Canada's Nuclear Regulator

CNSC COMPLIANCE INSPECTION REPORT

Inspection Identification No.: SRBT-2017-01

Compliance Inspection: Type II Radiation Protection Inspection

Prepared by: Robert Buhr, Lead Inspector
Nuclear Processing Facilities Division
Directorate of Nuclear Cycle and Facilities Regulation

Report Issuance Date: April 13, 2017

Security Designation: Unclassified

Canadian Nuclear Safety Commission | Commission canadienne de sûreté nucléaire

Canada

This page is left intentionally blank.

CANADIAN NUCLEAR SAFETY COMMISSION
COMPLIANCE INSPECTION
Inspection Identification No.: SRBT-2017-01

Licensee:	SRB Technologies (Canada) Inc.
Licence No.:	NSPFOL-13.00/2022
Facility Inspected:	Pembroke Ontario
Inspection Date(s):	February 16, 2017
Report Issuance Date:	April 13, 2017

Prepared by:

Robert Buhr
Lead Inspector, NPFD

Approved by:

Kavita Murthy
Director, NPFD

Safety and Control Area(s): Radiation Protection

Inspector Accompanied by:

Licensee Staff: Jamie MacDonald – Manager – Health Physics and Regulatory Affairs
Stephane Levesque – President
Ross Fitzpatrick – Vice President

CNSC Staff: Sheri MacDonald – Radiation Protection Specialist

EXECUTIVE SUMMARY

Pursuant to subsection 30(1) of the *Nuclear Safety and Control Act*, Canadian Nuclear Safety Commission (CNSC) staff conducted a Compliance Inspection at SRB Technologies (Canada) Inc. (SRBT) on February 16, 2017. The purpose of the inspection is to verify compliance with regulatory requirements.

The inspection focused on the radiation protection safety and control area (SCA), using compliance verification criteria as defined in SRBT's Licence Conditions Handbook. The inspection methods included interviews, records review, observations and radiological sampling.

CNSC inspectors' preliminary inspection facts and findings were discussed with licensee staff. A Preliminary Inspection Facts and Findings Report was tabled during the closing meeting held on February 16, 2017.

The inspection team found areas of non-compliance, and therefore 1 Directive, 1 Action Notice, and 6 Recommendations have been raised for SRBT to address. The identified enforcement actions do not pose an immediate or unreasonable risk to the health and safety of persons, but improvements are required to address the identified issues.

TABLE OF CONTENTS

Type II Radiation Protection Inspection

1. INTRODUCTION

A Type II inspection of SRB Technologies (Canada) Inc. (SRBT) facility was conducted February 16, 2017.

The licensee was assessed against provisions of the *Nuclear Safety and Control Act* and its associated regulations, the conditions of the SRBT's Licence NSPFOL-13.00/2022 and its accociated Licence Conditions Handbook, as well as applicable facility-specific and programmatic governing documentation.

Criteria for this inspection were derived directly from the set of documents described in the notification letter and compiled into a *Compliance Matrix*, which had been provided to licensee staff prior to the inspection. Observations, interviews, review of recordsand sradiological sampling were undertaken to assess compliance with regulatory requirements.

This report documents the findings and conclusions of the inspection, along with any compliance actions and recommendations arising from these findings. The results of this inspection activity will form part of CNSC staff's evaluation of the licensee's performance.

2. PURPOSE AND SCOPE

The inspection is being conducted as part of the baseline compliance. The purpose of the inspection is to verify compliance with regulatory requirements.

The scope of the inspection was focused on the Radiation Protection safety and control area. The following areas of SRBT's radiation protection program were assessed:

- Application of ALARA
- Worker dose control
- Radiation protection program performance
- Radiological hazard control

3. DESCRIPTION OF INSPECTION METHODS

Four methods of assessment were used during the inspection:

A. Documentation and records review

- Records were verified to be maintained as required by many of the outlined criteria, and a review of selected documents were performed to ensure their accuracy and completeness.

B. Visual assessment and verification

- A physical inspection of the facility with licensee staff was conducted. Observations based on identified compliance criteria were made for verification purposes.

C. Interviews and discussions with licensee staff

- Interviews and discussions with various licensee staff were conducted during the inspection. Questions were posed based on compliance criteria and responses documented for verification purposes.

D. Sampling, testing, and measurements

- Samples, tests, or measurements of radiation or potential contamination were collected during the inspection. Analysis of these measurements is based on current regulatory expectations and compliance criteria.

As per CNSC process, at the conclusion of the field verification portion of the inspection, a *Preliminary Inspection Facts and Findings* report was provided to SRBT representatives. This report was provided for purposes of outlining observations made by the inspection team at an overall level, based on a preliminary review of the criteria set identified in the compliance matrix (Appendix D).

Based on criteria identified in the compliance matrix, regulatory requirements and compliance expectations were determined to be met or not met, and reported as inspection findings. CNSC staff may identify compliance actions and recommendations in relation to an inspection finding. Compliance action definitions are provided in Appendix A.

4. INSPECTION RESULTS

The following findings and subsequent compliance actions and recommendations are the result of CNSC staff's inspection at SRBT. This section of the report has been structured to show the link from the initial inspection finding to the resulting compliance action and/or recommendation as shown below:

- Compliance verification criteria used to identify the deficiency;
- A description of the observed deficiency;
- An analysis linking the compliance verification criteria or regulatory requirement to the observed deficiency; and
- Detailed compliance action or recommendation requiring the licensee to address the deficiency.

The order in which findings are presented in the report does not indicate a ranking of their safety significance.

The findings documented in this report were arrived at by assessing the facts and observations, gathered by CNSC staff during the inspection activities, with the related compliance criteria and

regulatory requirements, as detailed in the compliance matrix. Where improvements are necessary, compliance actions and recommendations have been issued as detailed in this section of the inspection report.

Compliance criteria that was met during the inspection is also listed in the compliance matrix.

4.1 RADIATION PROTECTION

Criteria

- RPR 4 Every licensee shall implement a radiation protection program and shall, as part of that program,

  (*a*) keep the amount of exposure to radon progeny and the effective dose and equivalent dose received by and committed to persons as low as is reasonably achievable, social and economic factors being taken into account, through the implementation of

  (i) management control over work practices,

- CSA standard, N286-12, *Management System Requirements for Nuclear Facilities,* Section 4.7.3 states:

  Documents shall be controlled consistent with intended uses. Control shall include:
  (d) review for adequacy and approval;
  (f) prompt removal of obsolete documents from use.

Fact(s)

In June 2016, a memo to the Health Physic Committee, "Re: Self-Assessment of RMA Returns Processes", identified process changes that had been implemented for the receipt of nuclear substances. These changes were also captured in the July 18, 2016 Health Physics Committee Meeting minutes. It was stated in both that RSO-028 "Receiving Nuclear Substances" would be updated accordingly. As of the time of the inspection, this procedure had not been updated to reflect the new changes.

Analysis/Finding(s)

SRBT self-identified improvements to RSO-028 "Receiving Nuclear Substances" to account for changes to the returns process. These changes to RSO-028 remain outstanding and considered a significant change from the previous instruction.

Compliance Action(s)/Recommendations

Recommendation - SRBT-2017-01-R01: SRBT should update RSO-028 "Receiving Nuclear Substances" in timely manner to account for the significant changes to the returns process.

4.2 RADIATION PROTECTION

Criteria

- RPR 5 (1) For the purpose of keeping a record of doses of radiation in accordance with section 27 of the Act, every licensee shall ascertain and record the magnitude of exposure to radon progeny of each person referred to in that section, as well as the effective dose and equivalent dose received by and committed to that person.

- Dosimetry Service Licence 11341-3-18.0 section 2960-2, The licensee shall report to the Commission or a person authorized by the Commission, as soon as is practicable, the discovery of any inaccuracy or incompleteness in the documents referred to in the Appendix: Licence Document(s).

- RSO-004 - Bioassay Procedure, Section 8.2, Effective Dose states:

  The dose to the individual NEWs is determined by routine sampling, either on a one week or a two week sampling frequency for samples submitted not more than 28 days apart. The calculation for dose determinations, as independently verified by R. V. Osborne (reference email dated Nov. 29, 2007) are as follows:

  H_{eff} (mSv) = Effective Dose (mSv) = (C_1+C_2) Bq/ml x # of days between successive samples x 2.9×10^{-5} Sv/Bq/ml/day.

  The annual dose is calculated using the sum of the periodic assessments.

  H_{annual} = Annual Dose (mSv/a) = Σ H_{eff} (mSv), based on 52 weeks of assessments.

Fact(s)

SRBT uses bioassay measurements to determine dose to its workers and contractors. Workers who perform work in Zone 3 are required to submit weekly bioassay samples and all others are required to submit biweekly bioassay samples. SRBT's health physics technician prepares bioassay sample containers at the set sample frequency. The container labelled with the individual's name and their bioassay sample submission period (weekly or biweekly). However, there is no indication on the sample bottle or record of the exact date for when the sample was made. Currently SRBT assumes that workers on a weekly sample frequency made the sample exactly 7 days since the last sample was made and exactly 14 days since the last sample was made for workers on a biweekly sample frequency. Since the exact date for when the sample was made is unknown SRBT is not able to calculate the period of time between successive samples. For a bi-weekly sampling period, there could be as few as 10 days and as many as 14 days and for a weekly sampling period it could range between 3 and 11 days.

Analysis/Finding(s)

The calculation used to determine worker dose is given in Section 8.2 of RSO-004, Bioassay procedure, Rev K. As part of the calculation, SRBT must know the exact number of days between successive samples in order to accurately determine worker dose. CNSC staff determined that SRBT's current assumption that the number of days between successive samples is 7 or 14 days, depending on the bioassay sample frequency, may lead to over or under determination of worker dose.

SRBT's radiation safety program, Revision XI, is referenced in Appendix A of its dosimetry service licence No. 11341-3-18.0. Within the SRBT's radiation safety program, RSO-004 – "Bioassay Procedure" is referenced. As such, SRBT is in non-compliance with its dosimetry services licence No. 11341-3-18.0.

CNSC staff recognize that because no date was requested previously for the sample submissions, there is no way to go back and assess the doses retrospectively. However, to determine if there would be a large discrepancy in the doses assigned to workers, SRBT must do an assessment to determine how great the actual discrepancies would be.

Compliance Action(s)/Recommendations

Directive - SRBT-2017-01-D01: SRBT shall notify the CNSC Dosimetry Services Licensing Specialist of the observed non-compliance in calculating worker doses in accordance with section 2960-2 of its Dosimetry Service Licence No. 11341-3-18.0

Action Notice - SRBT-2017-01-A01: SRBT shall ensure that doses are calculated in accordance with RSO-004 - Bioassay Procedure, Section 8.2.

4.3 RADIATION PROTECTION

Criteria

- RPR 5 (1) For the purpose of keeping a record of doses of radiation in accordance with section 27 of the Act, every licensee shall ascertain and record the magnitude of exposure to radon progeny of each person referred to in that section, as well as the effective dose and equivalent dose received by and committed to that person.

