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SRBT

ISO 9001

SRB Technologies (Canada) Inc.
320 Boundary Road, Suite 140
Pembroke, Ontario

Emergency Plan

Revision 6 – February 27, 2017

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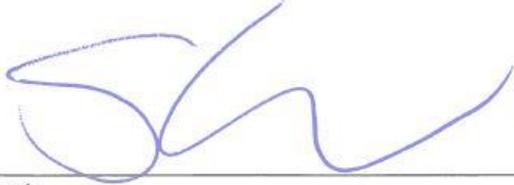
DOCUMENT REVIEW

Implementation Date	Reviewed By:	Revision Notes
July 1, 2006	Stephane Levesque	First issue
September 15, 2008	Stephane Levesque Ross Fitzpatrick	Changes made to Emergency Plan to address CNSC Staff letter dated February 21, 2008 and to reflect changes made to Fire Protection Program.
August 27, 2012	Ross Fitzpatrick Dan Herback Stephane Levesque	Changes made to Emergency Plan to update emergency contacts and to incorporate instructions in the event of extreme weather events. Details in letter to CNSC Staff dated August 27, 2012.
February 14, 2013	Ross Fitzpatrick Dan Herback Katie Levesque Stephane Levesque	Changes made to Emergency Plan to address CNSC Staff e-mail dated November 1, 2012.
October 7, 2015	Stephane Levesque Ross Fitzpatrick Katie Levesque Jamie MacDonald Dan Herback Doug McNab	Changes made to Emergency Plan to meet requirements of REGDOC-2.10.1 (Emergency Management and Fire Protection: Nuclear Emergency Preparedness and Response) and SRBT Operating Licence and associated Licence Conditions Handbook.
February 27, 2017	Ross Fitzpatrick Dan Herback Katie Levesque Stephane Levesque Jamie MacDonald	Changes made to document to correct several errors in grammar, formatting and wording after review by Fire Protection Committee. Changed 'Security and Workplace Safety Specialist' to 'Manager – Safety and Security'. Incorporated reference to Safety Analysis Report (Revision 3). Changed CNSC Project Officer name and updated Emergency Contact List.

EMERGENCY PLAN

The SRB Technologies (Canada) Inc. Emergency Plan is supported and approved by Senior Management:

SRBT Senior Management



President

Date: JAN 23, 2017



Vice-President

Date: JAN 24/2017



Executive Assistant

Date: Jan 22, 2017



Manager Health Physics and Regulatory Affairs

Date: JAN. 16, 2017



City of Pembroke Fire Chief

Date: JAN 16, 2017

TABLE OF CONTENTS

DESCRIPTION	PAGE
1.0 EXECUTIVE SUMMARY	10
2.0 INTRODUCTION	11
3.0 PURPOSE AND SCOPE	12
4.0 PROGRAM MANAGEMENT	13
5.0 ROLES AND RESPONSIBILITIES	14
6.0 PLANNING BASIS	17
6.1 EMERGENCY RESPONSE	17
7.0 EMERGENCY PREPAREDNESS	18
7.1 EVACUATION	18
7.2 EQUIPMENT	19
7.3 PERSONNEL	20
7.3.1 COMPANY STAFF	20
7.3.2 RESPONDERS	20
7.4 ALARM MONITORING COMPANY	21
7.5 CANADIAN NUCLEAR SAFETY COMMISSION	21
7.6 CITY OF PEMBROKE	22
7.7 PROVINCIAL MEMBER OF PARLIAMENT	22
7.8 FEDERAL MEMBER OF PARLIAMENT	22
7.9 PUBLIC	22
7.10 TESTING THE IMPLEMENTATION OF EMERGENCY MEASURES	22
7.10.1 EMERGENCY EXERCISES	22
7.10.1.1 EMERGENCY EXERCISE FREQUENCY	23

DESCRIPTION	PAGE
7.10.1.2 EMERGENCY EXERCISE PROCEDURE	23
7.10.1.3 EMERGENCY EXERCISE RECORDS	23
7.10.1.4 EMERGENCY EXERCISE OBJECTIVES	23
7.10.2 EMERGENCY DRILLS	24
7.10.2.1 EMERGENCY DRILL FREQUENCY	24
7.10.2.2 EMERGENCY DRILL PROCEDURE	24
7.10.2.3 EMERGENCY DRILL RECORDS	25
7.10.2.4 EMERGENCY DRILL OBJECTIVES	25
8.0 EMERGENCY RESPONSE PROCEDURE	26
8.1 NOTIFICATION OF COMPANY STAFF	26
8.1.1 DURING WORK HOURS	26
8.1.2 OUTSIDE OF WORK HOURS	26
8.2 NOTIFICATION OF RESPONDERS	27
8.3 ASSESSMENT OF EMERGENCIES	27
8.3.1 EMERGENCY SCENARIOS	28
8.3.1.1 IMPACT OF A LARGE ROGUE VEHICLE	30
8.3.1.2 TORNADO ACCIDENT	30
8.3.1.3 SMOLDERING FIRE	30
8.3.1.4 BREACH IN SECURITY	30
8.3.1.5 OTHER NATURAL DISASTER	30
8.3.1.6 OFFSITE RELEASES	31
8.3.1.7 EXTREME WEATHER EVENTS	31
8.4 ASSISTING EMERGENCY RESPONDERS	31

DESCRIPTION	PAGE
8.5 MITIGATE RADIATION EXPOSURE	32
8.5.1 EVACUATION OF AREA	32
8.5.2 PROTECTIVE CLOTHING	32
8.5.3 DECONTAMINATION	32
8.5.3.1 PROTECTIVE CLOTHING	33
8.5.3.2 EQUIPMENT	33
8.6 MITIGATE THE EFFECTS ON THE ENVIROMENT	33
8.7 FORMAL NOTIFICATION OF EMERGENCY	33
8.7.1 CANADIAN NUCLEAR SAFETY COMMISSION	33
8.7.2 CITY OF PEMBROKE	34
8.7.3 PROVINCIAL MEMBER OF PARLIAMENT	34
8.7.4 FEDERAL MEMBER OF PARLIAMENT	34
8.7.5 PUBLIC	34
8.8 ASSESS RADIATION EXPOSURE	34
8.9 ASSESS LEVEL OF SURFACE CONTAMINATION	34
8.9.1 PROTECTIVE CLOTHING	35
8.9.2 EQUIPMENT	35
8.9.3 FACILITY	35
8.9.4 ENVIRONMENT	35
8.10 TERMINATION OF EMERGENCY RESPONSE	36
9.0 RECOVERY	37
10.0 DEVELOP CORRECTIVE ACTION	38
11.0 CONTINUOUS ASSESSMENT OF EMERGENCY PLAN	39

DESCRIPTION	PAGE
12.0 EMERGENCY PLAN MAINTENANCE AND REVIEW	40
13.0 EMERGENCY PLAN APPROVAL	41
14.0 DOCUMENT DISTRIBUTION	42
15.0 DOCUMENT RETENTION	43
16.0 REFERENCES	44

DESCRIPTION	APPENDIX
EMERGENCY RESPONSE PROCEDURE FORM	A
EARTHQUAKES	B
FLOODS	C
CHEMICAL RELEASE	D
POWER OUTAGE	E
TORNADOS	F
WILDFIRES	G

1.0 EXECUTIVE SUMMARY

The SRBT Emergency Plan (EP) has been revised to meet the requirements of the Canadian Nuclear Safety Commission (CNSC) issued Operating Licence, associated Licence Conditions Handbook (LCH) and applicable regulatory and guidance documents.

