uipment or mate	clai a	Yes 🔯				
	r stored in a contamir	rated area?		Acz &				
	n'ough a decontainin.		Ø	Yes [Tjems (aped desen	with Frintastic
Loose Contamination	Survey Instrument	Backgroun (cpm)	ıd	Ma Conta a	ge Area sslinn nination bove graunit?		es, HØ cm² sample: Survey strument	Net Counts = Grass-Background (cpm)
β/γ emitters	M12 + 4-1-9	60		☐ Yes	⊠ No			Ó
a om tters	M12+119	0		☐ Yes	⊠ No			n
Fixed	Sur	vey Instrument			Backgro frjim		= G	NET Counts ross-Background (cpnt)
B/y emitters	3	M12 + 44-9			60			0
a emitters		M12+44-9			U			1)

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Nuclear Project#:	655352	Contract#:	255095	Page:	179 of 201
Customer Doc#:		Customer:	Saskatchewan I	ncil (SRC)	
Title:	END STATE D	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPO	OKE-2

U-910011-FM-001 Rev. 4					Ref Pi	rocedure NU-9100	1-PRO-00
Section C: Radiologic	al Details						
	toring required such as tritium	samples, g	amnia spert	troscopy or la	quid scintillatio	on Yes	M Ne
f Yes, give details or atta	ch results of analyses: n/a				-		
Vere all of the exterior at No, provide details: n/a	nd Interior surfaces monitored i	?		⊠ Yes	□ No	6 - CONTROL STATE	_
or items fit in the Sma	Il Article Monitor (SAM)						
or item(s) placed in SAM	4. did it "Clear" the SAM?	☐ Yes	□ No	If No. press	ride details: n/	a (no SAM on sit	e)
or items do not fit in t	he Small Article Monitor (SAN	1)		-			
old large area Musslinn(s	s) cleared the SAM?	☐ Yes	□ No	II No. prov	ride details: n/a	a [no SAM on sit	e)
Vas the gamma cose rate	e measured below background?	⊠ Yes	□ No	If No. prov	dde details:		
B-D-director							
ection D: Health Ph	red by Radiation Protection Sur ediately after the item(s) have ysicist and Radiation Prote	ection Pro	oved for rist ogram Aut	ioval. hority App	roval	Date	•
notection Surveyors ince surveys are completed Radiation Area from ection D: Health Ph Tuble 1: Maximus	ediately after the item(s) have ysicist and Radiation Prote n Surveyed Values for Unrestric	ection Pro	ogram Aut Table 2	ioval. hority App Maximum Va	roval lues for Unrest Maxim	urkted Use	
rotection Surveyor: ince surveys are comple rom Radiation Area (inno ection D: Health Ph	ediately after the item(s) have ysicist and Radiation Prote	ection Pro	ogram Aut Table 2	ioval. hority App	royal lues for Unrest Maxim (Bg	um Value	
notection Surveyors ince surveys are completed Radiation Area from ection D: Health Ph Tuble 1: Maximus	ediately after the item(s) have solved Radiation Prote sourceyed Values for Unrestric Surface Activity	ection Pro	gram Aut Table 2	ioval. hority App Maximum Va	roval lues for Unrest Maxim	urkted Use	
rotection Surveyor: ince surveys are completed Radiation Area innu- ection D: Health Ph Table 1: Maximus Radionuclide	ysicist and Radiation Prote n Surveyed Values for Unpestric Surface Activity (Bq/cm²)	ection Proceed Use	gram Aut Table 2 Radi β/γ	hority App Maximum Va unuclide	roval lues for Unrest Maxim (Bq Tntal	um Value (/cm²) Removable	

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Nuclear Project#:	655352	Contract#	255095	Page	180 of 201
Customer Doc#.		Customer:	Saskatchewan	Research Cou	ncil (SRC)
Title:	END STATE D	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPO	KE-2



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Unconditional Nu-910011-FM-001 Re	al Release Fo	rm		Ref.	Page 1 of
			File No.:		1-035-000
Section A: Validi	ty Information				
2 metal brackets, fra oox and separate bo adiation detector a	quipment or Material ame of water purifica ix from water purifica nd attached readout tier rack, woud and w	tion system,pipe with ition system, unit with cables,	ldentification Numb	er (crate or tool) .3	N/A
. Reason for Requi	est Recycle/landfill				
. Transfer Request			2.4	۸.,	
		ulpmeni or material a	l any time been:		
Contar	ninated?		Yes 🖾 No		
	r stored in a containir nrough a decontamina		Yes No		
Loose Contamination	Survey Instrument	Rackground (cpm)	Large Area Masslinn Contamination above background?	If Yes, 100 cm ² sample: Survey Instrument	Net Counts c Gross-Background (cpm)
β/γ emitters	2929	80	☐ Yes 🗵 No	_	Ø
a emitters	2929	0	☐ Yes ⊠ No	-	ø
Fixed	Sur	vey Instrument	Backgroun (cpm)	nd	NET Counts = Gross-Background (cpm)
β/y emitters	s	4393	230		0
a emitters		4393	0		0

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		20011	147-01000-200	11-002	1101.
Nuclear Project#;	655352	Contract#:	255095	Page:	181 of 201
Customer Doc#:		Customer:	Saskatchewan	Research Cour	ncil (SRC)
Title:	END STATE D	ECOMMISSIONIN	NG REPORT FOR	SRC SLOWPO	OKE-2

Doc# 147-01600-ESDP-002

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Il No, provide detalls: All accessible surfaces

Page 2 of 2 Ref Procedure NU-910011 PRO-009

NU 910011-FM-001 Ray 4

Section C: Radiological Details Was any additional monitoring required such as tritium samples, gamma spectroscopy in liquid scintillation ☐ Yes ☒ No counting? If Yes, give details or attach results of analyses Yes No Were all of the exterior and interior surfaces monitored?

For items fit in the Small Article Monitor (SAM)				
For item(s) placed in SAM, did it "Clear" the SAM?		Yes	□ No	If No. provide details: It/a (no SAM on site)
For items do not fit in the Small Article Monitor (SAM)			
Old large area Massinn(s) cleared the SAM?		Ves	□ No	If No. provide details: n/a (no SAM on site)
Was the gamma dose rate measured helow background?	\boxtimes	Yes	D. No	If No. provide details:

Group 1 Radiation Protection Surveyor: Once surveys are completed by Radiation Protection Surveyor, Equipment or Marerial from Radiation Area immediately after the item(s) have been approved for removal. Date.