Fact(s)

Through discussions with the Manager of Health Physics and Regulatory Affairs, it was determined that there is no formalized process for requesting previous dose histories for new workers, contractors and visitors.

Additionally, SRBT has is no formal requirements to identify under what circumstances workers, contractors or visitors would be required to provide a bioassay sample prior to commencing work to take account of doses received performing work for other licensees. CNSC staff note that both of these processes have been performed informally and documentation was provided to support this as documented in Section 3.5 of the Compliance Matrix (Appendix D).

CNSC staff note that Section 6.4 of RSO-004 identifies requirements for contractors and visitors to submit a urine sample upon completion of their work if they enter into an active or potentially contaminated area and there is a risk of receiving a dose. RSO-004 also indicates that if prior to the work commencing there were no urine samples submitted or it has been longer than a 28 day period, it is assumed that the contractor/visitor would have a tritium bioassay level of 0 Bq/ml when the work started. There is no indication in RSO-004 of the bioassay requirements for NEWs terminating work at the facility to ensure all potential doses are captured.

SRBT determines if contractors and visitors are required to be NEWs based on the purpose of their work. SRBT staff indicated this is rare and has not happened recently. All NEWs are informed of their dose in accordance with Section 11.7.2 of RSO-004.

Analysis/Finding(s)

SRBT has a program in place for monitoring the exposures of nuclear energy workers, contractors and visitors. There appears to be requirements in place for capturing dose histories upon commencement of work (onboarding) at the facility to ensure that all doses are taken into account and to prevent any dose limit exceedances, however these are not documented. Although it may not be necessary in all cases, the requirements should be captured formally. Also, the requirements for urine sample submission prior to and upon termination (off boarding) of work are not clear and should be formalized to ensure all possible exposures are captured.

Compliance Action(s)/Recommendations

Recommendation - SRBT-2017-01-R02: SRBT should update their procedures to formalize requirements regarding obtaining dose histories and for urine sampling submissions for the onboarding and off-boarding of all workers, contractors and visitors.

4.4 RADIATION PROTECTION

Criteria

- RPR 21 Every licensee shall post and keep posted, at the boundary of and at every point of access to an area, room or enclosure, a durable and legible sign that bears the radiation warning symbol set out in Schedule 3 and the words “RAYONNEMENT-DANGER-RADIATION”, if…

Fact(s)

The inspection team observed that SRBT has area postings in Zones 2 and 3 to indicate that there is a radiation hazard in the area. It was noted that the postings do not include the wording "RAYONNEMENT-DANGER-RADIATION", as seen in the picture below:

Analysis/Finding(s)

Radiation warning signs posted at the different zones in the SRBT facility are not fully in compliance with Section 21 of the *Radiation Protection Regulations* as they do not bear the wording "RAYONNEMENT-DANGER-RADIATION"; however, these signs do indicate the relevant hazard and are posted correctly.

Compliance Action(s)/Recommendations

Recommendation - SRBT-2017-01-R03: SRBT should ensure that radiation warning signs at the facility are in compliance with Section 21 of the *Radiation Protection Regulations*.

4.5 RADIATION PROTECTION

Criteria

- GNSCR 12 (1) Every licensee shall

  (c) take all reasonable precautions to protect the environment and the health and safety of persons and to maintain the security of nuclear facilities and of nuclear substances;
  (e) require that every person at the site of the licensed activity use equipment, devices, clothing and procedures in accordance with the Act, the regulations made under the Act and the licence;

- GNSCR 17 Every worker shall

(a) use equipment, devices, facilities and clothing for protecting the environment or the health and safety of persons, or for determining doses of radiation, dose rates or concentrations of radioactive nuclear substances, in a responsible and reasonable manner and in accordance with the Act, the regulations made under the Act and the licence;

Fact(s)

Since May 2016, a waste minimization initiative was introduced to reduce the use of disposable booties with reusable booties. The reusable booties are reused until it is deemed they need to be washed. There is no process or procedure regarding reusable booties. The reusable booties are washed in a basin in the sink in the Zone 3 area and then hung to dry. The waste water is stored in large barrels of waste water which are analyzed and disposed in accordance with their effluent monitoring program. The booties in Zone 3 are on the contamination monitoring list which is counted daily. SRBT staff indicated that there has been no change in contamination monitoring results in the zone 3 area indicating a negative consequence. The CNSC inspection team identified that elevated bootie counts were observed on the two most recent daily swipe results during the inspection.

Analysis/Finding(s)

There is currently no documented process for the use, care and maintenance of reusable booties. SRBT has no set contamination level for when a reusable bootie would be taken out of service or put back into service. In addition, there is no formal instruction on how these booties are to be monitored, cleaned, maintained or disposed of.

Compliance Action(s)/Recommendations

Recommendation - SRBT-2017-01-R04: SRBT should develop a use, care and maintenance procedure for reusable booties that may become contaminated.

4.6 RADIATION PROTECTION

Criteria

- RSO-039, Planning for Unusual Situations
- RSO-004, “Bioassay Procedures”

Fact(s)

Follow up expectations to unplanned events, skin contamination events or unusual bioassay results are not clearly documented for clarity and consistency.

Analysis/Finding(s)

RSO-039 “Planning for Unusual Situations” and RSO-004, “Bioassay Procedures” both identify that additional bioassay requirements are requested at the discretion of the health physics team in the event of an unusual situation or unplanned event such as elevated tritium in air concentrations, skin contamination events or unusual bioassay results. This was confirmed in interviews with the General Manager Health Physics and Regulatory Affairs.

While CNSC staff observed that there was evidence to demonstrate that appropriate follow up is performed in the event of such an unplanned situation, it would be beneficial to document expected follow up in the most likely scenarios to ensure that exposures to individuals are appropriately captured in a consistent manner, regardless of the member of the Health Physics Team responding to the event.

Compliance Action(s)/Recommendations

Recommendation - SRBT-2017-01-R05: SRBT should document specific details on how worker dose will be assessed following an unusual situation or unplanned event.

4.7 RADIATION PROTECTION

Criteria

- Licence Limits, Action Levels and Administrative Limits, Section 4 (for surface contamination limits)
- RSO-001, Facility Contamination Monitoring, sections 5.1, 6, 7, 8, 9, 10

Fact(s)

During the inspection, CNSC staff swiped various surfaces throughout the SRBT facility. The swipes were then analysed at the CNSC laboratory. The consolidated swipe results are provided in appendix E.

Of the 15 samples taken, swipe samples 10 and 13 were above zone 2 administrative limit.

Analysis/Finding(s)

Sample 10 was taken from the floor on the zone 2 side of the Zone 2/3 barrier and sample 13 was taken from the surface of a bench located in zone 3 near the barrier of the assembly area. The measured results were 8.1 Bq/cm^2 and 18.1 Bq/cm^2, respectively; which are above the Zone 2 administrative limit of 4.0 Bq/cm^2. These results are not of great concern as the level of contamination is far below any concern for worker safety. However, administrative levels are established to prevent the buildup of contamination.

Compliance Action(s)/Recommendations

Recommendation - SRBT-2017-01-R06: SRBT should confirm that the level of contamination from where sample 10 and 13 were taken is below the zone 2 administrative contamination level. In addition, SRBT should ensure appropriate housekeeping is in place to prevent the buildup of contamination.

5. SUMMARY OF COMPLIANCE ACTIONS AND RECOMMENDATIONS ISSUED

Directive - SRBT-2017-01-D01: SRBT shall notify the CNSC Dosimetry Services Licensing Specialist of the observed non-compliance in calculating worker dose in accordance with section 2960-2 of its Dosimetry Service Licence No. 11341-3-18.0

Action Notice - SRBT-2017-01-A01: SRBT shall ensure that doses are calculated in accordance with RSO-004 - Bioassay Procedure, Section 8.2.

Recommendation - SRBT-2017-01-R01: SRBT should update RSO-028 “Receiving Nuclear Substances” in timely manner to account for the significant changes to the returns process.

Recommendation - SRBT-2017-01-R02: SRBT should update their procedures to formalize requirements regarding obtaining dose histories and for urine sampling submissions for the onboarding and off-boarding of all workers, contractors and visitors.

Recommendation - SRBT-2017-01-R03: SRBT should ensure that radiation warning signs at the facility are in compliance with Section 21 of the *Radiation Protection Regulations*.

Recommendation - SRBT-2017-01-R04: SRBT should develop a use, care and maintenance procedure for reusable booties that may become contaminated.

Recommendation - SRBT-2017-01-R05: SRBT should document specific details on how worker dose will be assessed following an unusual situation or unplanned event.

Recommendation - SRBT-2017-01-R06: SRBT should confirm that the level of contamination from where sample 10 and 13 were taken is below the zone 2 administrative contamination level. In addition, SRBT should ensure appropriate housekeeping is in place to prevent the buildup of contamination.

6. CONCLUDING STATEMENTS

CNSC staff performed an Inspection at SRBT, in order to verify compliance with the *Nuclear Safety and Control Act*, its associated regulations, the conditions of the licence and the compliance verification criteria found in SRBT’s LCH.

As a result, inspectors found items of non-compliance with the criteria assessed from the *Compliance Matrix*, and therefore 1 Directives, 2 Action Notices, and 4 Recommendations have been raised. SRBT is requested to submit its corrective action for each compliance action *60* days from the time this report was issued. The response must include corrective measures and proposed completion dates, including the date by which the corrective measure will be documented (if required), implemented, and verified for adequacy and effectiveness.

Appendix A. **Definitions**

Compliance Action Categories:

Directive

A written request that the licensee take action to correct a non-compliance with governing regulations, licence conditions, codes, standards or a general or sustained failure to adhere to approved documents, policies, procedures, instructions, programs, or processes that the licensee has established to meet licensing requirements.

Action Notice

A written request that the licensee take action to correct a non-compliance that is not a direct contravention of governing regulations, licence conditions, codes or standards, but that can compromise safety, security, or the environment. Such non-compliances include:

- A failure to satisfy one of the compliance criteria if the criteria are not directly referenced in the governing regulations or licence conditions.

- A significant but non-systemic failure to comply with the licensee's own policies, procedures, or instructions that it has established to meet licensing requirements (including programs and internal processes submitted in support of a licence application).

Recommendations:

Recommendation

A written suggestion to effect an improvement based on good industry practice. A recommendation is not an indication of non-compliance with regulatory requirements, and the recipient is not obliged to accept the recommendation. A recommendation is not subject to enforcement action. Recommendations shall not be issued as a means of suggesting improvements to areas outside the CNSC's mandate.

Appendix B. **Acronyms and Abbreviations**

ALARA	As Low As Reasonably Achievable
CNSC	Canadian Nuclear Safety Commission
DNCFR	Directorate of Nuclear Cycle and Facilities Division
GNSCR	General Nuclear Safety and Control Regulations
LCH	Licence Conditions Handbook
NPFD	Nuclear Processing Facilities Division
NEW	Nuclear Energy Worker
NSCA	Nuclear Safety and Control Act
RPR	Radiation Protection Regulations
SRBT	SRB Technologies (Canada) Inc.