The following identifies the key documents that were utilized in the revision of the SRBT EP:

- Nuclear Substance Processing Facility Operating Licence, *NSPFOL -13.00/2022* and associated LCH;
- CNSC REGDOC-2.10.1 *Emergency Management and Fire Protection: Nuclear Emergency Preparedness and Response* and;
- CNSC guidance document G-225 *Emergency Planning at Class 1 Nuclear Facilities and Uranium Mines and Mills*.

2.0 INTRODUCTION

The SRBT EP and supporting plans and procedures has been developed to meet the requirements specified in the following:

- Nuclear Safety and Control Act;
- CNSC Regulations;
- Nuclear Substance Processing Facility Operating License, *NSPFOL - 13.00/2022* and associated LCH;
- CNSC REGDOC-2.10.1 *Emergency Management and Fire Protection: Nuclear Emergency Preparedness and Response* and;
- CNSC guidance document G-225 *Emergency Planning at Class 1 Nuclear Facilities and Uranium Mines and Mills*.

The EP has been developed based on the probability and potential severity of emergency scenarios associated with the operation of the facility.

The EP includes, preparing for, responding to, and recovering from the effects of accidental radiological and/or hazardous substance releases from the SRBT Class 1B nuclear facility.

SRBT occupies approximately 13,540 sq. ft. of a 35,390 sq. ft. multi-tenanted industrial building, located at 320-140 Boundary Road in Pembroke Ontario.

SRBT produces tritium filled glass tubes, which are placed in various device housings such as safety signs, aisle markers and special service lightings. These safety devices are utilized in commercial, military and aircraft applications utilized in various locations throughout the world.

3.0 PURPOSE AND SCOPE

SRBT is a Class 1B nuclear facility licensed under the CNSC. Emergency management and fire protection are key factors in the licensing process. SRBT has developed a comprehensive EP to meet SRBT's Operating Licence, associated LCH and the CNSC's REGDOC-2.10.1.

REGDOC-2.10.1 *Emergency Management and Fire Protection – Nuclear Emergency Preparedness and Response* sets out the emergency preparedness requirements and guidance of the CNSC related to the development of emergency measures for licensees of Class 1 nuclear facilities to satisfy:

- the requirements of subsection 24(4) of the Nuclear Safety and Control Act, by demonstrating that the applicant will, in carrying on the proposed activity, make provision for the protection of the environment, the health and safety of persons, and the maintenance of national security and measures required to implement international obligations to which Canada has agreed and;
- paragraph 6(k) of the Class 1 Nuclear Facilities Regulations.

The EP includes four key components:

- planning basis;
- emergency response plan and procedures;
- preparedness and;
- program management.

The EP has been developed in a manner that is commensurate with the complexity of the facility's associated undertakings, as well as the probability and potential severity of the emergency scenarios associated with the operation of facility.

4.0 PROGRAM MANAGEMENT

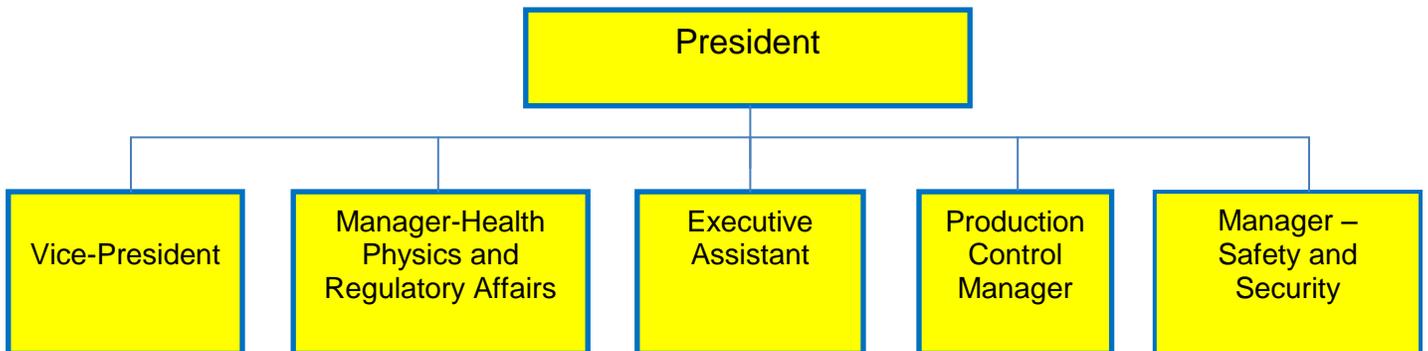
The President of SRBT (hereinafter “President”) has the overall responsibility for the oversight and management of the EP for the SRBT facility. The EP is a key first line document managed under the SRBT Quality Management System. The President of SRBT is responsible for the implementation and review of the EP according to SRBT’s Quality Management System.

In accordance with SRBT’s Operating Licence and LCH, SRBT is committed to submitting any proposed changes to the EP to the CNSC within 30 days prior to implementation.

5.0 ROLES AND RESPONSIBILITIES

SRBT has established an Emergency Response Organization (ERO) which defines roles and responsibilities of each ERO team member.

SRBT Emergency Response Organization (ERO)



The President has the overall responsibility for the design, management and implementation of the EP for the SRBT facility and his responsibilities include:

- assuming the role of Incident Commander (IC) during an emergency and/or exercise;
- ensuring the EP meets all licence regulatory requirements including REGDOC-2.10.1 and all applicable internal programs and procedures;
- scheduling and coordinating meetings with ERO team members;
- scheduling and coordinating emergency exercises;
- ensuring all ERO team members have been trained and assume their duties;
- assessing an emergency and/or exercise in conjunction with Pembroke Fire Department and other off-site responders as required;
- designating a SRBT staff member to assist and provide advice to a senior member (i.e. Fire Captain) of the Pembroke Fire Department who will be stationed outside of the SRBT facility in an emergency situation and/or exercise;
- ensuring that all SRBT staff are properly trained to assume their roles and responsibilities as per the EP;
- determining when an emergency and/or exercise will be terminated based on discussions with key personnel including off-site responders;
- completing of the Emergency Response Procedure Form as per Appendix A of the EP following the termination of the emergency and/or exercise; and
- liaise with the applicable authorities i.e. CNSC.