Section D: Health Physicist and Radiation Protection Program Authority Approval

Table 1: Maximum Surveyed Values for Unrestricted Use Table 2: Maximum Values for Unrestricted Use

Radionuclide	Surface (Bq	e Activity /cm²]
	Total	Ø
B/y emitters	Removable	0
	Total	Ø
a emitters	Removable	Ø

Radionuclide		um Value
	Total	Removable
fl/y emiliters	3.0	0.3
a emitters	Б О	0.03

Are the results from Table 1 Less than the values given in Table 2?		Yes	Removal of item is approved
		No	Removal of item is rejected, notify owner from Section A

Program Authority	2.	
Section E: Facility Manager Approval	7 11 91 7	
Facility Manager		-

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Nuclear Project#	655352	Contract#_	255095	Page.	182 of 201
Customer Doc#:		Customer:	Saskatchewan I	Research Cou	ncil (SRC)
Title;	END STATE D	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPO	OKE-2

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ALL-STORY I-FALOST Res. 4

NO-6 105 11-1 MINDS I NEW 4		Ref, Procedure NJ 910011-PRO-009
	File No.:	NU-910011-035-000
Section A: Validity Information		
 Description of Equipment or Material: Six (6) 9000 lbs concrete shielding blocks plus two (2) wheeled side attachments and handles 	Identification N	lumber (crate or tool): N/A
2. Reason for Request: Remove blocks from site in order of	in decommission the Sl	IC SLOWPOKE Z reactor
3. Law Kasamalanda a Ramana		

3. Last Known Location of Equipment or Material (brief history): Zone 1 - awaiting removal from SRC building. The concrete blocks, side attachments, and handles were previously in room 146 (used as cover for the reactor).

				-24 A		
F Transfer Roque	sted by: Name					
ection B: Radio	ological Assessment					
to the best of your	knowledge, has the equ	ipment or materia	lat any time	becin		
Conta	minated?		Yes 0	No No		
Used	or stored in a contamina	ited area?	Yes D	No.		
Been	through a decontaminat	init process?	Yes [3 No		
Loose Contamination	Survey Instrument	Background (cpm)	Cont	rge Area assilina amination above kground?	If Yes, 100 cm ² sample: Survey Instrument	Net Counts = Gross-Background (cpm)
β/γ emitters	Ludlum 2360 with 43-93 detector	201	☐ Yes	-		0
a emitlers	Ludium 2360 with 43-93 decector	O	☐ ¥es	⊠ Na		0

Fixed	Survey Instrument	Background (cpm)	NET Counts = Gross-Background (com)
β/y emitters	Ludlum 2360 with 43-93 detector	501	40
a emitters	Ludlom 2360 with 43-93 detector	C	3

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		Doc#:	147-01600-ESD	R-002	Rev.	0
Nuclear Project#.	655352	Contract#.	255095	Page:	183 of	201
Customer Doc#:		Customer.	Saskatchewan	Research Cour	ncil (SRC	;)
Title:	END STATE DI	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPO	KE-2	