Appendix C. **Attendance Record(s)**

e-Doc 5220473

Inspection Opening Meeting Attendance Record

Division	NPFD
Title of Inspection	Type II Radiation Protection Inspection
Inspection Identification Number	SRBT-2017-01

Name of Licensee	SRBT
Licence Number	NSPFOL-13.00/2022

Lead Inspector	Robert Buhr
Date of Inspection	February 16, 2017
Date of Opening Meeting	February 16, 2016

Instructions: Complete the top section of this form prior to the formal Opening Meeting. Have all attendees at the formal Inspection Opening Meeting sign this form, indicating their presence. Use multiple sheets if needed.

Name	Organization / Role	Signature
Rob Buhr	CNSC Project Officer	
Sheri MacDonald	CNSC RP Specialist	S MacDonald
STEPHANE LEVESQUE	SRBT	
Ross FitzPatrick	SRBT	
Joshua Bull	SRBT	
Tanya Sennett	SRBT	T. Sennett
Shane Pleau	SRBT	
JAMIE MACDONALD	SRBT.	
Brenda. St. Pierre	SRBT	

Inspection Closing Meeting Attendance Record

Division	NPFD
Title of Inspection	Type II Radiation Protection Inspection
Inspection Identification Number	SRBT-2017-01

Name of Licensee	SRBT
Licence Number	NSPFOL-13.00/2022

Lead Inspector	Robert Buhr
Date of Inspection	February 16, 2017
Date of Closing Meeting	February 16, 2016

Instructions: Complete the top section of this form prior to the formal Closing Meeting. Have all attendees at the formal Inspection Closing Meeting sign this form, indicating their presence. Use multiple sheets if needed.

Name	Organization / Role	Signature
Brenda St. Pierre	SRB. Human Protection Coordinator	
Shaw Rean	SRB / Import & Export Manager	
Joshua Bull	SRB / Health Physics Technician	
ROSS FITZPATRICK	SRBT / Vice-President	
JAMIE MACDONALD	SRBT / MANAGER OF HP+RA	
STEPHANE LEVESQUE	SRBT / PRESIDENT	
Sheri MacDonald	CNSC - RP Specialist	
Rob Buhr	CNSC - P.O.	

Appendix D. **Compliance Matrix**

DIRECTORATE OF NUCLEAR CYCLE AND FACILITIES REGULATION
COMPLIANCE MATRIX

Division	NPFD
Title of Inspection	Type II Radiation Protection Inspection
Inspection Identification Number	SRBT-2017-01

Name of Licensee	SRBT
Licence Number	NSPFOL-13.00/2022

Inspection Team: Rob Buhr, Project Officer, NPFD (Lead Inspector)
Sheri MacDonald, Radiation Protection Specialist, RPD

Safety and Control Area(s) of Interest:

☐Management System
☐Human Performance Management
☐Operating Performance
☐Safety Analysis
☐Fitness for Service
☐ Other:

☐Conventional Health and Safety
☐Environmental Protection
☐Waste Management
☐Security
☐Safeguards and Non-Proliferation

☒Radiation Protection
☐Packaging and Transport
☐Physical Design
☐Emergency Management and Fire Protection

SCA- RADIATION PROTECTION

7. 1 – APPLICATION OF ALARA						
SPECIFIC AREA OBJECTIVE: ***To verify efforts towards maintaining radiation doses ALARA, social and economic factors taken into account.***						
No.	**Review Topic**	**Verification Criteria**	**Compliance Verification Activity**	**Facts and Observations**	**Analysis and Findings**	**Met/ Not Met**
1.1	**ALARA program**	**Source: Regulation** **Details:** RPR 4(*a*) G-129 rev.1 **Source: LCH** **Details:** Radiation Safety Program Revision XI	**Document Review:** • Question senior management, RP staff and workers on their support of ALARA at the facility. • Review ALARA/radiation safety committee's terms of reference, as applicable. Observe records of minutes of meetings over the last 6-12 months. • Verify that meeting minutes (or some other means) are used to track progress for the development and implementation of ALARA initiatives and establishes ownership of these initiatives.	**Observations:** 1. Held discussions with Manager of Health Physics and Regulatory Affairs, Human Protection Coordinator, Import and Export Manager and VP and front line staff. There is active involvement in the Health Physics committee, where items related to RP and ALARA are discussed. All individuals expressed involvement and ownership of ALARA. **Documents Reviewed:** 1. Health Physics Committee Meeting Minutes Form 2016. (E-Doc 5176334). Meetings are held quarterly. There were two types of meeting held at each quarter: - health physics - swipe results	• Adequate organizational support is available for the application of ALARA. • • Organizational responsibilities and reporting relationships necessary to implement the ALARA program are defined and implemented.	Objectives are met

				Issues identified at each meeting were addressed in follow up meetings		
			Field Check: • Observe implementation of ALARA initiatives in the facility, as applicable. **(e.g. 2015 set up of TIA monitors in shipping area)** **Document Review:** • Confirm that ALARA targets are established according to a well-structured methodology and are periodically reviewed to ensure that they are kept up-to-date. Observe any records associated with these topics, generated within the last 12 months.	**Observations:** 1. The TIA was observed in the shipping area as identified in the 2015 ACR. 2. Discussions with Manager of Health Physics and Regulatory Compliance identified confirmed that performance data from surface contamination monitoring, dose measurements and area monitoring are reviewed against production output and historical data. This information is used as performance indicators for continuous improvement. 3. ALARA targets are established annually for average and maximum worker doses taking into consideration the previous year's dose results as well as anticipated production levels. These are discussed and agreed upon by the Health Physics team. **Documents Reviewed:** 1. Health Committee Meeting minutes. See Photo Appendix	ALARA initiatives are effectively implemented, monitored, assessed and reported to management.	

				F Figure 1 2. Radiation Safety Program IX 3. RSO-001-F-01 and -02, Facility and Contamination Monitoring Reports		
			Document Review: • Observe recent records of operational reviews (within this last 12 months). • Review use of continuous improvement initiatives through benchmarking, and use and sharing of operating experience. Observe recent records generated as part of these activities (within the last 12 months).	**Observations:** 1. Operational reviews are performed annually in accordance with Radiation Safety Manual (RSP). **Documents Reviewed:** 1. Internal Audit Report, Radiation Protection, Report No. 14-16 2. Radiation Safety Manual IX	Internal reviews are conducted using an approved process to improve ALARA performance.	Objectives are met
1.2	**ALARA in design of facilities, processes, structures, systems and components**	**Source: Regulation** **Details:** RPR 4(*a*) G-129 rev.1 Radiation Safety Program Revision XI	**Field Check**: • Observe work areas in the facility and note any engineered controls and design features that intend to keep radiation exposures to persons ALARA. **Document review**: • Question RP staff on the use of operating experience in design and review the process and an example (record) to demonstrate these activities.	**Observations:** 1. Fume hoods and ventilation on the equipment are installed to keep the amount of tritium in air concentrations within acceptable levels.	Ventilation equipment is installed to ensure that exposures to tritium are maintained ALARA.	Objectives are met
1.3	**ALARA optimization process**	**Source: Regulation** **Details:**	**Discussion/Document review:** • Question RP staff on their involvement in work planning and scheduling processes to allow for	**Observations:** 1. Work at SRBT is generally routine and deviations from	N/A	Objectives are met

		RPR 4(*a*) **Source: Other** **Details:** G-129 rev.1 **Source: LCH** **Details:** Radiation Safety Program Revision XI	identification where ALARA principles and controls may be applied. • Question RP staff and management to verify that work activities are scheduled, prepared and executed with the goal to keep exposures ALARA and to avoid unplanned exposures. Review records of job hazard analyses for certain work activities as evidence, generated within the last 12 months.	routine work are rare or non-existent.		
2 – RADIATION PROTECTION PROGRAM PERFORMANCE						
SPECIFIC AREA OBJECTIVE: ***To verify the effectiveness of the radiation protection program in protecting the health and safety of persons, including performance against objectives, goals and targets, and continuous improvement initiatives.***						
No.	**Review Topic**	**Verification Criteria**	**Compliance Verification Activity**	**Facts and Observations**	**Analysis/ Findings**	**Met/ Not Met**
2.1	**Effectiveness reviews of the RP program**	**Source: Regulation** **Details:** RPR 4(*a*) **Source: Other** **Details:** G-129 rev.1	**Desktop Review:** • Question RP staff and management on the use of RP program performance objectives, monitoring and trending. Review the process for setting, monitoring, tracking and reporting (i.e. management) targets. Confirm that targets are established according to a well-structured methodology and are periodically reviewed to ensure that they are kept up-to-date. • Review processes with RP staff for	**Observations Document review:** 1. Facility Contamination Monitoring and Analysis Reports, worker bioassay results, alarm reports, etc. are reviewed on a specified frequency to identify areas of decline in performance. 2. RSO-001-F-01, Facility Contamination Monitoring Analysis and Report (Zone 3)	The effectiveness of the RP program is reviewed to ensure radiation exposures and doses are kept below regulatory dose limits and ALARA. Reviews of RP program effectiveness are occurring at regular frequencies, using an approved process.	Objectives are met

		Source: LCH **Details:** Radiation Safety Program Revision XI	continuous improvement initiatives for the RP program, through benchmarking and use/sharing of operating experience. Observe records and documents (policies and procedures) associated. • Confirm that poor performance against objectives is flagged to management's attention, and corrective action plans were developed and implemented.	identified several areas of contamination above an acceptable level. Discussions with the Manager of Health Physics and Regulatory Affairs identified that during this time, there was a long period of precipitation during which production operations cannot occur. Production staff was proactive and took the opportunity to clean the old sealant from the rigs and apply new sealant. This is done to prevent obstruction when the glass tubes are being filled and generally only done once an obstruction occurs. This process resulted in elevated contamination levels. Once investigated by the Health Physics Committee, the cause was determined. It was decided that this type of "mass clean up" can no longer occur without approval from the Manager of Health Physics and Regulatory Affairs. This was communicated to staff via memo. 3. While Facility Contamination Monitoring and Analysis Reports are reviewed at the specified frequency, it was observed that immediate actions are not taken on initial discovery of a possible issue. For example, if it is noted that after 2 or 3 days that there are		

				elevated contamination results in the same area, this does not get addressed until an area of poor performance is identified at the committee meetings. 4. Poor performance is identified during committee meeting and actions are taken to correct them, as demonstrated in the meeting minutes and discussion with RP staff.		
2.2	**RP Action and Administrative Levels**	**Source: Regulation** **Details:** RPR 6 **Source: Other** **Details:** G-228	**Desktop Review:** • Compare recent doses (e.g. past 5 years) against action levels and challenge whether they remain meaningful, if appropriate. Note: The current action Levels were reviewed on February 2013.	**Observations:** 1. There were no action Level exceedances in the last 5 years. 2. There was one administrative level exceedance in 2015. 3. The action levels were most recently reviewed in 2013 and will be required to be reviewed again in 2018. **Documents Reviewed:** 1. Annual compliance Report 2015. 2. Dose spreadsheet	The RP program at SRBT includes opportunities for regular review and, when appropriate, revision of action and administrative levels. No action levels were exceeded during the last year.	Objectives are met
2.3	**RP event reporting and corrective action plan development and implementation**	**Source: Regulation** **Details:** RPR 4(*a*)	**Field Check:** As applicable. **Desktop Review:** Follow up on any administrative limit exceedances in the last 3 years, including the one reported in the 2015	**Observations:** 1. There was one administrative level exceedance in 2015 as reported in the 2015 ACR. A worker exceeded the administrative level of 100	SRBT has a process for establishing, monitoring, tracking and validating corrective actions related to RP non-conformances with effective management oversight.	Objectives are met