The Vice-President will assume the full responsibilities of the President in his absence and assist the President in his duties as required which include the design and maintenance of the EP. His responsibilities include:

- providing assistance to the President and other ERO team members as needed;
- liaise with the Pembroke Fire Department with regards to scheduling emergency exercises;
- assuming the lead role as IC in the absence of the President.

The Executive Assistant responsibilities include:

- assuming the lead role as Communications Officer during an emergency and/or exercise;
- providing notification to all key personnel as per the emergency contact list in the event of an emergency and/or exercise;
- providing ongoing updates to SRBT staff assembled at Pem Ice II;
- providing ongoing communications with the CNSC staff (including Duty Officer) and any other applicable authorities;
- updating the media and SRBT's Public Information Program and social media (Facebook) as required; and
- collect and maintain completed Appendix A document.

The Manager, Health Physics & Regulatory Affairs responsibilities include:

- assuming the lead role in assessing radiological impacts during an emergency and/or exercise;
- conducting radiological surveys during emergency and/or exercise;
- collecting and analyzing swipe and other samples taken during and following an emergency and/or exercise;
- documenting radiological results;
- liaise and provide radiological related advice directly to IC and other ERO team members;
- ensuring SRBT staff and off-site responders involved in the emergency and/or exercise provide bioassay samples as required;
- assessing and determining any radiological releases from the facility;
- ensuring monitoring and sampling equipment is available and maintained;
- assigning roles and responsibilities to SRBT health physics team members during emergency and/or exercise as needed; and
- ensuring appropriate contamination swipe surveys are taken on off-site responders and affected equipment in an emergency and/or exercise.

The Production Control Manager responsibilities include:

- assuming the lead role in conducting SRBT staff accountability verification at the Marshalling Area in the event of an emergency and/or exercise;
- ensuring SRBT staff follow the designated route from the Marshalling Area to Pem Ice II;
- providing accountability information to the IC and Communications Officer;
- recording the time taken for SRBT staff to assemble at Marshalling Area and assemble at Pem Ice II if applicable during an emergency and/or exercise;
- ensuring access to Pem Ice II is available during an emergency and/or exercise;
- confirming and documenting staff accountability at Pem Ice II; and
- tracking of emergency and/or exercise start and stop times (using portable timers provided).

The Manager – Safety and Security responsibilities include:

- liaise in advance of an emergency exercise with off-site responders;
- carrying out activities as direct by Incident Commander during an emergency and/or exercise;
- utilization and management of the personnel tracking system during an emergency, for personnel accountability and location determination, and
- assuming the lead role with regards to health and safety aspects of SRBT staff during an emergency and/or exercise.

Notes:

- In the situation where the President and Vice-President are not available during an emergency, the Manager of Health Physics & Regulatory Affairs will assume the role of the IC.
- A back-up person will be assigned and trained for each of the ERO positions. This will provide additional coverage should a first line ERO team member not be available during an emergency and/or exercise.

6.0 PLANNING BASIS

The EP is based on the hazards that could have an adverse impact on the facility, environment and the health and safety of staff and / or the public. The development of the EP took into account the internal and external events based on SRBT's Safety Analysis Reports.

The EP covers the following emergency elements:

- response organization and staffing;
- categorization, activation and notification;
- response procedures;
- assessment;
- offsite response organization interface and support;
- personal protection;
- response facilities and equipment;
- public communications;
- recovery and;
- validation of the EP.

6.1 EMERGENCY RESPONSE

In the event of an emergency and/or exercise the IC is responsible for coordinating activities and ensuring that ERO team members assume their defined roles and responsibilities. The Vice-President is also required to assume the full duties of the IC in his absence and/or otherwise assist the IC in his duties.

Emergencies can occur during and outside of work hours. During work hours the ERO team members will be on-site. If an emergency takes place outside of work hours, the ERO team members would immediately be notified and will be expected to respond within 30 minutes of being contacted.

When an emergency resulting in an accidental release of nuclear substances and/or hazardous substances is detected or suspected, the IC will assess and determine the severity of the emergency and respond accordingly.

The EP outlines the various emergency scenarios that could take place at the facility along with response actions. In the majority of cases, the Pembroke Fire Department is the key off-site responder. Additional off-site response may include assistance from the OPP, local paramedic team and Pembroke Regional Hospital.

A Fire Safety Plan has been developed and would be implemented in the event of a fire occurring at the SRBT facility. The Pembroke Fire Department has reviewed, approved and maintains a copy of SRBT's Fire Safety Plan.

7.0 EMERGENCY PREPAREDNESS

The EP has been developed to ensure that SRBT staff, equipment and infrastructure are in place to respond to an emergency and/or exercise in accordance with documented procedures.

7.1 EVACUATION

Upon notification to evacuate the SRBT facility, SRBT staff must:

- secure work areas and leave them in a safe state;
- immediately exit the facility via the closest exit door;
- close but do not lock doors;
- ensure pathways are clear as best as possible when exiting the facility;
- if possible, verbally inform other SRBT staff of nature and location of the emergency while exiting the facility;
- proceed to the Marshalling Area;
- assemble at the Marshalling Area for accountability verification;
- wait at the Marshalling Area until advised that it is safe to return to the facility or to transfer to Pem Ice II;
- follow designated routes to Pem Ice II as instructed; and
- IC will make a decision on whether or not it is safe to return to the facility following the termination of the emergency.

Notes:

- There will be a direct communications link between the ERO team member in charge at Pem Ice II with the IC. SRBT staff must remain at Pem Ice II until granted approval to leave by the IC for safety and security reasons; and
- SRBT staff are not permitted to re-enter the SRBT facility during and following an emergency and/or exercise unless approved by the IC and the PFD.

7.2 EQUIPMENT

Personal protective equipment and supplies are available to be utilized in the event of an emergency.

Communication equipment includes several two-way portable radios as well as cell phones that will be used by key responders in the event of an emergency and/or exercise. SRBT staff have been trained on the proper use of these devices. The use of the two-way radios and cell phones provides an effective means of communication between the IC, the SRBT staff at the Marshalling Area and/or Pem Ice II.