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NU-9100111-FM-001 Rev. 4

Page 2 of 2 Ref. Procedure NU-610311-PRO-309

counting?	Itoring required such						Yes	⊠ No
If Yes, give details or are	ach results of analyses	s: n/a						
Were all of the exterior		monitored?			∀es	☐ No		
f No. provide details: n/	а	effective to the						
or items fit in the Sma	ıll Article Monitor (S	iam)						
or item(s) placed in \$A	M, did it "Clear" the SA	AM'	☐ Yes	□ No	If No. prov	ide details: n/	a (literus are tou la	rge for
or items do not fit in t	he Small Article Mon	nitor (SAM)			1 many			
iil large area Massiliin(s) cleared the SAM!		Yes Yes	∑ No	tf No, prov	lde details: n/	a (no SAVI on site))
Vas the gamma dose rut	a measured below bac	ckground?	⊠ Yes	□ No	If No. prov	ide details:		
and the distance				^				
roup 1 Radiation rotection Surveyor:								
nce surveys are comple	red by Radiation Brot	ection East	Out Face	menant or 1	Catamia much	so nameus d		
	Ken by Registron F100	ERABITION SHAPPY		pmentariv	ta cersa) must i	ne removed	Date:	
om Radiation Area Ima	rediately after the iten	m(s) have be	en appro	wed for rem	uval.		LAMES:	_
om Radiation Area lina		m(s) have be	en appro	wed for rem			Date:	
om Radiation Area lina		m(s) have be	en appro	wed for rem		oval	Date:	
om Radiation Area Ima		n(s) have be	en appro	wed for rem igrain Aut	hority Appi	oval Les for Unrea		
om Radiation Area Ima	ysicist and Radiati	n(s) have be	en appro	wed for rem igrain Aut	hority Appi	ues for Unrea	ricted Use	
om Radiation Area Ima ection D: Health Pi Table 1: Maximu	ysicist and Radiati	n(s) have be ion Protect r Unrestricte	en appro	red for rem gram Aut Table 2:	hority Appi Maximum Val	ues for Unrea Maxim	tricted Use	
om Radiation Area Ima	ysicist and Radiati in Surveyed Values for	n(s) have be lan Protect r Unrestricte Activity	en appro	red for rem gram Aut Table 2:	hority Appi	ues for Unrea Maxim	ricted Use	
ction D: Health Pi Table 1: Maximu Radionucide	ysicist and Radiati in Surveyed Values for Surface A	n(s) have be lan Protect r Unrestricte Activity	en appro	gram Aut Table 2:	hority Appi Maximum Val	ues for Unrea Maxim (Bo Total	ricted Use can Value (/cm²) Removable	
om Radiation Area Ima ection D: Health Pi Table 1: Maximu	Surface A (Eq/c) Total Removable	Ion Protect r threstricte Activity 2021 0	en appro	gram Aut Table 2:	hority Appi Maximum Val	ues for Unrea Maxim (8)	ricted Use am Value 1/cm²)	
om Radiation Area Inst ection D: Health Pi Table 1: Maximu Radionucide	Surface A (Eq/or Total Removable foral	n(s) have be Ion Protect r threstricte Activity 2021 0 0.003	en appro	gram Aut Table 2: Radi: β/γ3	hority Appi Maximum Val	ues for Unrea Maxim (Bo Total	ricted Use can Value (/cm²) Removable	
ection D: Health Pi Table 1: Maximu Radionucide	Surface A (Eq/c) Total Removable	Ion Protect r threstricte Activity 2021 0	en appro	gram Aut Table 2:	Maximum Val	Maxim (8) Total 3.0	ricted Use time Value 1/cm²) Removable 0.3	
em Radiation Area Ima ection D: Health Pi Table 1: Maximu Radionuclide B/y emitters aremitters	Surface A (Bq/c Total Removable Total Removable	n(s) have be ion Protect r timestricte Activity 20051 0 0.003 0	Mon Pro	gram Aut Table 2: Radii β/γ4	Maximum Val enuclide enuclide enuclide	ues for Unrea Maxim (Bo Total 3.0 0.3	ricted Use time Value 1/cm²) Removable 0.3	
em Radiation Area ima ction D: Health Pi Table 1: Maximu Radionuclide β/γ emitters a emiliters Are the results from Tak	Surface A (Bq/c Total Removable Total Removable	n(s) have be ion Protect r timestricte Activity 20051 0 0.003 0	Mon Pro	gram Aut Table 2: Radii β/γ3 a ea	Maximum Val enuclide enuclide enuclides mitters mitters	Les for Unrea Maxim (Bo Total 3.0 0.3	ricted Use am Value //cm²) Removable 0.3 0.03	
ection D: Health Pi Table 1: Maximu Radionucide β/γ emitters a emitters Are the results from Tak given in	Surface A (Eq/c) Total Removable Total Removable Total Removable	n(s) have be ion Protect r timestricte Activity 20051 0 0.003 0	Mon Pro	gram Aut Table 2: Radii β/γ3 a ea	Maximum Val enuclide enuclide enuclides mitters mitters	Les for Unrea Maxim (Bo Total 3.0 0.3	ricted Use time Value 1/cm²) Removable 0.3	
ection D: Health Pi Table 1: Maximu Radionuclide β/y emitters a emiliters Are the results from Tab given in	Surface A (Eq/c) Total Removable Total Removable Total Removable	n(s) have be ion Protect r timestricte Activity 20051 0 0.003 0	Mon Pro	gram Aut Table 2: Radii β/γ3 a ea	Maximum Val enuclide enuclide enuclides mitters mitters	Les for Unrea Maxim (Bo Total 3.0 0.3	ricted Use am Value //cm²) Removable 0.3 0.03	
ection D: Health Pi Table 1: Maximu Radionuclide β/y emitters # emitters Are the results from Tat given in Insite Health Physicise of Radiation Safety	Surface A (Eq/c) Total Removable Total Removable Total Removable	n(s) have be ion Protect r timestricte Activity 20051 0 0.003 0	Mon Pro	gram Aut Table 2: Radii β/γ3 a ea	Maximum Val enuclide enuclide enuclides mitters mitters	Les for Unrea Maxim (Bo Total 3.0 0.3	ricted Use am Value //cm²) Removable 0.3 0.03	
om Radiation Area Ima ection D: Health Pi Table 1: Maximu Radionuclide B/y emitters diemliners Are the results from Tab given in unito Health Physicist of C Radiation Safety ficer ellation Protection	Surface A (Eq/c) Total Removable Total Removable Total Removable	n(s) have be ion Protect r timestricte Activity 20051 0 0.003 0	Mon Pro	gram Aut Table 2: Radii β/γ3 a ea	Maximum Val enuclide enuclide enuclides mitters mitters	Les for Unrea Maxim (Bo Total 3.0 0.3	ricted Use am Value //cm²) Removable 0.3 0.03	
m Radiation Area Ima colion Dr. Health Pi Table 1: Maximu Radionuclide β/y emitters a emiliters a emiliters cre the results from Tab given in into Health Physicist on C Radiation Safety ficer collation Protection	Surface A (Eq/c) Total Removable Total Removable Total Removable	n(s) have be ion Protect r timestricte Activity 20051 0 0.003 0	Yes Ro	gram Aut Table 2: Radii β/γε a es	Maximum Val enuclide enuclide enuclides mitters mitters	Les for Unrea Maxim (Bo Total 3.0 0.3	ricted Use am Value //cm²) Removable 0.3 0.03	
m Radiation Area Ima cotion D: Health Pi Table 1: Maximu Radionuclide β/γ emitters a emitters a emitters continue iterate Physicise of C Radiation Safety ficer collation Protection operan Authority	Surface A (Eq/or Total Removable Total Removable of the Less than the val.	n(s) have be ion Protect r timestricte Activity 20051 0 0.003 0	Yes Ro	gram Aut Table 2: Radii β/γ3 a ea	Maximum Val enuclide enuclide enuclides mitters mitters	Maxim (Bo Total 3.0	ricted Use am Value //cm²) Removable 0.3 0.03	
m Radiation Area Ima ection D: Health Pi Table 1: Maximu Radionuclide β/γ emitters a emitters a emitters continue Health Physicise of Radiation Safety ficer eliation Protection param Authority ection E: Facility Ma	Surface A (Eq/or Total Removable Total Removable of the Less than the val.	n(s) have be ion Protect r timestricte Activity 20051 0 0.003 0	Yes Ro	gram Aut Table 2: Radii β/γε a es	Maximum Val enuclide enuclide enuclides mitters mitters	Maxim (Bo Total 3.0	ricted Use am Value //cm²) Removable 0.3 0.03	
ection D: Health Pi Table 1: Maximu Radionuclide β/γ emitters a emitters	Surface A (Eq/or Total Removable Total Removable of the Less than the val.	n(s) have be ion Protect r timestricte Activity 20051 0 0.003 0	Yes Ro	gram Aut Table 2: Radii β/γε a es	Maximum Val enuclide enuclide enuclides mitters mitters	Maxim (Bo Total 3.0	ricted Use am Value //cm²) Removable 0.3 0.03	

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Nuclear Project#:	655352	Contract#:	255095	Page:	184 of 201
Customer Doc#:		Customer:	Saskatchewan	Research Cou	ncil (SRC)
Title:	END STATE DE	ECOMMISSIONIN	G REPORT FOR	SRC SLOWPO	OKE-2

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Page 1 of 2

NU-010011-FM 001 Rev 4		Ref. Frocedure NU-910011-PRO-009
	File No.:	NU-910011-035-000
Section A: Validity Information	THE REAL PROPERTY.	The state of the s
1. Description of Equipment or Material MISC. ITCHS, 2 RADIH TION I ELECTRICAL BOX, DESK, CA	HALL MOUNT SE BLE TRAYS (8), M	TECTORS, CIGENTEC YOUTOR, VALVES, RML-200 YOUTOR, VALVES, PETECTOR
2. Reason for Request: RECYCLE	LANDFILL	
3 Last Known Location of Equipment or Material (SRC SLOW	brief history): I POKE FACILITY	/

4. Transfer Requests Section B: Radiol		Non-			1,24.
		uipment or material a	t any time been:		
	unated?	П	Yes 🕱 No		
Used or	r stored in a contamir	nated area?	Yes 🗌 No		
Been th	rough a decontamina	ation process?	Yes 🛣 No		
Loose Contamination	Survey Instrument	Hackground (cpm)	Large Area Masslinn Contamination above background?	If Yes, 100 cm ² sample: Survey Instrument	Net Counts - Gross-Background (cpm)
B/y emitters	2929	.88	Yes 🔀 No	no.	Φ
α emitters	2929	D	☐ Yes 💢 Nu	-	P
		vey Instrument	Backgroun (cpm)	d =	NET Counts Gross-Background (cpm)
-		11000	710		r K

Fixed	Survey Instrument	Background (cpm)	NET Counts = Gross-Background (cpm)
B/y emitters	4393	228	50
a enitters	4393	Ø	2

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		Doc#:	147-01600-ESDR-002		Rev 0
Nuclear Project#:	655352	Contract#.	255095	Page:	185 of 201
Customer Doc#:		Customer	Saskatchewan Resea	rch Cou	ncil (SRC)
Title:	END STATE D	ECOMMISSIONIN	NG REPORT FOR SRC	SLOWPO	DKE-2