		Source: Other **Details:** G-129 rev.1 **Source: LCH** **Details:** Radiation Safety Program Revision XI	ACR. *Tailored for specific follow up to confirm implementation of corrective actions taken by the licensee for previous radiation protection events and CNSC action items.*	Bq/L (106 Bq/L) for any period in Zone 1 or 2. Non-Conformance Report NCR-044 was filed to document the exceedance. Corrective actions were implemented and the worker was restricted from performing the same work until the bioassay concentrations fell less than half of the admin level. Additional samples were also requested. 2. Corrective actions for RP events and non-conformances are established with appropriate milestones and assignment of responsibility. **Documents Reviewed:** 1. Non-Conformance Report NCR-444 2. Radiation Safety Program Revision XI 3. Licence Limits, Action Levels and Administrative Limits, rev D.		
2.4	**Quality management of RP program and procedures** Appendix A. Appendix B.	**Source: Regulation** **Details:**	**Document Review:** • Confirm procedures reviewed as part of the inspection have been revised as per the licensee's document review cycle.	**Documents Reviewed:** 1. All documents were reviewed and confirmed to be the current versions.	The procedures observed were updated at the defined frequency and by the appropriate individuals in accordance with the program requirements. Identified improvements to RSO-028	Objectives were not satisfied

		RPR 4(*a*)(i) CINFR 3(*d*)	• Confirm a roll-out process is in place for new or revised procedures. • Confirm procedures reviewed as part of the inspection reflect current operations and practices.	2. Process changes were made for the receipt of nuclear substances that were captured in a memo to the Health Physic Committee "Re: Self-Assessment of RMA Returns Processes" on June 2016 and also identified in the July 18, 2016 Health Physics Committee Meeting minutes. It was stated in both that RSO-028 "Receiving Nuclear Substances" would be updated accordingly. As of the time of the inspection, this procedure had not been updated to reflect the new changes.	"Receiving Nuclear Substances" were not updated in a timely manner.	
2.5	**Management RP oversight**	**Source: Regulation** **Details:** RPR 4(*a*) **Source: Other** **Details:** G-129 rev.1	**Field Check:** • Question management and RP staff on their responsibilities for RP (for themselves and others). Ask what steps they would take if they observed an unsafe work practice or situation. **Document Review:** • Review records associated which demonstrate management RP oversight including job observations, departmental safety meetings, etc. generated within the last 12 months.	**Observations:** 1. All staff interviewed were aware of: - Their responsibilities related to RP. - The proper responses to incidents such as a broken light source or alarming TIA. 2. Internal audits of the RP program are performed annually. These audits review all aspects of the RP program and identify non-conformances with regulatory and procedural requirements, opportunities for improvement and good	SRBT has adequate management control and RP oversight of work practices.	Objectives are met

				practices. Previously identified non-compliances and areas for improvement are followed up. **Documents Reviewed:** 1. Radiation Safety Program IX 2. RSO-039, Planning for Unusual Situations Revision A. 3. Internal Audit Report, Radiation Protection, Report No. 14-16		
2.6	**Organization and administration for RP**	**Source: Regulation** **Details:** GNSCR 3(1)(*k*) RPR 4 (*a*) **Source: Other** **Details:** RSO-039, Planning for Unusual Situations	**Field Check:** • Question workers/contractors, management and RP staff on: o Their responsibilities for RP. o Who they would report RP issues to and if management is accessible and responsive to concerns. • Observe RP staff in the field and their interaction with workers/contractors and management.	**Observations:** 1. All staff questioned identified any member of the Health Physics Committee, but specifically the Manager of Health Physics and Regulatory Compliance, when questions or concerns arise related to RP. 2. Staff observed was very comfortable with the Health Physics team.	The organization and administration of the RP program at SRBT provides effective implementation and control of RP activities. The roles, responsibilities and qualification requirements of all persons involved in the RP program are clearly defined.	Objectives are met
2.7	**Training and qualification of workers, management and contractors**	**Source: Regulation** **Details:**	**Field Check:** • Question workers/contractors/ management regarding the last	**Observations:** 1. All staff interviewed received RP training in December	At SRBT Persons have the qualifications (knowledge, skills, experience) needed to effectively perform RP practices associated with	Objectives are met

	in RP	CINFR 6(*m)* RPR 4(*a*) **Source: LCH** **Details:** Radiation Safety Program, Section, 4.1 **Source: Other** **Details:** G-129 rev. 1 RSO-027, Contractors RSO-027-F-01, Contractor/Visitor Log RSO-027-F-03, Training Record for Contract Staff	time they received RP training; including the content, the concept of ALARA (indoctrination training, annual training, OJT). • Question workers/contractors on whether they received on-the-job training. • Question workers/contractors/ management on what radiological hazards they encounter in their day-to-day work. **Document Review:** • Observe the most recent records of training and qualifications of select persons observed in the field. • Review the most recent records of on-the-job training for select persons observed in the field. • Perform the same checks as above, however, for contractors and visitors (refer to RSO-027, section 5)	2016. 2. All staff receive annual refresher training at the same time. The facility closes for the day and the training is implemented offsite. 3. All annual refresher training records observed were up date. 4. Indoctrination training for new workers was performed/received as required. 5. On the Job training is performed, however, the process is being revamped as part of the SAT based training. **Documents Reviewed:** 1. Annual refresher training records for 2015 and 2016 (all workers) 2. Indoctrination training records for 2016 (2 worker) were observed. 3. Training for tritium in air monitors (4 records)	their work.	
2.8	**General observations of persons**		**Field Check:** • Observe all persons on site	**Observations:**	Workers, management and contractors are cognizant of basic RP rules and practices, and follow the principles of	Objectives are met

	following safe work practices in line with ALARA (or radiation protection) principles	**Source: Regulation** **Details:** RPR 4(*a*) GNSCR 12(1)(*c*)(*d*)(*e*) 17(*a*)(*b*)(*d*)(*e*)	wearing appropriate/required dosimetry and personal protective equipment (PPE). • Observe persons as they move through zone transitions throughout the facility. • Observe all persons following safe practices in line with ALARA/RP principles. • If possible, observe RP staff performing an in-house RP inspection of work area(s). **Document review:** • Observe records of in-house RP inspections and/or self-assessments conducted at the facility within the last 12 months.	1. All individuals wore the proper PPE as required 2. All individuals observed the proper techniques for transitioning through zones. See Appendix F Figure 2 3. There were no non-compliances with RP practices observed. 4. RP self-assessment audit was performed in November 2016. **Documents Reviewed:** 1. Radiation Safety Manual IX 2. Sub-documents to RP program.	ALARA.	

3 – WORKER DOSE CONTROL

SPECIFIC AREA OBJECTIVE: ***To verify the control of occupational exposures to radiation and to report on radiation doses received by workers.***

No.	Review Topic	Regulatory Criteria	Compliance Verification Activity	Facts and Observations	Analysis/Findings	Met/ Not Met
3.1	**Radiation Exposures and Radiation Dose Assessments : Recording of radiation doses**	**Source: Regulation** **Details:** RPR 5	**Document review:** • Observe how radiation doses are tracked and monitored for workers, contractors and visitors. • Verify how maximum effective dose and average dose statistics are determined and reported with the licensee's organization	**Observations:** 1. There were no exceedances of the 1 and 5 year dosimetry limits for workers or contractors. 2. Manual and electronic dose records are maintained. Doses are calculated manually on the Bioassay Dose Calculations- Work sheet. They are verified by the Human	Radiation doses are tracked and monitored for workers, contractors, and visitors. There is a process for monitoring dose data for exceedances of action levels and regulatory dose limits.	Objectives are met

		Source: LCH **Details:** Radiation Safety Program IX, Section 4.12 Licence Limits, Action Levels and Administrative Limits **Source: Other** **Details:** G-91 RSO-027, Contractors, Section 7 RSO-004, Bioassays, Section 12.2	and to the CNSC. • Review workers, contactors, and visitors radiation dose records for the last 12 months. Verify that the current year and five year regulatory dose limits have not been exceeded. • Review dose history records for workers, contract workers, new hires and visitors over the last 12 months. Verify that the current year and five year regulatory dose limits have not been exceeded. Verify that dose histories are taken into consideration when setting internal dose limits. • If radiation doses are entered into a database; review QA process associated (e.g. reconciliation of radiation exposure reports from dosimetry service provider). • Ensure dose records are maintained for the appropriate retention period. (10 years for contractors and 5 years after the termination of employment for a worker)	Protection Coordinator. Results are manually entered into an excel spreadsheet which are validated by the Manager of Health Physics and Regulatory Affairs. 3. Records are maintained indefinitely at this point, in excess of their procedural requirements. **Database Reviewed:** 1. Dose database		
3.2	**Radiation Exposures and Radiation Dose Assessments**	**Source: Regulation** **Details:** RPR 5	**Field Check:** • Observe the process for urinalysis, from collection to receipt of results from the lab, and entry into the health	**Observations:** 1. Health Physics Technician prepares bioassay sample containers for each individual/contractor. Sample bottle has individual and frequency period, which is	SRBT's bioassay program ensures that doses are tracked and monitored to ensure they remain below the regulatory dose limits and ALARA, action and administrative	Objectives were not satisfied

	: Tritium-in-urine Bioassay program	**Source: Other** **Details:** GD-150 G-91 RSO-004- Bioassay Procedure RSO-027, Contractors RSO-027-F-01, Contractor/Visitor Log RSO-027-F-03, Training Record for Contract Staff RSO-011, Instrument Calibration **Source: LCH** **Details:** Radiation Safety Program IX, Section 4.12	physics database. • Observe the process to ensure compliance by workers/contractors for timely submission of urine samples. • Observe urine collection stations are adequately stocked. o Observe chain-of-custody of samples followed. • Question workers/contractors on the process for urinalysis collection and communication of their results. **Document review:** • As applicable; review process for urinalysis, from collection to receipt of results from the lab, and entry into the health physics database. Observe records of tritium-in-urine bioassays for all persons over the last 12 months. • Review the QA process for validation of urinalysis results. • Review the process for validation of bioassay results. • Review process for flagging and tracking of tritium-in- urine administrative and action level exceedances. • Observe records of dose assignment for all persons over the last 12 months. • As applicable; review the	one week. For example, if an individual is on a bi-weekly frequency, they would receive a bioassay sample bottle for the specific week the sample is due and they are able to submit their sample any time during that week. Samples are counted on the assumption that each sample is submitted at exactly every 7 or 14 days, depending on the frequency the individual is required to submit. This means that for a bi-weekly sampling period, there could be as few as 10 days and as many as 14 days and for a weekly sampling period it could range between 3 and 11 days. 2. Non-compliance with the bioassay program is rare and usually related to vacation or medical leave. Reminders are provided by the Health Physics Technician near the end of the frequency period if a sample has not yet been submitted. 3. The Human Protection Coordinator tracks bioassay screening results. If results exceed 15 Bq/ml, doses are assigned. This has not occurred up to this point at SRB. 4. Contractors who performed previous work at Canadian Nuclear Laboratories were required to submit a urine sample prior to work being performed to provide a baseline in the event there was a previous tritium uptake. For the same contract workers, no exit bioassays were performed because of the duration that they were at the facility and no light breaks occurred while they were on site. 5. Weekly bioassay results are posted (Bq/ml) are posted in the lunchroom. 6. Doses are submitted to the NDR on a quarterly basis by zip file. The Q1 2017 results were demonstrated.	levels. SRBT's liquid scintillation counter for the bioassay program are maintained and calibrated in accordance with procedure. The method of bioassay sampling was discussed with a CNSC dosimetry specialist and it was determined that based on RSO-004, Bioassay procedure Rev K, Section 8.2. The effective dose should be calculated based on the actual number of days between successive samples as opposed to assuming 7 or 14 days, depending on the frequency.	