Portable timers (stopwatches) are located at each exit door of the facility along with the emergency contact list. These devices are used to record the start and stop times of the various sequences of an emergency and/or exercise.

The sprinkler system, fire extinguishers, emergency lighting, manual pull stations, visual and audio fire annunciators are in place to cope with many emergencies, predominantly those that would arise as a result of a fire. Equipment and systems are regularly tested in accordance with the requirements of the SRBT Fire Protection Program. This equipment is maintained in accordance with the facility Maintenance Program. Records of completed inspection, testing and maintenance are kept on file.

SRBT's facility alarm monitoring system is required to cope with many emergencies, predominantly those that would arise as a result of a fire or security breach. This equipment is regularly tested and maintained in accordance with the SRBT Security Program. Records of completed inspection, testing and maintenance are kept on file.

The stack monitoring system and chart recorder are installed at the SRBT facility and would be used to assess a radiological release of tritium from the facility in the event of an emergency. This equipment is maintained and tested in accordance with the facility Radiation Protection Program. Records of completed inspection, testing and maintenance are kept on file.

Liquid scintillation counters on-site will be used for assessing swipe results taken in various locations throughout of the facility during and following an emergency. This equipment is inspected, tested and maintained in accordance with approved procedures. Records of completed inspection, testing, maintenance and calibration are kept on file.

Tritium-in-air monitors on-site (portable and fixed) will be used for assessing tritium releases during and following an emergency. This equipment is inspected, tested and maintained in accordance with approved procedures. Records of calibration are kept on file.

All portable and stationary radiological survey and test equipment is calibrated on a routine basis and in accordance with the SRBT Radiation Safety Program and Quality Management System. Records are kept on file.

7.3 PERSONNEL

In the event of an emergency and/or exercise the IC and ERO team members are responsible for carrying out their assigned duties as specified in the EP. Duty assignment may vary based on the emergency scenario in question.

The IC, Vice-President and ERO team members have the required knowledge and experience to perform key duties in the event of an emergency and/or exercise.

7.3.1 COMPANY STAFF

SRBT staff are required to adhere to all the requirements in the EP and SRBT's Fire Protection and Radiation Protection Programs.

SRBT staff are required to exit the building as quickly and as safely as possible while following the designated routes to the Marshalling Area during an emergency and/or exercise. If possible, SRBT staff should verbally inform others of the nature and location of the emergency while exiting the facility.

SRBT staff are provided with basic emergency training on a yearly basis. This is one component that is included as part of the in-house radiation protection training as defined in the Radiation Protection Program. Included in this training is a presentation delivered by the President on emergency procedures which also includes a questions and answers session. SRBT staff training records are kept on file.

SRBT staff are also provided with additional emergency training given by Pembroke Fire Department. Training includes the use of fire extinguishers as outlined in the Fire Protection Program. Staff sign a record attesting to the fire extinguisher training which is kept on file.

During an emergency and/or exercise, the IC may at his discretion assign duties to the Vice-President or ERO team members. Members of the ERO are trained to perform radiological tasks and can assist during an emergency. These tasks include taking samples in the environment, conducting radiological surveys, taking swipe samples, analyzing results and ensuring personnel provide bioassay samples as required. The duties assigned would fall to those that are properly trained and training records are kept on file.

SRBT staff must direct all inquiries from the media, members of the public and others to the Executive Assistant and / or the Incident Commander.

7.3.2 RESPONDERS

On-site and off-site responders will participate during an emergency and/or exercise.

On-site responders include the IC, Vice-President and associated ERO team members.

Off-site responders will include the Pembroke Fire Department, and may include the OPP, the local paramedics and Pembroke Regional Hospital.

One or multiple emergency responders may be required depending on the emergency scenario.

The Pembroke Fire Department are provided with SRBT specific facility training at least once every 5 years. Tours of the facility are conducted for new personnel including volunteers for the Pembroke Fire Department and on a regular basis. The Pembroke Fire Department is fully versed in SRBT's Fire Protection Program including the safety fire systems that are in place at SRBT. The Pembroke Fire Chief is an Authority Having Jurisdiction (AHJ) for SRBT's Fire Protection Program. The Pembroke Fire Department is involved in preparing and participating in emergency exercises conducted at the SRBT facility.

The Pembroke Fire Department is also provided with copies of all hypothetical worse case release scenarios that were submitted to the CNSC in support of the licensing of the SRBT facility. Any updates to the EP and related scenarios are also provided to the Pembroke Fire Department for their review. Hypothetical worse case release scenarios are also discussed in detail during the training of the firefighters.

SRBT works with the OPP to ensure responders have a appropriate level of familiarity, and that the facility is well understood by their organization. A Memorandum of Understanding (MOU) is on file between SRBT and the OPP, and all training and familiarization is performed in accordance with it.

SRBT has also completed an MOU with the Pembroke Fire Department with regards to the replacement of any protective equipment or clothing should these items become contaminated during an emergency.

MOU's are also being considered with other off-site responder groups. SRBT continues to work with off-site responders to identify additional training that may be relevant when responding to an emergency at SRBT.

7.4 ALARM MONITORING COMPANY

A local alarm monitoring company has been contracted by SRBT and is required to alert various responder groups and authorities. The alarm monitoring company is provided with instructions and contact names in the event of an emergency at SRBT.

7.5 CANADIAN NUCLEAR SAFETY COMMISSION

The CNSC will be notified within 15 minutes of the declaration of an emergency and/or exercise taking place at the facility. CNSC staff will include Duty Officer and key licensing personnel (refer to contact list for details). The CNSC has also been provided with copies of all hypothetical worse case scenarios in support of the licensing of the facility. Any updates are also submitted to the CNSC for review and comment.

7.6 CITY OF PEMBROKE

The City of Pembroke will be notified verbally and in writing of any emergency associated with the facility as soon as possible after the emergency has occurred.

7.7 PROVINCIAL MEMBER OF PARLIAMENT

The Provincial Member of Parliament will be notified verbally and in writing of any emergency associated with the facility as soon as possible after the emergency has occurred.

7.8 FEDERAL MEMBER OF PARLIAMENT

The Federal Member of Parliament will be notified verbally and in writing of any emergency associated with the facility as soon as possible after the emergency has occurred.

7.9 PUBLIC

SRBT has developed and implemented a comprehensive Public Information Program and Public Disclosure Protocol in accordance with the CNSC regulatory document RD/DG-99.3 titled *Public Information and Disclosure*.

The company also maintains a public notifications link on the SRBT web site to inform the public in the event of an emergency associated with the facility.

7.10 TESTING THE IMPLEMENTATION OF EMERGENCY MEASURES

The implementation of emergency measures to prevent, mitigate, or control the adverse effects of an accidental release are tested by conducting exercises and drills.