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Page 2 of 2

Vas any additional moni punting?	toring required su	uch as Iritium i	samples, ga	inima spect	ruscopy or lic	quid scintillatio	n Yes	No No
f Yes, give details or atta	ch results of analy	/ses:						
Were all of the exterior a					☐ Yes	₩ No	,	
If No, provide details A	11 accessib	K area	s che	cked	, NOT /	USIDE V	alve	
For items fit in the Sma						-		
For item(s) placed in SAN	d, did it "Clear" the	e SAM7	Yes	≥ No	If No. prov	lde details n/a	(no SAM on site))
For items do not fit in th	he Small Article !	Monitor (SAM	1)					
Old large area Masslinn(s	s) cleared the SAM	1?	☐ Yes	₩ No	If No. prov	ide details n/a	(no SAM oo site)	
Was the gamina dose rati	e measured below	hackground?	X Yes	□ No	If No. prov	ide details		
Group 1 Radiation Protection Surveyor.								
Once surveys are comple	ted by Radiation I	Protection Sur	veyor, Equ			be removed	Date:	
			been appro	wed for ren	ioval			-
rom Radiation Area imm	nediately after the	item(s) have t				royal		
rom Radiation Area (mm Section D: Health Ph	ysicist and Rad	item(s) have t	ction Pro	ogram Aut	thority App		ricted Use	
From Radiation Area (mm Section De Health Ph	nediately after the	item(s) have t	ction Pro	ogram Aut	thority App	royal lues for Unrest	pricted Use	
rom Radiation Area (mm Section D: Health Plo Table 1: Maximus	nediately after the ysicist and Rad in Surveyed Value	item(s) have t	ction Pro	Table 2	thority Appi Maximum Va	lues for Unrest Maxim	um Value	
rom Radiation Area (mm Section D: Health Ph	ysicist and Rad in Surveyed Value	item(s) have t	ction Pro	Table 2	thority App	lues for Unrest Maxim (Bu	um Value [/tm²)	
rom Radiation Area (mm Section D: Health Ph Table 1: Maximus	ysicist and Rad in Surveyed Value Surfa (E	item(s) have b liation Prote s for Unrestric sce Activity 3q/cm ²)	ted Use	Table 2	thority App Maximum Va conuclide	lues for Unrest Maxim (Bo	num Value (/cm²) Removable	
rom Radiation Area (mm Section D: Health Plo Table 1: Maximus	ysicist and Rad in Surveyed Value	item(s) have to the liation Protest for Unrestrice Activity	ted Use	Table 2	thority Appi Maximum Va	lues for Unrest Maxim (Bu	um Value [/tm²)	
rom Radiation Area (mm Section D: Health Ph Table 1: Maximus Radionuclide B/y emitters	ysicist and Rad in Surveyed Value Surfa (E	item(s) have b liation Prote s for Unrestric sce Activity 3q/cm ²)	ted Use	Radi	Maximum Va	Maxim Maxim (Bu Total 3.0	Removable	
rom Radiation Area (mm Section D: Health Ph Table 1: Maximus Radinnuclide	ysicist and Rad in Surveyed Value Surfa (E Total Removable	item(s) have to litem(s) have to litem(s) have to litem s for University and ce Activity aq/cm²)	ted Use	Radi	thority App Maximum Va conuclide	lues for Unrest Maxim (Bo	num Value (/cm²) Removable	
From Radiation Area (mm Section 0: Health Ph Table 1: Maximus Radianuclide B/y emitters	ysicist and Rad in Surveyed Value Surfa (E Total Removable Total	item(s) have to the faction Protests for Universities for Universities and the fact Activity Bq/cm²) O. 063 Ø 0.002	ted Use	Radi	Maximum Va	Maxim Maxim (Bu Total 3.0	Removable	
From Radiation Area imm Section D: Health Ph Table 1: Maximus Radianuclide B/y emitters a emitters Are the results from Tal	Surface Total Removable Total Removable Total Removable Total	item(s) have to protect the second se	ted Use	Radie 2	Maximum Va	Maxim (Bu Total 3.0	Removable	
From Radiation Area imm Section D: Health Ph Table 1: Maximus Radianuclide B/y emitters a emitters Are the results from Tal	ysicist and Rad in Surveyed Value Surfa (E Total Removable Total Removable	item(s) have to protect the second se	red Use	Radie 2 Radie 3 Radie 6/7	Maximum Va	Maxim (Bu Total 3.0	Removable	
From Radiation Area imm Section 0: Health Ph Table 1: Maximus Radianuclide B/y emitters a emitters Are the results from Talgiven in	Surface Total Removable Total Removable Total Removable Total Removable Total Removable	item(s) have to protect the second se	red Use	Radie 2 Radie 3 Radie 6/7	Maximum Va	Maxim (Bu Total 3.0	num Value (/cm²) Removable 0.3	
From Radiation Area imm Section D: Health Pir Table 1: Maximum Radianuclide β/y emitters α emitters Are the results from Tal given in Candu Health Physicist of SRC Radiation Safety	Surface Total Removable Total Removable Total Removable Total Removable Total Removable	item(s) have to protect the second se	red Use	Radie 2 Radie 3 Radie 6/7	Maximum Va	Maxim (Bu Total 3.0	num Value (/cm²) Removable 0.3	
From Radiation Area imm Section D: Health Pla Table 1: Maximum Radianuclide β/y emitters α emitters Are the results from Tal given in Candu Health Physicist of SRC Radiation Safety Officer	Surface Total Removable Total Removable Total Removable Total Removable Total Removable	item(s) have to protect the second se	red Use	Radie 2 Radie 3 Radie 6/7 Removal of II	Maximum Va	Maxim (Bu Total 3.0	num Value (/cm²) Removable 0.3	
rom Radiation Area (mm Section D: Health Pir Table 1: Maximum Radianuclide B/y emitters a emitters Are the results from Tal given in Candu Health Physicist of SRC Radiation Salety Officer Radiation Protection	Surface Total Removable Total Removable Total Removable Total Removable Total Removable	item(s) have to protect the second se	red Use	Radie 2 Radie 3 Radie 6/7 Removal of II	Maximum Va	Maxim (Bu Total 3.0	num Value (/cm²) Removable 0.3	
Radiation Area imm Section 0: Health Ph Table 1: Maximus Radianuclide β/y emitters α emitters Are the results from Tal given in Candu Health Physicist of SRC Radiation Safety Officer Radiation Protection Program Authority	Surface of Surveyed Value Surveyed Value Surfa (E Total Removable Total Removable Total Removable Total Removable	item(s) have to litem(s) have to litem(s) have to litem Protest so for Universities are Activity 3q/cm²) O. 063 O. 002 Ø e values	Yes R	Radie 2 Radie 3 Radie 6/7 Removal of II	Maximum Va	Maxim (Bu Total 3.0	num Value (/cm²) Removable 0.3	
From Radiation Area imm Section 0: Health Ph Table 1: Maximus Radianuclide β/y emitters α emitters Are the results from Tal given in Candu Health Physicist of SRC Radiation Safety Officer Radiation Protection Program Authority	Surface of Surveyed Value Surveyed Value Surfa (E Total Removable Total Removable Total Removable Total Removable	item(s) have to litem(s) have to litem(s) have to litem Protest so for Universities are Activity 3q/cm²) O. 063 O. 002 Ø e values	Yes R	Radie 2 Radie 3 Radie 6/7 Removal of II	Maximum Va	Maxim (Bu Total 3.0	num Value (/cm²) Removable 0.3	
rom Radiation Area (mm Section D: Health Pl Table 1: Maximum Radianuclide β/y emitters α emitters Are the results from Tal given in Candu Health Physicist of SRC Radiation Safety Officer Radiation Protection Program Authority Section 3: Pacility Maximum Section 3: Pacility Maximum Processing Authority	Surface of Surveyed Value Surveyed Value Surfa (E Total Removable Total Removable Total Removable Total Removable	item(s) have to litem(s) have to litem(s) have to litem Protest so for Universities are Activity 3q/cm²) O. 063 O. 002 Ø e values	Yes R	Radie 2 Radie 3 Radie 6/7 Removal of II	Maximum Va	Maxim (Bu Total 3.0	num Value (/cm²) Removable 0.3	
From Radiation Area imm Section 0: Health Ph Table 1: Maximus Radianuclide β/y emitters α emitters Are the results from Tal given in	Surface of Surveyed Value Surveyed Value Surfa (E Total Removable Total Removable Total Removable Total Removable	item(s) have to litem(s) have to litem(s) have to litem Protest in the state of the	Yes R	Radie 2 Radie 3 Radie 6/7 Removal of II	Maximum Va	Maxim (Bu Total 3.0	num Value (/cm²) Removable 0.3	