			process for submission of results to the National Dose Registry. • Review the process to ensure compliance by workers/contractors for timely submission of urine samples in accordance with RSO-004 (NEWs in Zone 3 –weekly, Zones 2 and 1 – bi-weekly or as determined by the Health Physics) Department. For contractors/visitors – upon completion of their work as screening and if above MDA effective dose would be calculated based on RSO-004 and submission of subsequent samples) • If administrative or action levels are exceeded, worker is suspended from entry into Zones 2 and 3. Review any non-compliance with the bioassay program and if any ensure that if worker was suspended from working in Zones 2 and 3 after 2 non-compliances R9Radiation Safety Program, Section 4.12.3. • Review the process to assign dose in the event a worker does not submit their bioassay as required.	7. The liquid scintillation counter used to count bioassay samples was maintained and calibrated in accordance with procedures. 8. It was confirmed verbally that pipettes are calibrated annually. 9. SRBT participates in the independent testing with the National Calibration Reference Center for Bioassay and In Vivo Monitoring of Health Canada. **Documents Reviewed:** 1. RSO-027, Contactors Rev C. 2. Contractor Bioassay Results (Bq/ml) for the Year 2016. 3. RSO- 004, Bioassay Procedure, Rev K. 4. Dose database 5. A minimum of 10 examples of Bioassay Dose Calculations – Work Sheets for 2016/ 2017 6. LSC Machine Calibration Record 7. Contractor bioassay results form for the year 2016. 8. RSO-036 , Independent Testing for In-vitro Measurements 9. Health Canada Issued Certificate for In-vitro Measurements Certificate		
3.3	**Radiation dose targets and tracking/tre**	**Source: Regulation**	• Request annual facility dose targets/goals and confirm that they are established appropriately. Request evidence	**Observations:** 1. Facility dose goals are established as	Radiation dose targets at SRBT are established at set frequencies in accordance	Objectives are met

	nding	**Details:** RPR 4(*a*) **Source: LCH** **Details** Radiation Safety Program IX	that performance is reported to management at some frequency. • Request records to demonstrate that corrective actions are implemented if targets are not being met.	required through the Health and Safety Committee. **Documents Reviewed:** 1. Health and Safety Meeting Minutes. 2. Discussions with SRBT staff	with their processes Progress towards achieving radiation dose targets is monitored, and appropriate corrective actions are taken.	
3.4	**Nuclear Energy Worker (NEW) policy and procedures**	**Source: Regulation** **Details:** RPR 7, 9, 10, 11, 24 **Source: LCH** **Details:** Radiation Safety Program, XI, Section 4.12.3 **Source: Other** **Details:** RSO-004, Bioassays, Section 17.2	**Field Check:** • Question workers/contractors if they are aware if they are a NEW and what that means (rights and obligations). • Question workers/contractors regarding their current dose, if they are informed on and if they know how this information can be obtained. • Current and quarterly dose information is posted in accordance with Section 4.12.3 of Radiation Safety Program. **Document Review:** • Observe records maintained by the licensee as evidence of provision of information to NEWs (workers and contractors). • Confirm NEWs are provided with a copy of their dose annually in writing in accordance with Radiation Safety Program IX, Section	**Observations:** 1. All staff interviewed: • Were aware of their status as a NEW and were aware of their rights and obligations. • Were aware of their current dose and identified that they were informed annually in writing and the doses are also posted quarterly in the lunchroom. Weekly bioassay results are also posted in the lunchroom in accordance with RP program. • Signed records for a sample of provision of information of NEWs were observed and completed in accordance with procedures. • Pregnant NEWs are aware of the requirements to inform the licensee in writing upon becoming aware of their pregnancy. Doses at the facility are typically lower than the regulatory dose limits for pregnant NEWs, however, discussions are held with pregnant NEWs and they are given the choice to work in lower dose areas although this has never happened. • Records of workers names and job categories are maintained. Job categories are maintained through the organizational	SRBT implements a policy which ensures that : • NEWs have been informed of their rights and obligations as NEWs, in accordance with regulatory requirements, and have provided written acknowledgement. • Pregnant NEWs have informed the licensee as required by Regulation. • The licensee has fulfilled the regulatory requirements in informing NEWs of their status, of the risks associated with radiation, of the regulatory dose limits and of their individual radiation dose levels. • Female NEWs have been informed of their rights and obligations upon becoming pregnant.	Objectives are met

			4.12.3 and RSO-004. Confirm there is a similar process for contractors. • Follow up on any recent pregnant NEWs (i.e. within last two years), the process followed, and records generated, including dose received. • Ask if there are provisions in place for breastfeeding NEWs. • Observe the record of name and job category for all NEWs.	chart and workers doses are tracked through the zoned area in which they perform their work. **Documents Reviewed:** 1. Nuclear Energy Worker (NEW) Declaration Forms (10 +) 2. One pregnancy declaration		
3.5	**Contractor and Visitor Management Practices**	**Source: Regulation** RPR 5, 7, 9, 10, 11, 24 **Source: Other** RSO-027, Contractors	**Field Check:** *Follow compliance verification activities for above section's field checks.* **Document Review:** • Review the process for onboarding contractors, including determination of NEW status. • Review the process for visitors to the facility, including determination of NEW status. • Review process for tracking and recording contractor and visitor doses, including obtaining dose histories. • Use names in the contractor/ visitor log (RSO-027, Section 5) obtained to verify the ascertainment and recording of doses. • Review records to ensure that doses are reported, being tracked	**Observations:** 1. Discussions with the Manager of Health Physics and Regulatory Affairs indicated that there is no formalized process for requesting workers/ contractors/ visitors of their previous dose history, although it is performed informally. 2. All workers are identified as NEWs. Contractors and visitors are determined to be NEWs on a case by case situation and training is provided accordingly, although this is rare and has not happened in the recent history. 3. Contractors and visitors undergo may be required to provide a urine sample for screening depending on the work/areas/upset conditions they may encounter. In 2016, no contract worker or visitor exceeded a sample result of 15 Bq/ml which would require a dose assignment. All doses were below the recordable dose. 4. There are no formal requirements to identify under what circumstances contractors would be required to either a)	SRBT implements a policy for the management of contractors and visitors which ensure their radiation exposures and doses are kept below the regulatory dose limits and ALARA. Contractor and visitor radiation exposures and doses are monitored and tracked according to the licensee's external and internal dosimetry programs, and to ensure that doses are kept below the regulatory dose limits and ALARA There is no formal procedure requesting previous dose histories or for requesting and tracking incoming and outgoing bioassays for contract workers, although it appears to be performed	Objectives were not satisfied

			and maintained. • Review records to determine if dose history records for contract workers and visitors were obtained as required. • Verify that the current year and five year regulatory dose limits were not exceeded by contractors and visitors (for non-NEWs or NEWs as applicable).	submit a sample prior to commencing work or b) upon completion of work. 5. Contractors who performed previous work at Canadian Nuclear Laboratories were required to submit a urine sample prior to work being performed to provide a baseline in the event there was a previous tritium uptake. While this is a demonstration of a good practice, it is not captured in procedures. 6. For the same contract workers, no exit bioassays were performed because of the duration that they were at the facility and no light breaks occurred while they were on site. This is also no specified in procedures. **Documents Reviewed:** 1. Radiation Safety Program IX 2. RSO-004, Bioassay Procedure, Rev K 3. RSO-027, Contractors, Rev C 4. Dose Database for 2016 and 2015 5. Contractor Bioassay Results (Bq/ml) for the Year 2016.	informally.	
3.7	**Controls for keeping worker doses ALARA**	**Source: Regulation** **Details:** RPR 4 (*a*) **Source: LCH** **Details:**	**Field Check:** • Observe workers/contractors following good ALARA practices by standing/waiting in low potential areas of exposure when not performing radioactive work. • Observe workers/contractors wearing lab coats, disposable gloves and overshoes in Zones 2 and 3. Respirators are used when required	**Observations:** 1. Workers were observed following good ALARA practices such as: • Not holding light sources in breathing zone • Wearing PPE as required • Properly donning and doffing PPE • Performing proper zone transitioning • Ventilation was implemented and maintained as required. • Air flow within the facility was confirmed to move from an area of lesser	Personnel adhere to good dose control/ALARA practices.	Objectives are met

		Radiation Safety Program, IX, Section 3.4.1	• Observe workers/contractors as they move through zone transitions. • Observe workers/contractors following safe work practices in line with ALARA principles. • Observe work areas in the facility and note any engineered controls and design features that intend to keep radiation exposures to workers ALARA.	concentration (Zone 1) to higher concentration (Zone 3) **Documents Reviewed:** 1. Results of smoke test 2. Ventilation/fume hood maintenance requirements 3. Radiation Safety Program, IX		
3.8	**Area Postings and RP-related signage along with policies and procedures**	**Source: Regulation** **Details:** RPR 4(*a*), 21, 22, 23 NSRDR 23 GNSCRs 3(1) (*d*) CINFRs 3(*b*), 5(*a*) **Source: LCH** **Details:**	**Field Check:** • Observe area postings and RP-related signage posted as per regulatory requirements. • Confirm entry and exit procedures and PPE requirements are posted at the contamination barriers for Zones 2 and 3 as identified in Section 3.1 and 3.4 of Radiation Safety Program. • Confirm no frivolous postings. • Confirm emergency name and contact information posted at nuclear substances and radiation device locations (storage and in-use). • As applicable; confirm trefoil, RP wording and requirement to follow personnel entry procedures posted at personnel access openings of equipment fitted with radiation devices. • Observe workers/contractors adherence to the procedural	**Observations:** 1. RP area postings in Zones 3 and 2 were not in accordance with Section 21 of the *Radiation Protection Regulation.* 2. Entry and exit procedures and PPE requirements were posted at the entrances to Zones 2 and 3 in accordance with the program. 3. No frivolous posting were identified. 4. Workers adhered to procedural postings. **Documents Reviewed:** 1. Radiation Safety Program, Section 3.1 and 3.	The RP program signage strategy is implemented and adhered to in the facility. Radiation warning signs are not in compliance with Section 21 of the *Radiation Protection Regulations* for not bearing the wording "RAYONNEMENT-DANGER-RADIATION". See Photo Appendix F Figure 3 and 4	Objectives were not satisfied