7.10.1 EMERGENCY EXERCISES

As defined in REGDOC-2.10.1, an emergency exercise is a simulation of emergency events in order to test the integrated performance of an emergency response scenario. This includes an evaluation of the adequacy of the procedures and training of ERO team members to respond to an emergency.

Emergency exercises typically take place over several hours in order to test the integrated performance of the EP. Typical attributes of an emergency exercise include the mobilization of resources in a realistic environment over an extended period of time, demonstration of mutual aid agreements and testing of communication systems, public information systems and testing of emergency facilities and equipment readiness.

The EP is specifically based on accidental release scenarios that could have an adverse impact on the environment and the health and safety of on-site staff or the public.

The accidental release scenarios used are those assumed in the Safety Analysis Report^[1] and Review of Hypothetical Incident Scenarios^[2] submitted in support of the licensing of the facility.

7.10.1.1 EMERGENCY EXERCISE FREQUENCY

Emergency exercises are conducted at least once every five years. The latest full scale emergency exercise was conducted on February 9th, 2015 at the SRBT facility.

7.10.1.2 EMERGENCY EXERCISE PROCEDURE

During the planning of an emergency exercise the President selects an accidental release scenario defined in section 8.3.1 titled “Emergency Scenarios” of the EP.

The President plans the actions to be taken during the exercise with assistance from ERO team members, SRBT supervisory staff and representatives from off-site responders.

Each ERO team member will be provided with an approved copy of the emergency exercise documents and will be informed of their roles and responsibilities during the exercise.

The IC, Vice-President, and ERO team members as well as key off-site emergency responders will meet in advance of the exercise for a briefing session. During the briefing session the IC will clearly stress that should a real emergency take place during the exercise he will announce the words “real event” which will cancel the exercise and appropriate measures will be taken to deal with the emergency. The IC will also stress the importance of frequently using the words “this is an exercise” both verbally and over the radios when conducting the emergency exercise.

Following each emergency exercise, the IC, Vice-President, ERO team members, SRBT staff, and off-site emergency responders will attend a debriefing session to report on the actions and the reactions of participants involved in the emergency exercise and discuss any positive and negative points highlighted.

SRBT Management will prepare a comprehensive emergency exercise report within 60 days of the completion of the emergency exercise. The report will include any corrective actions that need to be addressed as a result of the emergency exercise. This report will be available to CNSC staff.

7.10.1.3 EMERGENCY EXERCISE RECORDS

Details of the emergency exercise and exercise results are recorded and retained by SRBT Management.

7.10.1.4 EMERGENCY EXERCISE OBJECTIVES

The President, Vice-President, ERO team members, SRBT supervisory staff and off-site emergency responders will analyze and assess if the emergency exercise objectives were met. Corrective actions will be raised if items of non-compliance with the EP were identified.

General emergency exercise objectives are as follows:

- mitigation of the dose to SRBT staff, on-site and off-site responders and members of the public;
- mitigation of releases to the environment;
- mitigation of damage to equipment and the facility;
- adequate notification of stakeholders (the public, off-site responders, authorities, CNSC and elected officials);
- adequate ongoing communication with stakeholders (the public, off-site responders, staff, CNSC and elected officials);
- availability of off-site monitoring equipment and services;
- adequate termination of emergency and;
- adequate reporting.

7.10.2 EMERGENCY DRILLS

As defined in REGDOC-2.10.1 an emergency drill is a supervised instruction intended to test, develop, maintain, and practice the skills required in a particular emergency response activity.

An emergency drill involves a coordinated and supervised activity. Typical attributes of an emergency drill include: a narrow focus; limited number of personnel; specific equipment; timely feedback; and a realistic environment.

The purpose of an emergency drill or fire drill is to ensure that the occupants and staff are familiar with facility evacuation requirements as described in the EP and Fire Protection Program.

7.10.2.1 EMERGENCY DRILL FREQUENCY

Drills are conducted at the facility at least on a quarterly basis.

7.10.2.2 EMERGENCY DRILL PROCEDURE

All emergency fire drills are unannounced and the fire alarm is normally activated during the quarterly inspection of the sprinkler system, but can also be done by pulling a predetermined pull station.

All SRBT staff have been provided with proper training to respond to a fire alarm. Initial reaction is to close doors and exit the building via the closest exit door and report to the designated Marshalling Area.

The Production Control Manager or designate (Production Control Assistant) completes a staff accountability verification for their appropriate staff and provides verbal information to the personnel completing the head count for the entire facility.

Once staff accountability has been completed and the fire alarm has been cleared, SRBT Management will notify SRBT staff to return to their work stations in the facility.

After the emergency fire drill has been terminated, members of the Fire Protection Committee will schedule a meeting to discuss the results of the emergency fire drill. The Fire Protection Committee will discuss various aspects of the fire drill and will review the Fire Alarm Drill Reports. If any deficiencies or issues are identified follow up actions will be taken and recorded.

7.10.2.3 EMERGENCY DRILL RECORDS

Details of the drill and drill results are recorded and retained with the Fire Drill Reports.

7.10.2.4 EMERGENCY DRILL OBJECTIVES

The President and Vice-President determines if the set objectives for the emergency drill have been met and if any corrective actions are required.

General emergency drill objectives are as follows:

- alerting all staff and other personnel;
- evacuating all staff and other personnel;
- verifying staff accountability at Marshalling Area and;
- Fire Protection Committee review and assessment of emergency drill and associated reports.

8.0 EMERGENCY RESPONSE PROCEDURE

A number of activities will take place as part of the emergency response process. This process will include a number of measures to mitigate the effects of accidental releases of nuclear substances on the environment, the health and safety of persons and the maintenance of security.

Emergency scenarios can vary in nature including response procedures. However, the basic steps that must be addressed are included in the Emergency Response Procedure Form found in Appendix A of the EP.

The Emergency Response Procedure Form is to be used and completed by the IC. The Emergency Response Procedure Form will be available with the IC but will be fully completed following the termination of the emergency and/or exercise.

8.1 NOTIFICATION OF COMPANY STAFF

Emergencies can occur during and outside of work hours. As the company normally operates Monday to Thursday between 7:00 am to 7:00 pm, and on Friday 7:00 am to 4:00 pm, SRBT staff are not expected to be present on-site outside of those hours.

8.1.1 DURING WORK HOURS

During work hours the IC would be aware or notified by other SRBT staff of an emergency quickly after its occurrence. All staff would be on site ready to support the efforts to address the emergency by performing the duties requested by the IC.