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Nuclear Project#:	655352	Contract#	255095	Page:	186 of 201
Customer Doc#:		Customer:	Saskatchewan	Research Cou	ncil (SRC)
Title:	END STATE DE	ECOMMISSIONIN	NG REPORT FOR	SRC SLOWPO	OKE-2

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Unconditiona	al Release For	rm			Page 1 of
NU-910011-FM-001 Re	4.4			R	tel. Procedure NU-910011-PRO-00
		F	Tile No :	NU-910	0011-035-000
Section A: Validi	ty Information				
Description of Ec	quipment or Material		Identification Numb	er (crate or tool): N/A
Pool La	ater purif	fication sy	stem.		
2. Reason for Requi	To be ? Facilit	ransferre	of to RA	ic sta	weeke
L. Last Known Loca	tion of Equipment or	Material (brief history	Facility		
i. Transfer Request	ed by: Name:		11	l.	
Section B: Radio	ogical Assessmen				
To the best of your k	nowledge, has the eq	uipment or material at	any time been		
	ilnated?		Yes 🔀 No		
	stored in a contamir		Yes No		
Been U	rough a decontamina	ation process? 💹	Yes L No		
Loose Contamination	Survey Instrument	Rackground (cpm)	Large Area Masslinn Contamination above inckground?	EYes, 100 sample: Survey Instrume	× Gross Background
β/γ emitters	4393	143	☐ Yes ☑ No	-	Ø
a emitters	4393	3	Yes 🛭 No	-	ø
Fixed	Sur	vey Instrument	Backgrout (cpm)	nd	NET Counts = Gross-Background [cpm]
β/γ emitter	s	4393	143		0,
a emitters		11293	2		16

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		D00#.	147-01000-E30	K-002	Rev. U
Nuclear Project#:	655352	Contract#:	255095	Page:	187 of 201
Customer Doc#:		Customer.	Saskatchewan	Research Cou	ncil (SRC)
Title.	END STATE D	ECOMMISSIONIN	IG REPORT FOR	SRC SLOWPO	OKE-2

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Page 2 of 2

NU-910011-FM-001 Rev. 4

Ref Procedure NU-910011-PRO-009

counting?						Yes 🔯
lf Yes, give desalls on atta	ch results of analys	ies				
Were all of the exterior a	nd interior surfaces	s monitored?		Yes		
f No, provide details:	TENIOR IF P	WES, PUNK	£ F11.7	RHTIUN-	TANKS A	ST ACCESSIBLE
For Items fit in the Sma	ll Article Monitor	(SAM)				
For Rem(s) placed in SAI	M, did it "Clear" The	SAM? YES	⊠ Na	If No. prov	ide details: n/a	(no SAM on site)
For Items do not fit in t	he Smati Article M	ontror (SAM)				
Did large area Masslinn(s) cleared the SAM7	☐ Yes	₩ No	If No. prov	ide details n/a	(no SAM nn site)
Was the gamma dose rat	e measured below t	background? 🔀 Yes	□ No	II No. prov	ide detalls	
Group 1 Radiation						
Protection Surveyor:						
Once surveys are comple					be removed	Date:
rom Rad ation Area imm	nediately after the il	tem(s) have been appr	oved for ren	10 V#1.		
Section D: Health Ph		ation Protection Profession Profession Protection Profession Protection Prote			rovel lues for Unrest	ricted Use
Section D: Health Ph	m Surveyed Values	for Unrestricted Use	Table 2:		lues for Unrest Maxim	ricted Use um Value /cm²)
Section D: Health Ph Table 1. Maximu	m Surveyed Values Surfac (He	for Unrestricted Use te Activity q/cm ²)	Table 2:	Maximum Va	lues for Unrest Maxim	um Value
Section D: Health Ph Table 1. Maximu	m Surveyed Values	for Unrestricted Use e Activity q/cm ²]	Table 2:	Maximum Va	lues for Unrest Maxim (Bq	um Value /cm²)
Radionuclide B/y emitters	Surveyed Values Surfac (Ho	for Unrestricted Use te Activity q/cm ²)	Radi	Maximum Va anuclide emitters	Jues for Unrest Maxim (8q Tutal	um Value /cm²) Removahir
Section D: Health Ph Table 1. Maximu Radionuclide	Surfac Surfac (He Total Removable	for Unrestricted Use e Activity q/cm ²) Ø	Radi	Maximum Va	lues for Unrest Maxim {Bq Tutal	um Value /cm²) Removahle
Section D: Health Ph Table 1: Maximu Radionuclide B/y emitters α emitters	Surveyed Values Surfac (He Total Removable Total Removable	for Unrestricted Use te Activity q/cm²) Ø	Radi	Maximum Va onuclide emitters mitters	Maxim (Bq Tutal 3.0	um Value /cm²) Removahir
Section D: Health Ph Table 1: Maximu Radionuclide B/y emitters α emitters	Surfac (He Total Removable Total Removable	for Unrestricted Use re Activity q/cm²] Ø Ø Ø values □ Yes	Table 2: Radi β/γ- α c	Maximum Va onuclide emitters mitters	Maxim (Bq Tutal 3.0 0.3	um Value /cm²) Removahlr 0.3
Section D: Health Ph Table 1. Maximu Radionuclide B/y emitters α emitters	Total Removable Total Removable Total Removable Total Removable	for Unrestricted Use te Activity q/cm²) Ø	Table 2: Radi β/γ- α c	Maximum Va onuclide emitters mitters	Maxim (Bq Tutal 3.0 0.3	um Value /cm²) Removahir
Section D: Health Ph Table 1: Maximu Radionuclide B/γ emitters α emitters Are the results from Tagiven in	Total Removable Total Removable Total Removable Total Removable	for Unrestricted Use re Activity q/cm²] Ø Ø Ø values □ Yes	Table 2: Radi β/γ- α c	Maximum Va onuclide emitters mitters	Maxim (Bq Tutal 3.0 0.3	um Value /cm²) Removahlr 0.3
Radionuclide B/y emitters α emitters Are the results from Tagiven in Candu Health Physicist of SRC Radiation Safety Officer	Total Removable Total Removable Total Removable Total Removable	for Unrestricted Use re Activity q/cm²] Ø Ø Ø values □ Yes	Table 2: Radi β/γ- α c	Maximum Va onuclide emitters mitters	Maxim (Bq Tutal 3.0 0.3	um Value /cm²) Removahlr 0.3
Radionuclide B/y emitters α emitters Are the results from Tagiven in Candu Health Physicist of SRC Radiation Safety Officer Radiation Protection	Total Removable Total Removable Total Removable Total Removable	for Unrestricted Use re Activity q/cm²] Ø Ø Ø values □ Yes	Table 2: Radi β/γ- α c	Maximum Va onuclide emitters mitters	Maxim (Bq Tutal 3.0 0.3	um Value /cm²) Removahlr 0.3
Radionuclide B/γ emitters α emitters Are the results from Tagiven in Candu Health Physicist of SRC Radiation Safety Officer Radiation Protection Program Authority	Surfac (Ital Total Removable Total Removable ble 1 Less than the Table 2?	for Unrestricted Use re Activity a/cm²) d d values Yes No	Table 2: Radi β/γ- α c	Maximum Va onuclide emitters mitters	Maxim (Bq Tutal 3.0 0.3	um Value /cm²) Removahlr 0.3
Radionuclide B/y emitters α emitters Are the results from Tagiven in Candu Health Physicist of SRC Radiation Safety Officer Radiation Protection Program Authority Section E: Facility M.	Surfac (Ital Total Removable Total Removable ble 1 Less than the Table 2?	for Unrestricted Use re Activity a/cm²) d d values Yes No	Table 2: Radi β/γ- α c	Maximum Va onuclide emitters mitters	Maxim (Bq Tutal 3.0 0.3	um Value /cm²) Removahlr 0.3
Section D: Health Ph Table 1. Maximu Radionuclide B/y emitters α emitters	Surfac (Ital Total Removable Total Removable ble 1 Less than the Table 2?	for Unrestricted Use re Activity a/cm²) d d values Yes No	Table 2: Radi β/γ- α c	Maximum Va onuclide emitters mitters	Maxim (Bq Tutal 3.0 0.3	um Value /cm²) Removahlr 0.3