		Radiation Safety Program, Section 3.1 and 3.4	postings. • Question workers/contractors on what various postings throughout the facility mean to them. **Document Review:** • Review signage strategy is in place which ensures consistent posting of signs (including radiation warning signs) throughout the facility and in accordance with regulatory requirements.			
3.9	**Radiation personal protective equipment (PPE)**	**Source: Regulation** **Details:** RPR 4(*a*) GNSCR 12(1)(*c*)(*d*) (e); 17(*a*) **Source: LCH** **Details:** Radiation Safety Program , IX, Section 3.4.1	**Field Check:** • Observe radiation PPE storage areas. • Question workers/contractors on where they can find radiation PPE as needed. • Confirm adequate quantities of radiation PPE available to workers/contractors in their work areas. • Confirm adequate quantities of radiation PPE for visitors. • Observe laundry facility and workers donning appropriate PPE while handling contaminated PPE. • Perform direct and indirect contamination monitoring of radiation PPE, radiation PPE storage facilities, and laundry facilities.	**Observations:** 1. PPE was stocked as required and in accessible areas. 2. Adequate PPE was available. 3. Lab coats are not disposed of after each use. There is no requirement for swipes to be performed on PPE other than booties. 4. Since May, reusable booties have been worn in Zones 2 and 3. This was initiated as a waste minimization initiative. These booties are reused until it is deemed they need to be washed. There is no set time period for this or associated procedure. They are washed in a basin in the sink in the relative Zone and then hung to dry. The waste water is stored in large barrels of waste water which are analyzed and disposed in accordance with their effluent monitoring program. The booties in Zone 3 are on the list as an area for swipe sampling which is counted daily. SRBT staff indicated that no change in contamination monitoring has been	SRBT ensures appropriate radiation PPE is available and used where necessary to keep radiation exposures and doses ALARA. It is unclear if there was any assessment for the implementation of the reusable booties was performed and whether washing initiatives are effective or appropriate or even documented. SRBT should perform an assessment of whether this new initiative is appropriate including documenting the laundering process of the booties as well as when and under what circumstances should the booties be disposed of.	Objectives were not satisfied

			• Observe proper radiation PPE is selected and worn by workers/contractors based on known hazards and provisions are included in the event the hazards are unknown **Document Review:** • Review record of contamination monitoring of radiation PPE, storage facilities, and laundry facilities over the last 12 months.	observed so there have been no negative consequences. CNSC staff identified that elevated booty counts were observed on the two most recent daily swipe results. It is unclear if there was any type of assessment done to determine if this is an acceptable method. 5. All workers observed, wore the required PPE. **Documents Reviewed:** 1. RSO-001, Facility Contamination Monitoring,		
3.10	**Planning for unusual situations**	**Source: Regulation** **Details:** GNSCR 12(1)(*c*), 17 RPR 4, 5 **Source: Other** **Details:** G-147 RSO-039, Planning for Unusual Situations RSO-004, Bioassay Procedure, Sections 11.2 and 11.3 RSO-024, Zone Alarm Record Keeping	**Field Check:** • Question workers/contractors on o What constitutes an upset condition in their work place? o their response/actions to take during upset conditions o Their response to TIA monitors alarms. o How they would be alerted to/respond to: ▪ elevated tritium levels in the workplace ▪ failure or leaking of tritium processing equipment ▪ a personal contamination event **Document Review:** • Review process for responding to upset conditions, including response to abnormal intakes of nuclear substance and work	**Observations:** 1. All workers interviewed where clear on the requirements of RSO-039 and what is considered an upset condition and who to contact. 2. There is no specific requirement for identifying when additional bioassay samples are required (e.g. in the event of skin contamination or elevated tritium in air results). When discussed with the General Manager Health Physics and Regulatory Affairs, it was identified that additional bioassays may be requested at his discretion or if necessary, other member of the Health Physics Committee. This is discussed in their RS Program as well as RSO-039. RSO-039 states that *" If it is suspected that a tritium intake may have occurred as a result of the unusual situation, non-routine bioassay tests may be requested from persons involved."*. There are no specific requirements for additional bioassays. 3. There was on administrative level	Contingencies for upset conditions are implemented to ensure radiation exposures are ALARA. Persons are cognizant of actions to be taken in the event of an upset condition. RP program requirements for responding to upset conditions are adhered to. Follow up expectations to skin contamination events or unusual bioassay results are not clearly documented for clarity and consistency.	Objectives were not satisfied

			removals (as applicable). o Ensure there are provisions for enhanced bioassay sampling guidelines/actions non-routine bioassays in accordance with RSO-039). o Ensure that there are requirements for contamination monitoring of persons and areas involved in an upset condition (i.e. loss of containment). • Review records associated with : o Incidences of abnormal intakes of nuclear substance over the last 12 months. o Zone alarms o Non-conformance reports	exceedance for which non-conformance report NCR-444 was issued in compliance with the RS Program, section 4.12.1. The worker was removed from the work causing the elevated result until their bioassay level returned to below ½ the administrative level. This was verified by CNSC staff in reviewing the individual's bioassay submissions. 4. RSO-024 records the occurrence of zone alarms. These records are maintained as required and tracked to determine trends. **Documents Reviewed:** 1. RSO-039, Planning for Unusual Situations 2. RSO-004, Bioassay Procedure 3. Non-Conformance Report NCR-444 4. RSO-024 (5)		

8. 4 – RADIOLOGICAL HAZARD CONTROL

SPECIFIC AREA OBJECTIVE: ***To verify efforts to control radiological hazards, preventing unnecessary radioactive releases and radiation exposures.***

No.	Review Topic	Regulatory Criteria	Compliance Verification Activity	Facts and Observations	Analysis/Summary	Met/ Not Met
4.1	**General observations of facility conditions, including housekeeping**	**Source: Regulation** **Details:** RPR 4 (*a*)	**Field Check:** • Observe housekeeping of the facility and note any areas of concern (such as spilled product in work areas).	**Observations:** 1. Housekeeping was generally good.	No concerns in this area.	Objectives are met

4.2	**Radioactive Contamination Monitoring and Control Program: Areas, rooms and enclosures**	**Source: Regulation** **Details:** RPR 4(*b*) **Source: LCH** **Details:** Radiation Safety Program IX, Section 4.8 Licence Limits, Action Levels and Administrative Limits, Section 4 (for surface contamination limits) **Source: Other** **Details:** RSO-001, Facility Contamination Monitoring, sections5.1, 6, 7, 8, 9, 10	**Field Check:** • Perform swipe samples for CNSC laboratory analysis throughout the facility. Include lunchrooms, change rooms and water fountains. • Observe RP staff performing contamination monitoring if included in routines. **Document Review:** • Review records (RSO-001, Section 10) of routine contamination monitoring of areas for the last 12 months. Ensure wipe testing is performed as follows: o 8 swipes 1x/week- Zone 1 o 12 swipes 3x/week- Zone 2 o 24 swipes daily- Zone 3 • Missed monitoring is noted and justified. • The following information is recorded: date of the measurement, name of individual, units of measure, make, model and serial number of the instrument used to take the measurement, and location of measurement are recorded. • Ensure results are reviewed by Human Protection Coordinator. • When the surface contamination limits identified in "*Licence Limits, Action Levels and Administrative Limits*'" are exceeded, surfaces are cleaned and monitored until	**Observations:** 1. Contamination monitoring is performed at the required frequency in accordance with procedures. 2. When areas which exceed the acceptable levels are identified and decontaminated. If the following day's swipes do not register as acceptable, the process is performed again. 3. Swipes were performed in several areas of Zone 1 of the facility. Results are included in e-Doc 5213774. Two areas were found to be above SRBT's acceptable levels for the identified Zones. 4. CNSC staff noted that when trends are observed for an area identified on the logging sheets, they are not immediately followed up to determine a cause. However, the sampling results are reviewed at the Health and Safety Meetings (every 2 months). **Documents Reviewed:** 1. RSO-001, Facility Contamination Monitoring 2. Five examples ofRSO-001-F-01, Facility Contamination Monitoring Analysis & Report (Zone 3) 3. Five examples RSO-001-F-02, Facility Contamination Monitoring Analysis & Report (Zone 1&2) 4. Five examples Quarterly Swipe data sheets, 2016 5. Health and Safety Committee Minutes	The workplace monitoring program includes frequent contamination monitoring to ensure radiation exposures are kept ALARA. Contamination monitoring is performed by the Health Physics Technician at the defined frequency.	Objectives are met

			acceptably decontaminated. Results are filed by the Health Physics Department. • Health Physics department initiates any action to determine the cause of high surface contamination results and initiates corrective actions. • Ensure that quarterly reviews are performed in accordance with RSO-001, Facility Contamination Monitoring to review/revise selected areas for contamination monitoring and that the areas which must always be included are tested (p 4 of same procedure).			
4.3	**Radioactive Contamination Control: Division of areas into zones and movement and monitoring of persons and materials at access/egress points**	**Source: Regulation** **Details:** RPR 4 GNSCR 12(1)(*c*)(*d*)(*e*)(*f*), 17(*a*)(*b*)(*d*)(*e*) **Source: LCH** **Details:** Radiation Safety Program Revision XI RSO-001, Facility Contamination	**Facility Check:** • Observe movement of workers/contractors and items through access/egress points. • Ensure all materials, tools and equipment are monitored in accordance with Section 4.7. • Observe interzonal boundaries are clearly marked. (3 Zones) • Observe washing facilities and contamination control check points. • Observe change facilities.	**Observations:** 1. Several workers were observed moving between Zone 3 and 2 to Zone 1 and vice versa. In all instances, access and egress between zones was performed in accordance with procedures. 2. All equipment and tools were swiped and checked for contamination by measuring the swipes in the LSC in accordance with RSO-001... 3. Interzonal boundaries were clearly marked. 4. Lab coats are disposable and do not leave Zones 2 and 3. There are disposed of when deemed appropriate by the wearer or when contamination is detected. Lab coats are randomly checked for contamination. Re-useable booties are also kept and washed in Zone 3 or 2 areas. 4. Hand washing stations were observed near Zone exits.	Movement of personnel and equipment between zones is done in a controlled manner. Inter-zonal boundaries are clearly marked at cross over points. Adequate decontamination facilities are available at inter-zonal boundaries.	Objectives are met