Emergency scenarios due to fire or breach in security would also be detected by the fire alarm/security system which is being monitored by an alarm monitoring company.

In the event that a fire is detected within the facility, the alarm monitoring company alerts the Pembroke Fire Department.

8.1.2 OUTSIDE OF WORK HOURS

Emergency scenarios due to fire or breach of security are those most likely to occur outside of work hours.

Emergency scenarios due to fire or breach of security would be detected by the fire alarm/security system which is being monitored by an alarm monitoring company.

In the event that a fire is detected within the facility, the alarm monitoring company first alerts the Pembroke Fire Department. In the event that a breach of security is detected within the facility, the alarm monitoring company first alerts the OPP.

The alarm monitoring company is then required to alert the first individual on the SRBT emergency contact list.

In the event that the President cannot be reached, the alarm monitoring company will proceed and contact the second individual on the SRBT emergency contact list.

In the event that the President or Vice-President cannot be reached, the alarm monitoring company will proceed and contact the subsequent individuals on the SRBT emergency contact list.

Once an SRBT employee listed on the emergency contact list has been made aware of an emergency they have the responsibility to ensure that the President or Vice-President is notified of the emergency.

All SRBT employees listed on the emergency contact list have the responsibility of initiating response to an emergency scenario. These individuals are typically members of the ERO and possess the qualifications and experience required to perform the basic activities required to initiate emergency response.

The President or Vice-President has the responsibility to carry out the Emergency Response Procedure Form in Appendix A as a result of an emergency scenario including coordinating activities during emergency and assigning duties during a response.

These individuals are typically long standing members of senior management and possess the qualifications and experience required to carry out the Emergency Response Procedure.

8.2 NOTIFICATION OF RESPONDERS

In the event that the responders were not contacted by the alarm monitoring company the President and/or Vice-President must ensure that the relevant on-site and/or off-site responders are contacted within 15 minutes of categorizing the event to address an emergency scenario.

The off-site emergency responder (Pembroke Fire Department) at their discretion may also choose to contact other supporting emergency responders to address the emergency scenario.

The CNSC will also be contacted within 15 minutes of an emergency being declared. Members of the public at the discretion of the off-site emergency responder (Pembroke Fire Department) may also be contacted as part of addressing the emergency scenario.

8.3 ASSESSMENT OF EMERGENCIES

When an emergency is detected or suspected the IC will determine the severity of the emergency, and respond in accordance with an emergency scenario which best resembles the characteristics of the emergency detected. This will allow the IC to follow the appropriate sequence of activities outlined in the Emergency Plan.

The IC along with assistance from the ERO team members will assess the situation and take the appropriate measures based on the emergency scenario and contact off-site emergency responders within 15 minutes of the emergency being declared. In emergency situations the Pembroke Fire Department would be contacted as the first off-site responder. Personnel from the Pembroke Fire Department have knowledge and training regarding operation activities conducted at the SRBT facility including the radiological and other associated hazards. Assistance from other off-site responders would be implemented as per advice and information from the Pembroke Fire Department and the IC.

8.3.1 EMERGENCY SCENARIOS

The emergency plan is developed based on the probability and potential severity of the emergency scenarios associated with the operation of the facility.

The scenarios identified within the EP are realistic in nature and are based on Safety Analysis Reports and Review of Hypothetical Incident Scenarios.

Releases of tritium resulting from the operations which are well below any weekly administrative limit or action level resulting in doses to a member of the public well below the public dose limit of 1 millisievert (mSv) are not defined as emergencies and do not require emergency response. Accidental releases of tritium such as the release of the entire contents of a pyrophoric unit and bulk container are prevented by having numerous safety system and components in place thus making this scenario unrealistic.

In addition accidental releases of tritium would occur over a very short period of time where the effects could not be mitigated. Doses to a member of the public should either of these scenarios occur would be well below the public dose limit of 1 mSv and are also not defined as emergencies and do not require emergency response.

The EP is specifically based on release scenarios that could have an adverse impact on the environment and the health and safety of on-site staff or the public. The release scenarios used in developing the EP are those assumed in the Safety Analysis Report^[1] and Review of Hypothetical Incident Scenarios^[2] submitted in support of the licensing of the facility.

Hazardous substances located at the SRBT facility are limited and would not create an emergency as a result of a spill or release. Tritium is the only substance in the facility, found in large enough quantity, which could in very unlikely circumstances yield accidental releases and result in an event defined as an emergency.

Over the years SRBT has had several Safety Analysis Reports completed that assess the worst case scenarios for accidental release of tritium to the public and the environment.

In 1996 a consultant prepared a Safety Analysis Report^[4] to address potential radiological impact from a hypothetical release of tritium from our facility from three unlikely incident scenarios.

In 2000, a third party consultant prepared two Safety Analysis Reports^{[5][6]} to address potential radiological impact from a hypothetical release of tritium from a smoldering fire incident at our facility.

In 2008, SRBT performed a Review of Hypothetical Incident Scenarios^[2] for the facility considering improvements made to the safety programs and procedures and the equipment and system upgrades that have been implemented over the years. The analytical method, calculations and parameters used to calculate the maximum dose to a receptor from the hypothetical incident scenarios was also reviewed. Findings were reported in a document titled Review Of Hypothetical Incident Scenarios^[2].

The Safety Analysis Reports^{[1][3][4][5][6]} and the subsequent Review Of Hypothetical Incident Scenarios^[2] which were submitted in support of the licensing of the facility show the very low potential for radiological exposure due to uptake of tritium from accidental releases to the environment. For this reason, the requirement for evacuation of members of the public only exists as a result of threat of injury due to fire. Other scenarios which could result in accidental release of tritium have also been described for the purpose of the Emergency Plan.

8.3.1.1 IMPACT OF A LARGE ROGUE VEHICLE

In this scenario it was determined that 16,025 Ci would be released from the impact of a large rogue vehicle. It was calculated that a member of the public, at maximum would received a dose of 0.142 mSv.

This scenario will require that the Pembroke Fire Department and OPP are contacted to provide assistance in dealing with the incident. The CNSC and the public will also have to be notified of the incident.

8.3.1.2 TORNADO ACCIDENT

In this scenario it was determined that 97,297 Ci would be released from a tornado incident. It was calculated that a member of the public, at maximum would received a dose of 0.147 mSv.

This scenario will require that the Pembroke Fire Department is contacted to provide assistance in dealing with the incident. The CNSC and the public will also have to be notified of the incident.

8.3.1.3 SMOLDERING FIRE

In this scenario it was determined that 219 Ci would be released from the breakage of tritium tubes from the force exerted by the spray from a fire extinguisher used by a staff member during a smoldering fire. It was calculated that a staff member, at maximum would received a dose of 12.41 mSv.