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		Doc#.	147-01600-ESDR-002	2	Rev:	0
Nuclear Project#	655352	Contract#:	255095	Page	188 of	201
Customer Doc#:		Customer:	Saskatchewan Rese	arch Cou	ncil (SRC))
Title:	END STATE D	ECOMMISSIONIN	IG REPORT FOR SRC	SLOWPO	OKE-2	

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NU-910011-FM-001 R	W 4				Rei. Pn	Page 1 c Depoure NU-910011-PRO-C
			Flie No.		NU-910011-	035-000
Section A: Valid	ty Information					
Description of E beams from reactor	quipment or Material: room	3 metal plates, 2-t	Identification	Number (crate	or tool): N/	Α
2. Reason for Requ	est Recycle					
. Last Known Loca and for loading of bi	ation of Equipment or N ins	viaterial (brief histo	ry). Plates and I be	ams were used	d to retrievo	reactor compeners
. Last Known Loca and for loading of bi	ation of Equipment or N	vlaterial (brief histo	ry). Plates and I be	ams were used	d to retrievo	reactor compenents
on to teating of or		Viaterial (brief histo.	ry): Plates and I be		d to retrievo	reactor compenents
. Transfer Request	ed hy: Name;	Material (brief histo	ry): Plates and I be		d to retrieve	reactor compenents
. Transfer Request	ed hy: Name:				d to retrieve	reactor compenents
. Transfer Request	ed hy: Name;				d to retrieve	reactor compenents
Transfer Request cetton B: Radio o the best of your k	ed hy: Name; logical Assessment mowledge, has the equi	ipnient or material	it any time been:		d to retrieve	reactor compeners
cetton B: Radio o the best of your k Contain Used or	ed hy: Name: logical Assessment mowledge, has the equi	ipment or material :	at any time been: Yes ⊠ No		d to retrieve	reactor compeners
cction B: Radio to the best of your k Contain Used on Been th	ed hy: Name: logical Assessment snowledge, has the equi	ipment or material :	at any time been: Yes Mo Yes No	i If Ye	s, 100 cm² ample: urvey trument	Net Counts
cction B: Radio o the best of your k Contain Used or Been th	ed hy: Name: logical Assessment snowledge, has the equi ninated? r stored in a contaminati rough a decontaminati	ipment or material inted area?	et any time been: Yes No Yes No Yes No Large Area Masslinn Contamination	i If Yes	s, 100 cm² ample: arvey	Net Counts = Gross-Dackground

Fixed	Survey Instrument	Background (cpm)	NET Counts = Gross-Background [cpm]
β/y emitters	1393	160	0
a emitters	4393	0	0

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Unconditional Release Form

Page 2 of 2 Ref. Procedure NU-910011 PRO-009

Removable

NU-910011-FM 001 Rev. 4

Section C: Radiological Details		-	01	
Was any additional monitoring required such as tritlum scounting?	amples, ga	ammii spect	roscopy or liquid scintillation	□ Yes ⊠ No
If Yes, give details or attach results of analyses:				
Were all of the exterior and interior surfaces monitored?			⊠ Yes □ No	
If No, provide details:				
For items fit in the Small Article Monitor (SAM)				
For item(s) placed in SAM, did it "Clear" the SAM?	Yes	□ No	It No, provide details: n/a (no SAM on site)
For Items do not fit in the Small Article Monitor (SAM	1)			
Did large area Masshinn(s) cleared the SAM?	Tes.	□ No	If No. provide details; n/a (no SAM on site)
Was the gamma dose rate measured below background?	⊠ Yes	☐ No	If No. provide details:	
Group 1 Radiation Protection Surveyor:				
Once surveys are completed by Radiation Protection Sur- from Radiation Area Immediately after the Rem[s] have				Date:

Section D: Health Physicist and Radiation Protection Program Authority Approval Table 1: Maximum Surveyed Values for Unrestricted Use Table 2. Maximum Values for Unrestricted Use Maximum Value Surface Activity (Bq/cm²) Radionuclide Radionuclide (Bq/cm²) Total

β/γ emitters	Total Removable	Ø	β/y emitters	30	0.3
	Total	Ø	u emitters	0.3	0.03
a emitters	Removable	Ø	it entities a	0.0	1.110
		X Yes	Removal of item is approv	rad .	
he results from Ta given is	ble 1 Less than the values	50 162	nemeral or nem is approx		from Section 6