		Monitoring Rev. L		**Documents Reviewed:** 1. Radiation Safety Program Revision XI 2. RSO-001, Facility Contamination Monitoring Rev. L		
4.5	**Radioactive Contamination Control: Personnel contamination monitoring and control**	**Source: Regulation** **Details:** RPR 4 RSO-001, Facility Contamination Monitoring Rev. L	**Document Review:** • Review records of contamination monitoring of work clothing for the last 12 months.	**Observations:** 1. A review of the contamination control records for Zones 2 and 3 identified that contamination monitoring of lab coats and re-useable booties is part of the routine checks. .	Personnel contamination monitoring is performed to control radiation exposures ALARA.	Objectives are met
4.5	**Radioactive Contamination Control: Monitoring of materials, tools and equipment**	**Source: Regulation** **Details:** RPR 4 NSRDR 5.1 **Source: LCH** Radiation Safety Program Revision XI, Section 4.8 **Source: Other** RSO-001, Facility Contamination Monitoring, Section 5.2, 5.3, 6, 7, 8, 9,	**Field Check:** • All items/products that have been assembled, used, or stored in Zone 2 or 3 are required to be assessed for removable tritium contamination prior to being transferred to Zone 1 (RSO-001, Section 7). **Document Review:** • Review records for the last 12 months demonstrating that o Materials moving from Zones 2 and 3 to Zone 1 met the following criteria: 4 Bq/cm^2 based on a 100 cm^2 swipe area. o Items to be offered for transport or shipment met the criteria of 4	**Observations:** 1. All equipment, products and tools were swiped and checked for contamination by measuring the swipes in the LSC in accordance with RSO-001. **Documents Reviewed:** 1. RSO-001, Facility Contamination Monitoring 2	Tools and equipment are monitored for contamination prior to leaving radiological work areas.	Objectives are met

		10	Bq/cm^2 based on a 300 cm^2 swipe area. o For either of the above scenarios, items that are between 3-4 Bq/cm^2 over a 3 minute count must be re-swiped and re-counted for a period of 10 min and confirmed < 4 Bq/cm^2 or decontaminated and re-assessed.			
4.7	**Airborne Radioactive Contamination Monitoring and Control Program: Ventilation and Containment Systems (preventive and corrective maintenance, and performance testing)**	**Source: Regulation** **Details:**RPR 4(*b*) **Source: LCH** **Details:** Radiation Safety Program Revision XI, Section 3, Facilities and Equipment, Industrial Ventilation	**Field Check:** • Observe the facility ventilation and containment system(s) operating as required by observing visual indicators or other means which demonstrate operating to acceptable specifications. • Ensure that licensee is able to demonstrate that air flow moves from areas of lower contamination and not the reverse. **Document Review:** • Review process and records to ensure that the ventilation and containment systems are verified as operating as required and are within their design specifications. • Review that airflow checks at the working face of each of the fume cupboards and cabinets in Zones 2 and 3 areas: o have air flow velocities maintained at 100=/- 20ft/min o are performed on a monthly basis	**Observations:** 1. Facility ventilation and fume hoods were observed to be operating as indicated by the indicator lights. 2. Differential pressure tests/smoke tests are performed annual in accordance with maintenance document MTC-005 “Facility Ventilation Checks”. The records for this testing are to be captured within the Health Physics Committee meeting minutes. SRBT has identified the need for a form to record the results of differential tests. **Documents Reviewed:** 1. Records of the airflow checks at the working face of each of the fume cupboards and cabinets in Zones 2 and 3 areas were within the required results and performed in accordance with procedures. 2. Smoke test results.	SRBT implements a preventive and corrective maintenance program for the operation of ventilation and containment systems. Systems operation is frequently verified and validated.	Objectives are met

			o Have records are maintained by health physics dept. • Review actions taken when the acceptance criteria are not satisfied.			
4.7	**Airborne Radioactive Contamination Monitoring and Control Program: Tritium-in air monitors (TIA monitors)**	Source: Regulation Details: RPR 4, GNSCR 12(1)(*d*) Source: LCH Details: Radiation Safety Program Revision XI, Section 3, Facilities and Equipment, Airborne Contamination Monitoring, Section 3.6, Working Environment Monitoring Licence Limits, Action Levels and Administrative Limits **Source: LCH** **Details:**	**Field Check:** • Observe TIA Monitors operating in Zone 2 and 3 are running with the appropriate/acceptable flow rate (via visual indicator or other means). • Ensure stationary TIA Monitors operating in the facility have alarm set points as identified in SRB document "Licence Limits, Action Levels and Administrative Limits" • Observe appropriate placement of TIA Monitors in the facility commensurate with their intended use. • TIA monitors are calibrated annually or as needed, have label applied identifying calibration date, Cal. Due date, ID number and initials of person performing calibration. **Cross-reference calibration stickers to calibration certificates and maintenance records**. • Question workers/contractors on how they verify that the TIA monitors in their work areas are operating correctly. **Document Review:** • Review maintenance and	**Observations:** 1. All TIA monitors observed in the field (fixed and portable) were calibrated and the stickers were within the dates observed in the records. See photos Appendix F Figures 5 to 9 **Documents Reviewed:** 1. Calibration records for anemometer, 2017 2. Maintenance records for the tritium gas calibrator were available in accordance with RSO-011. 3. Maintenance and calibration records (RSO-011-F01) were reviewed 4. Fixed TIA monitors were calibrated in 2016 5. TIA calibration source certificate was observed and within appropriate dates (new on required in 2018). 6. Portable TIA monitors were calibrated in 2016.	Real-time, workplace air monitoring is performed by appropriately-placed tritium in air monitors in accordance with procedures. The operation and maintenance of TIA monitors (fixed and portable) are done in accordance with program requirements.	Objectives are met

		RSO-011, Instrument Calibration	calibration records (RSO-011-F-01) for the TIA monitors. Ensure there is adequate coverage while the TIA monitor is out-of-service. • Review maintenance and calibration records for the tritium gas calibrator used to calibrate the TIA monitors Ensure: o Gas cylinder is replaced within last 5 years. o Label applied identifying calibration date, Cal. Due date, ID number and initials of person performing calibration. o Completed by trained individuals			
4.8	**Airborne Radioactive Contamination Monitoring and Control Program: Facility Passive Air Sampling**	**Source: Regulation** **Details:** RPR 4, GNSCR 12(1)(*d*) **Source: Other** **Details:** RSO-040, Facility Passive Air Sampling RSO-011, Instrument Calibration	**Field Check:** • Observe tritium passive air samplers (PAS) identified on RSO-040-F-01. • For the liquid scintillation counter (LSC) used to measure passive air samplers, ensure label applied identifying calibration date, Cal. Due date, ID number and initials of person performing calibration in accordance with RSO -011. **Document Review:** • Review copies of RSO-040-F-01 and RSO-04-F-02, for the last 12 months to ensure they are changed weekly in accordance with RSO-040.	**Observations:** 1. Airborne passive samplers were observed throughout the facility in accordance with RSO-040. See Photo Appendix F figure 10 2. The Human Protection Coordinator is responsible for the review of the passive sampling results. Elevated airborne tritium results are investigated and have actions have been taken in some instances to prevent/prior to elevated bioassay results. 3. The information is tracked and trended. **Documents Reviewed:** 1. Copies of RSO-040-F-01 and RSO-04-F-02 for the last 12 months were observed.	Tritium passive air samplers are implemented at the facility in accordance with procedures and the results are used to keep doses ALARA.	Objectives are met

			• Ensure there is a process to follow up in the event elevated results are observed. • Review documents/meeting minutes where this information is used to improve the RP program in accordance with RSO-040.			
4.9	**Radiation warning signs (postings) and labelling of containers and devices containing nuclear substances**	**Source: Regulation** **Details:** RPR 4(*a*), 20, 21, 22, 23	**Field Check:** • Observe radiation warning signs posted as required by Regulation and the licensee's RP program requirements. • Observe containers and devices containing nuclear substances are labeled as required by Regulations. • Confirm that radiological hazard postings are reviewed at a set frequency to ensure they are up to date. **Document Review:** • Review signage strategy is in place which ensures consistent posting of signs (including radiation warning signs) throughout the facility and in accordance with regulatory requirements.	**Observations:** 1. RP area postings in Zones 3 and 2 were not in accordance with Section 21 of the *Radiation Protection Regulation.* **This is addressed in Section 3.8.**	See section 3.8.	Objectives were not satisfied
4.10	**Radioactive Waste Handling**	**Source: Regulation** **Details:**	Field Check: • Observe the means for collection and storage of radioactive waste	**Observations:** 1. The collection and storage of radioactive waste in the facility was discussed with several	Based on discussions held with SRBT staff, a radioactive waste management program is	Objectives are met

		RPR 4 NSRDR 5.1 **Source: LCH** **Details:** Waste Management Program **Source: Other** **Details:** RSO-001, Facility Contamination Monitoring, Sections 5.4 and 7.4 WMP-001, Waste Classification and Characterization WMP-003, Interim Preparation and Storage of Waste	in the facility. • Question workers/contractors on the proper collection and storage of radioactive waste.	staff. All were aware of the procedures, including for solid and liquid waste. 2. Discussions help with SRBT staff regarding waste procedures were in keeping with program expectations.	implemented to control and minimize the volume of radioactive waste. There are no concerns at this time.	
4.11	**Personnel hygiene and smoking, eating and drinking restrictions**	**Source: Regulation** **Details:** RPR 4(*a*) GNSCR 12(1)(*c*), 17(*b*)	**Field Check:** • Observe compliance with the licensee's RP program requirements and rules for personal hygiene, smoking, eating and drinking in zoned areas. • Observe correct practices followed by workers/contractors	**Observations:** 1. Expectations for personal hygiene, smoking, drinking and eating restrictions are identified in 2. No non-compliances were observed.	Eating, drinking, smoking, and chewing are not permitted, except in approved areas and in a controlled and monitored manner.	Objectives are met

		Source: LCH **Details:** Radiation Safety Program Revision XI	in zoned areas and in eating areas. • Question workers/contractors on the correct practices for eating, drinking and smoking in the workplace. **Document Review:** • Confirm that expectations for personal hygiene and smoking, eating and drinking restrictions (including chewing of gum) are documented.	**Documents Reviewed:** 1. Radiation Safety Program Revision XI 2. Health and Safety Committee Meeting minutes 3. Internal Audit Report No. 14-16		

Appendix A. **Sample Results**

Final Report

Laboratory Services Canadian Nuclear Safety Commision

Date: 2017-03-02
Submitted By: Robert Buhr
Approved By: Slobodan Jovanovic
Sample Analysis Report for: LR-SA-2017-00003
Division/Directorate/Site: NPFD
Analysis Review and Report by: Nadereh St-Amant

Background and Methodology:

Fifteen (15) swipe samples taken by CNSC inspectors at the SRBT Facility were received by the CNSC Laboratory on February 21, 2017 for gross beta (tritium) analysis.

The swipes were analysed for gross beta activity concentration within the tritium window using the liquid scintillation counter. A laboratory blank sample and a check sample were also included in the measurement sequence for quality control.

Result Summary:

The activity of each swipe is reported in unit of Bq/cm2 given a surface area of 100 cm2 and swipe removal efficiency of 10%. The minimum detectable concentration (MDC) for gross beta activity concentration within the tritium window is 0.050 Bq/cm2.