The Fire Safety Plan in the Fire Protection Program describes the procedures to be conducted as a result of this scenario. The CNSC will also have to be notified of the incident.

8.3.1.4 BREACH IN SECURITY

In this scenario it is assumed that up to a substantial quantity of tritium is released from the breakage of a number of tritium tubes by an individual during a breach in security.

This scenario will require that the OPP is contacted to provide assistance in dealing with the incident, restore security and perform an investigation. The CNSC will also have to be notified of the incident.

8.3.1.5 OTHER NATURAL DISASTER

In this scenario it is assumed that up to a substantial quantity of tritium released from the breakage of a number of tritium tubes during a natural disaster which would not involve a fire.

This scenario will require that the Pembroke Fire Department is contacted to provide assistance in dealing with the incident. The CNSC will also have to be notified of the incident.

8.3.1.6 OFF-SITE RELEASES

The off-site emergencies that are considered are transport incidents and accidents whereby the shipments of consignments containing gaseous tritium light sources may be involved.

The likelihood of a transport incident or accident is low. SRBT possesses the equipment and materials available to respond to an accident or incident involving tritium sources.

The potential hazard or risk to life and health due to an accident or incident whereby tritium is released is extremely low.

This emergency scenario may necessitate the support of Fire and Police Departments stationed near the incident.

Members of the SRBT ERO team are prepared to assist first responders in the event of an accident or incident involving tritium.

8.3.1.7 EXTREME WEATHER EVENTS

SRBT Health Physics personnel have reviewed all the information on the CNSC's web site titled *CNSC Information related to Japan earthquake*. Furthermore SRBT has reviewed Fukushima Nuclear Accident Update Log and Briefing on the IAEA web site.

As a result of this review^{[7][8]} general instructions have been included in Appendices B through G of the EP to provide guidance during the unlikely occurrence of extreme weather events.

This includes earthquakes, floods, chemical release, power outage, tornados and wild fires.

8.4 ASSISTING EMERGENCY RESPONDERS

Once the IC has determined or confirmed if an emergency has occurred he has the responsibility to provide support, manage and coordinate on-site and off-site emergency responders in performing their duties safely for the particular scenario in question. The IC is responsible to stay with, or ensure that an individual with thorough knowledge of the facility stays with, the command centre of off-site responders at all times.

The IC will also ensure proper radiological assessments are being conducted to monitor releases from the facility and maintain health and safety of persons, as well as security in and around the facility. The IC will utilize the service of other ERO team members as required.

8.5 MITIGATE RADIATION EXPOSURE

The IC has the responsibility to provide support and advice to on-site and off-site emergency responders to mitigate radiation exposure from an accidental release. The IC will utilize the services and expertise of on-site Health Physics and Radiation Safety personnel as required.

8.5.1 EVACUATION OF AREA

Due to the uncertainty with doses to receptors within 100 meters of the facility associated with some of the emergency scenarios, as an additional precaution to help mitigate any exposure to the public, an area of at least 200 meters in all directions around SRBT would be evacuated of all non-essential personnel. The Pembroke Community Centre (Pem Ice II) is located 200 m from the SRBT facility and has been defined as the location where non-essential personnel must convene during an emergency. It should be noted that no residences exist in this 200 meters perimeter.

The Pembroke Fire Department is the responsible authority that would help SRBT manage any fire emergency situation arising at the facility. The Pre-Incident Fire Safety Plan prepared by the Pembroke Fire Department requires that the Pembroke Fire Department evacuate an area at least 200 meters in all directions around SRBT of all non-essential personnel. In these situations the Pembroke Fire Department may seek the support of the OPP.

In an emergency situation where an evacuation of an area takes place the IC will confirm with the Pembroke Fire Department officials that the evacuation area has been established and maintained.

8.5.2 PROTECTIVE CLOTHING

A Self Contained Breathing Apparatus (SCBA) eliminates practically all tritium inhalation. The Pembroke Fire Department personnel are fully aware and properly trained to assure that SCBA's are worn when entering an emergency situation at the SRBT facility. The Pre-Fire Safety Plan prepared by the Pembroke Fire Department also mandates the use of full protective clothing including a SCBA.

Full protective clothing includes but is not limited to gloves, boots, helmets, pants, coats, etc.

In case of emergency, as an added check, the IC will confirm with fire responder officials that full protective clothing and SCBA's are worn.

8.5.3 DECONTAMINATION

The IC and Manager of Health Physics and Regulatory Affairs will ensure that decontamination is used to mitigate radiation exposure from being exposed to contaminated materials and surfaces.

8.5.3.1 PROTECTIVE CLOTHING

Full protective clothing (gloves, boots, helmets, pants, coats, etc.) and SCBA's potentially exposed to tritium shall be quarantined and kept in the SRBT facility or shipped to Canadian Nuclear Laboratories (CNL), if SRBT's facility is not available due to damage as a result of the emergency, for cleaning as required. Clothing may be cleaned by wiping it with wet cloths and disposing of the wet cloths accordingly.

8.5.3.2 EQUIPMENT

Any equipment potentially exposed to tritium used in an emergency response efforts shall be quarantined and kept in the facility or shipped to Chalk River Laboratories Waste Management Operations (if SRBT's facility is not available due to damage as a result of the emergency) for cleaning as required.

This equipment includes but is not limited to fire hoses, axes, ladders, etc. Equipment may be cleaned by wiping it with wet cloths and disposing of the wet cloths accordingly.

8.6 MITIGATE THE EFFECTS ON THE ENVIRONMENT

The IC has the responsibility to provide support and advice to emergency responders to mitigate the effects on the environment from an accidental release.

Depending on the emergency scenario in question this may result in advising fire responders to concentrate fire fighting efforts on areas where release of tritium has a higher consequence or probability or maintaining the integrity of the barriers that control potentially contaminated water in Radiological Zones 2 and 3.

8.7 FORMAL NOTIFICATION OF EMERGENCY

The IC will formally notify a number of stakeholders in the event of an emergency being declared in the SRBT facility. The IC maintains a contact list of all key personnel which is included in this EP.

8.7.1 CANADIAN NUCLEAR SAFETY COMMISSION

In any situation where an emergency has been declared, which could include the accidental release of tritium from the facility, the CNSC will be notified within 15 minutes of the emergency being declared.

8.7.2 CITY OF PEMBROKE

The City of Pembroke will be notified verbally and in writing of any emergency associated with the facility as soon as possible after the emergency has occurred.

8.7.3 PROVINCIAL MEMBER OF PARLIAMENT

The Provincial Member of Parliament will be notified verbally and in writing of any emergency associated with the facility as soon as possible after the emergency has occurred.