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Facility Manager

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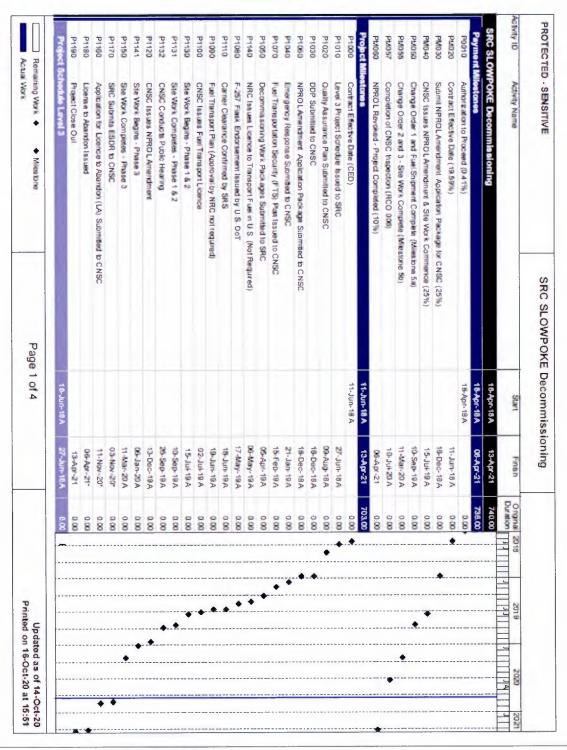
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Nuclear Project#:	655352	Contract#:	255095	Page:	190 of 201	
Customer Doc#:		Customer.	omer: Saskatchewan Research Council (SRC			
Title:	END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2 FACILITY					

Appendix K PROJECT SCHEDULE

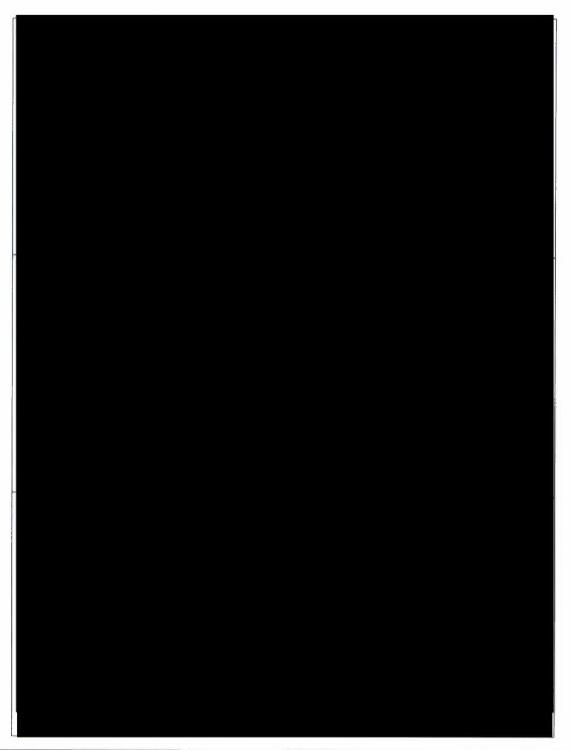
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Nuclear Project#:	655352	Contract#.	255095	Page.	191 of 20
Customer Doc#:	Customer:		Saskatchewan Research Council (SRC)		
Title:	END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2 FACILITY				



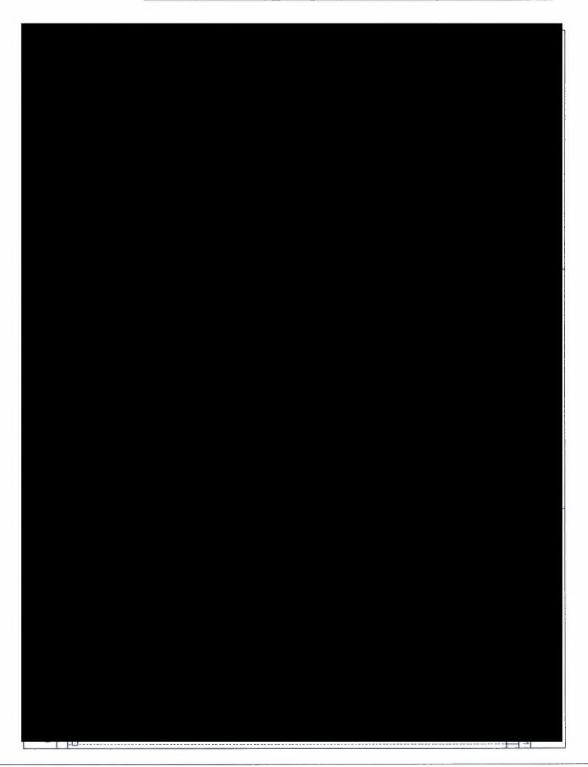
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Nuclear Project#:	655352	Contract#	255095	Page:	192 of	201
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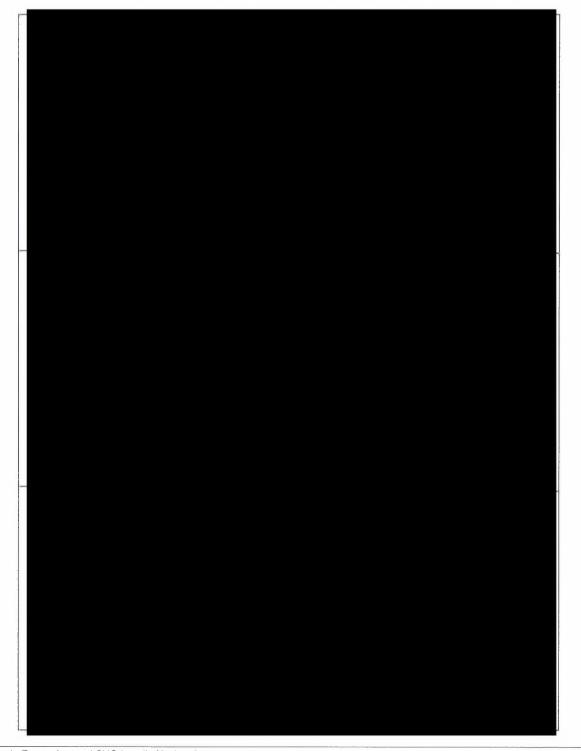
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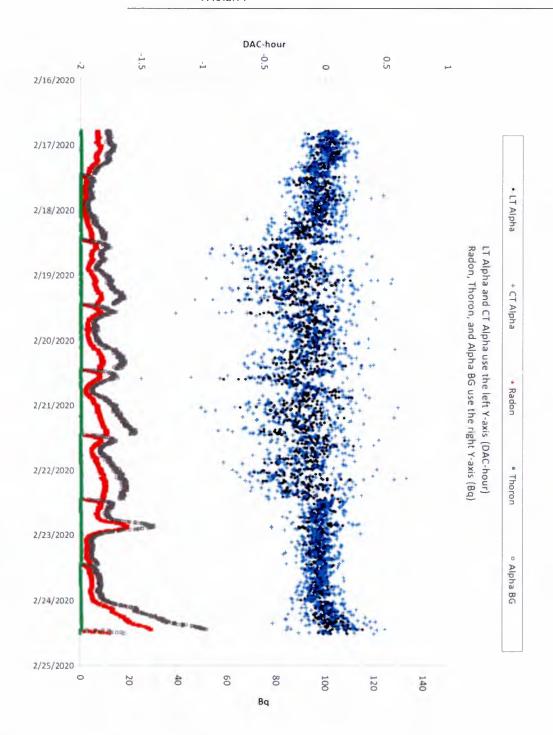
Appendix L ICAM REPORT