Results:

Sample Type: Swipe Analysis: Gross Beta

Sample Description / Location	Sample #	Result	Unit
Control	1	< 0.050	Bq/cm^2
Zone 1 Conference Room	2	< 0.050	Bq/cm^2
Zone 2 Shipping Counter	3	< 0.050	Bq/cm^2
Zone 2 Shipping Floor Entrance	4	0.42	Bq/cm^2
Zone 1 Fridge Handle	5	0.058	Bq/cm^2
Zone 1 Lunch Room Counter	6	< 0.050	Bq/cm^2
Zone 1 LCS Paper Towel Handle	7	< 0.050	Bq/cm^2
Zone 1 Floor by LSC Waste Drum	8	0.71	Bq/cm^2
Zone 2 LSC Lab Computer Desk Top	9	0.12	Bq/cm^2
Zone 3 Barrier Floor	10	8.1	Bq/cm^2
Zone 3 Anteroom Chart Recorder Table	11	0.82	Bq/cm^2
Zone 2 Barrier Floor	12	1.8	Bq/cm^2
Zone 2 Barrier Bench	13	18.1	Bq/cm^2
Zone 1 Office Desk Manager HP&RA	14	0.10	Bq/cm^2
Zone 1 Office Desk VP	15	0.065	Bq/cm^2

Appendix B. **Photographs**

Inspection Photos

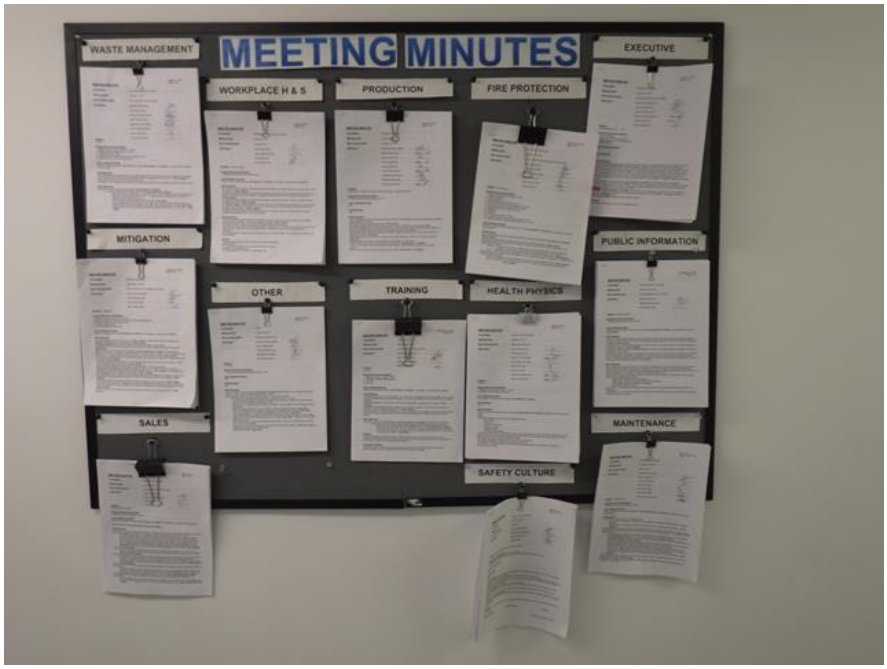

Figure 1. Posting of Committee Meeting Minutes

Figure 2. Barrier Transition Procedure

Figure 3. Radiation Warning Signs at Zone 3 Barrier

Figure 4. Radiation Warning Sign on Waste Storage Area Door

Figure 5. Portable Tritium In Air Monitor Serial Number 4198

Figure 6. Portable Tritium In Air Monitor Serial Number 4196

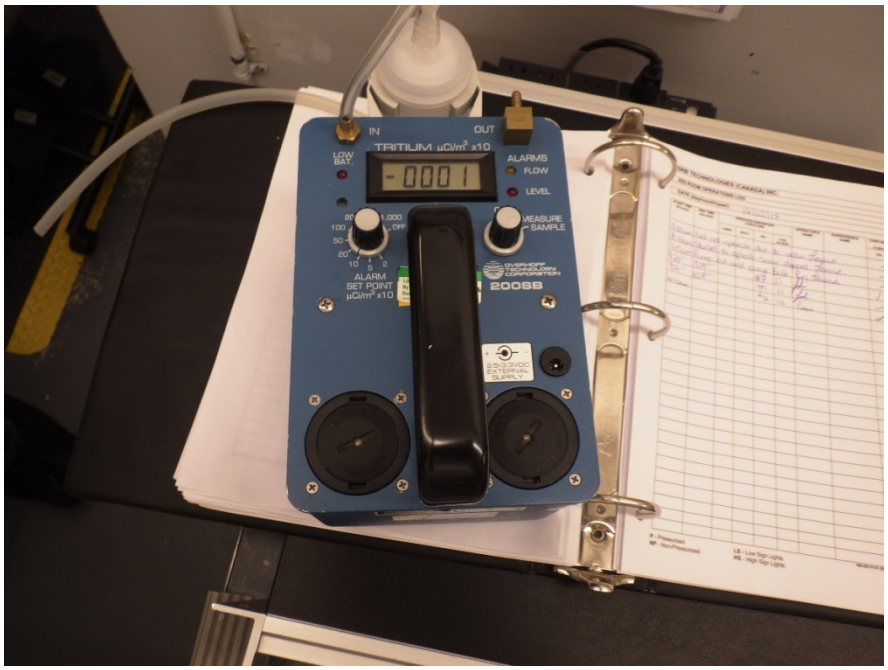

Figure 7. Portable Tritium In Air Monitor

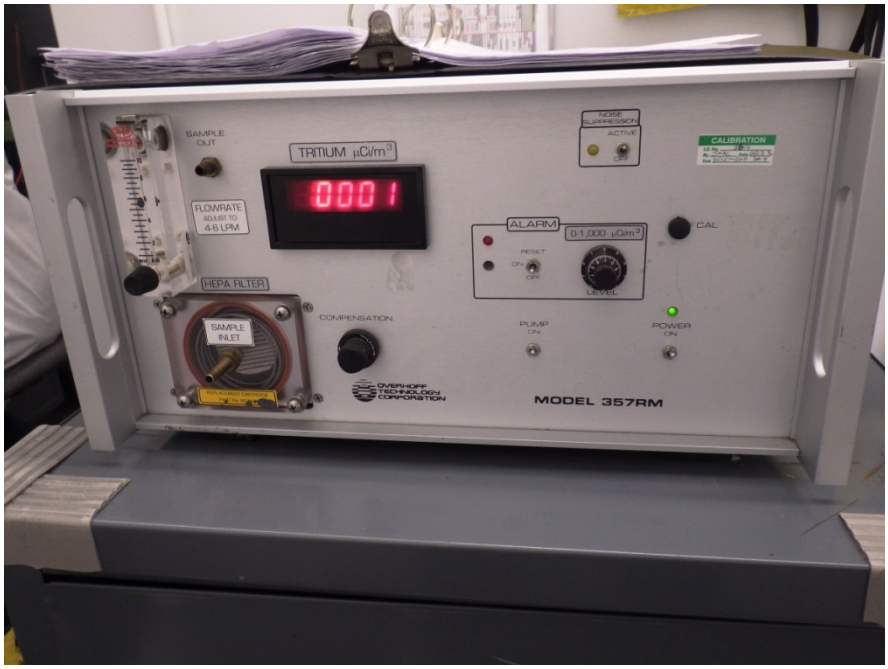

Figure 8. Fixed Tritium In Air Monitor Serial Number 2814

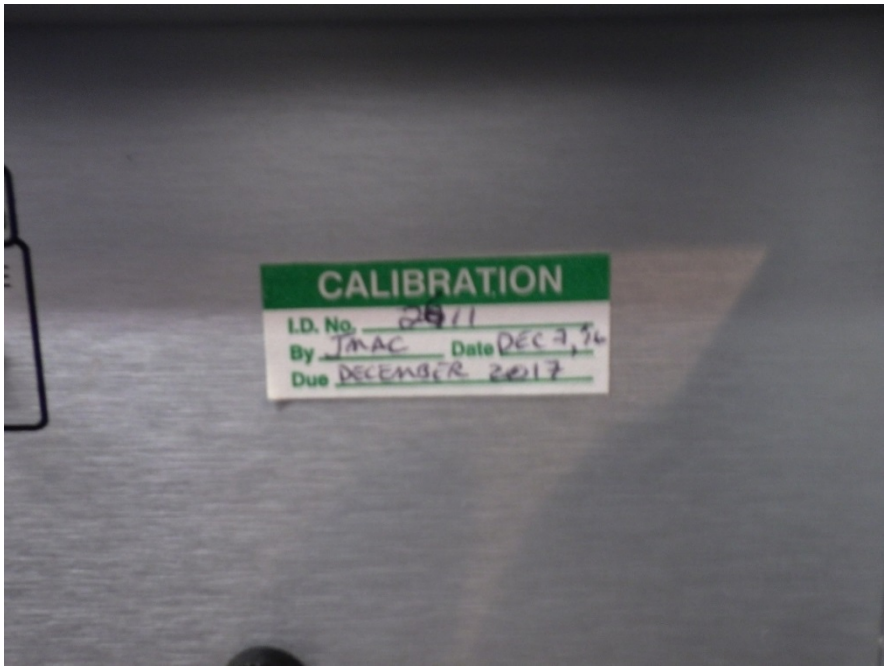

Figure 9. Fixed Tritium In Air Monitor Serial Number 2811

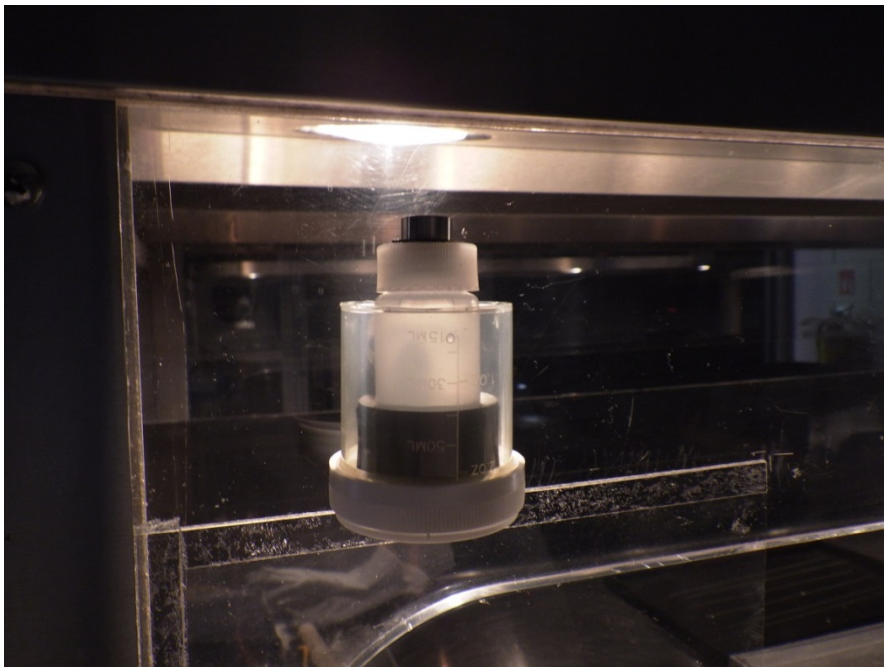

Figure 10. Airborne passive sampler, Laser Cutting Room