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Appendix M
DOSE REPORT

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Occupational Radiation Exposure Report Rapport sur l'exposition aux rayonnements en milieu de travail REPORT NO: 18351 I BEER BEERRERERERER Mirrion Technologies (GDS) Inc. MIRIO 0248743 0248783 0248783 0248783 0248783 0248783 0248783 0248783 0248783 0248783 0248783 0248783 0248783 0248783 CERR CITE DE SUM DU PHOCESSUM REPORT TO: DESTINATARE DU RAPPORT: SASKATCHEWAN RESEARCH COUNCIL GLORIA DRADER - SPARES SASKATOON, SK S7N 2X8 125-15 INNOVATION BLVD OR OTHER DESIGNATION ACTOR APPELLATION WEATER IDENTIFICATION Z ACCOUNT NO: C2349 EMPLACEMENT: 00000SPA SEE REPERSIS SUE FOR COMPLETE REPORT DETAILS BY COLUMN NUMBER VOIR AU VERSO LE DETAIL DU CONERNU DU RAPPORT PAR NUMERO DE COLOU IT IS RECOMMENDED HAT YOU KEEP THIS REPORT FOR YOUR RECORDS I EST RECOMMANDE DE CONSERVER CE RAPPORT DANS VOS DOSSIERIS BADGE TYPE MEDIE BORNET ****** Nison Fechilidades (ODS) Inc. 205, avenue Molaw, invie (CA) 92614 US/ Careda - (MO) 211-USA Entre Lin Careda - (60) 251-3334 Vibriana in 160411-1000 DATE DU RAPPORT SUR LES DOSIMÉTRES DATE DE RÉCEPTION DE 8 DOSMÉTRES : NOTIFICATION LEVELS 10.00 REPORTS APPROVED BY WYLAP SIGNATORY REP 4947_INT 10/01/07 MOISATED NEW MINEAUX D'AVIS MOTES MOTES JUN 4, 2020 07/05/2020 13 50.00 13 GLORIA DRADER - SPARES 125-15 INNOVATION BLVD SASKATOON, SK S7N 2X8 SHIP TO: ADRESSE D'EXPEDITION: SASKATCHEWAN RESEARCH C/S:A 28 NO RPTS AUG RAPP 29 SA VI SQ LNGGG 37 66430 SAVED, 3WL34FT 12000 430 395460 101 Water Street Ħ COUNCIL

Title

FACILITY

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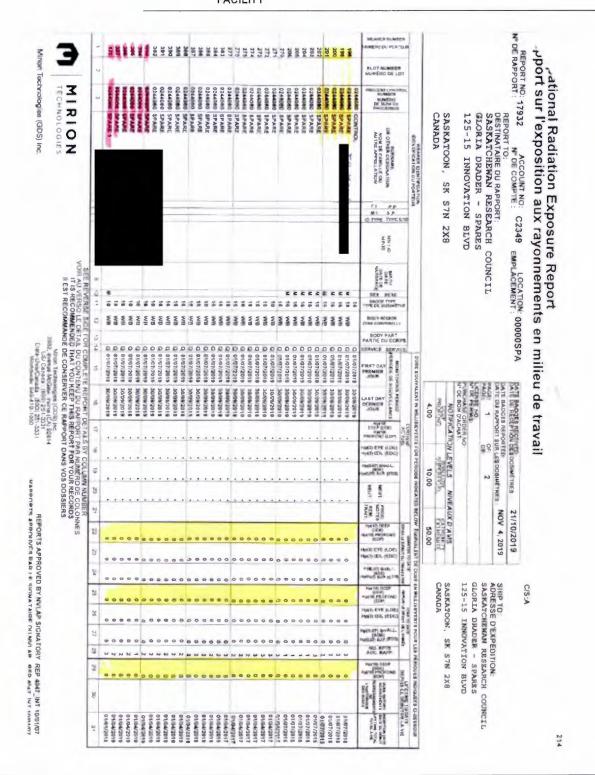
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Customer Doc#: Customer: Saskatchewan Research Council (SRC)

END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2 FACILITY

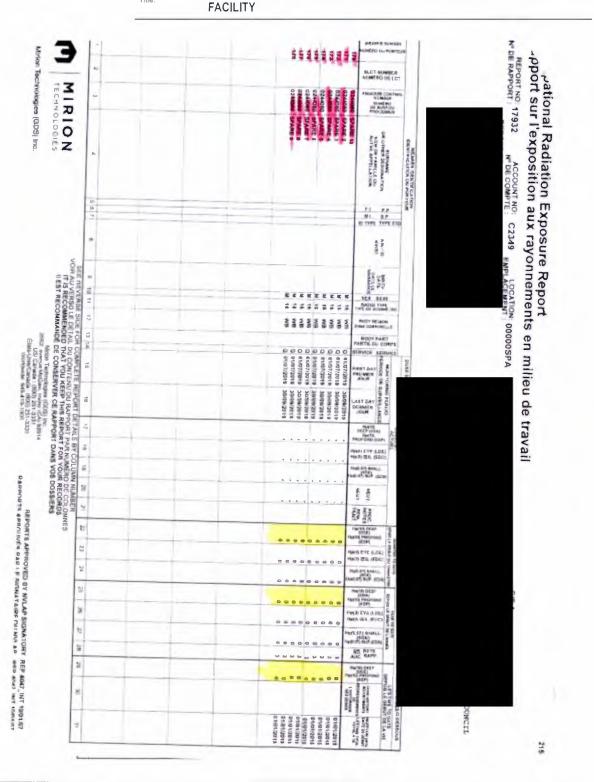
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255095 200 of 201 Nuclear Project#: 655352 Contract#. Page Customer Doc# Saskatchewan Research Council (SRC) Customer. END STATE DECOMMISSIONING REPORT FOR SRC SLOWPOKE-2

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Appendix N PROJECT BUDGET UPDATE SRCSF

Cost Element	Budget	
Labour	\$2,935,000	
Materials	\$763,000	
Equipment	\$178,000	
Waste Management	\$850,000	
Environmental Assessment	\$56,400	
Monitoring	\$178,000	
Administration (e.g., training, safety, project management, government and public liaison	\$1,066,000	
Energy	\$5,926	
Taxes	\$285,500	
Regulatory agency fees	\$0	
Contingency plans	\$348,000	

The actual project cost is less than the budgeted cost.

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