8.7.4 FEDERAL MEMBER OF PARLIAMENT

The Federal Member of Parliament will be notified verbally and in writing of any emergency associated with the facility as soon as possible after the emergency has occurred.

8.7.5 PUBLIC

The public will also be notified of any emergency associated with the facility on the public notifications link on the company web site as soon as possible after the emergency has occurred.

8.8 ASSESS RADIATION EXPOSURE

The IC will assign the properly trained member of the ERO to ensure that exposure to affected individuals are monitored. Radiological dose assessments would have to be performed to requirements of the Radiation Safety Program and second tier radiation safety procedures.

Once the emergency is under control the IC will assign one of the ERO team members to develop a list of the names of all emergency response personnel including names and their contact information. Each individual will be required to provide bioassay (urine) samples for analysis by SRBT or by Canadian Nuclear Laboratories (CNL) Environmental Technologies Branch Monitoring Services should SRBT's facility not be available.

Response personnel will also be requested to provide additional bioassay samples for a period up to 5 weeks following the emergency; SRBT will provide and pick up bioassay sample bottles from each noted individual.

The bioassay level and dose will be reported in writing to each emergency response personnel together with an explanation of the dose in context of other well known or natural radiation doses. All results should be kept on file and a report of the bioassay level and dose for all emergency responder personnel will also be provided to emergency response officials, the CNSC and Health Canada.

8.9 ASSESS LEVEL OF SURFACE CONTAMINATION

The IC has the responsibility to ensure that comprehensive radiological surveys are conducted in the facility following an emergency.

The IC will assign a trained and qualified ERO team member to take the required contamination surveys and conduct an analysis on site if possible. If analyses cannot be conducted on site, samples will be analyzed by qualified staff at CNL.

All sample results will be assessed to verify if regulatory clearance levels have been exceeded.

Appropriate remedial clean-up activities will be conducted by SRBT qualified staff following approved procedures as laid out in the SRBT Radiation Safety Program.

8.9.1 PROTECTIVE CLOTHING

Full protective clothing (gloves, boots, helmets, pants, coats, etc.) and SCBA's potentially exposed to tritium shall be quarantined and kept in the SRBT facility or shipped to CNL Waste Management Operations for surface contamination analysis by swipe measurements prior to cleaning. All results will be used and compared to regulatory clearance levels. Appropriate actions will be taken based on result levels, all swipe results will be kept on file.

8.9.2 EQUIPMENT

Any equipment potentially exposed to tritium in an emergency response efforts will be quarantined and kept in the facility or shipped to CNL Waste Management Operations for surface contamination assessment by swipe measurements prior to cleaning. This equipment includes but is not limited to fire hoses, axes, ladders, etc. All results will be used and compared to regulatory clearance levels. Appropriate actions will be taken based on result levels, all swipe results will be kept on file.

8.9.3 FACILITY

Surface contamination swipe sampling will be performed in any area of the facility that may have been exposed to tritium as a result of the emergency. Swipe sample locations may include, work surfaces, external walls of the facility, the roof, etc. All results will be assessed against regulatory clearance levels and remedial actions taken will be based on analysis results.

8.9.4 ENVIRONMENT

Areas in the environment outside the facility that may have been exposed to tritium as a result of the emergency will be checked for contamination levels. Sampling could include the assessment of tritium contamination in soil, vegetation, water, outside walls of neighboring establishments, and surfaces of parked vehicles, etc.

All results will be analyzed and assessed to regulatory clearance levels. Remedial actions taken will be based on analysis results. If any regulatory radiological release limits are exceeded during or following the emergency these will be highlighted with verbal notification immediately and written notification submitted to the CNSC within 21 days as per licensing requirements.

Data will be kept on file and provided to the CNSC on an ongoing basis during and following an emergency by the SRBT Manager of Health Physics and Regulatory Affairs or their designate.

8.10 TERMINATION OF EMERGENCY RESPONSE

The IC is responsible for determining when an emergency response can be terminated and the steps that need to be carried out as part of the termination of the emergency response and after the emergency response.

9.0 RECOVERY

Post incident recovery activities will be initiated as soon as possible after the termination of an emergency. The President will assume the lead role in the recovery operations and the ERO team members will be assigned key roles and responsibilities depending on the post incident recovery plans.

Recovery operations will include the following:

- repair of damaged structures;
- restoration of services, such as power, heating, cooling and communications;
- clearing of access routes; and
- radiological assessment and remedial actions.

Clean up of the incident site should begin as soon as possible under the direction of the President with the focus on personnel that have knowledge and hands on experience in health physics and radiation protection (i.e. Manager of Health Physics and Regulatory Affairs).

Tritium is the radiological consideration that must be addressed in remediation activities and proper protective clothing and equipment must be utilized in conducting radiological surveys, sampling and all associated contamination clean up actions.

Individuals involved in the recovery plans are those stated as members of the ERO team. Their recovery duties will be based on their experience and knowledge. If additional personnel and expertise is required, it will be handled on a case by case basis under the direction of the President.

10.0 DEVELOP CORRECTIVE ACTION

The President in conjunction with the Quality Manager and other key SRBT staff have the responsibility to ensure that corrective actions are developed to remediate the effects following an emergency. Corrective action(s) would have to be performed based on the requirements of the Quality Management System and second tier quality procedures.

11.0 CONTINUOUS ASSESSMENT OF EMERGENCY PLAN

Once an emergency response procedure has been carried out to its completion, the President and Vice-President along with staff which was assigned responsibilities to address the emergency scenario will be invited to review the effectiveness of the procedure that was performed. Comments from external agencies will also be solicited.

These findings will be used in future revisions of the EP.

12.0 EMERGENCY PLAN MAINTENANCE AND REVIEW

The President is responsible for the design and implementation of the EP.

Key staff including ERO team members that would be assigned responsibilities to emergency scenarios will be invited to review the emergency plan on an ongoing basis and provide input for future revisions.

The Pembroke Fire Department is involved in addressing most emergency scenarios and will therefore also be invited to review the emergency plan on an ongoing basis and provide input for future revisions.

New revisions of the Emergency Plan will also be issued to the CNSC for review and comment.

13.0 EMERGENCY PLAN APPROVAL

The EP must be approved by the President, Vice-President, and designated SRBT staff and the Pembroke Fire Chief.

14.0 DOCUMENT DISTRIBUTION

A copy of the SRBT EP is maintained at the SRBT facility and the President and Vice-President also maintain a copy at their home residence as well as keeping a copy in their vehicles. The Pembroke Fire Department also maintains a hard copy of the SRBT EP at the fire station.

The CNSC will also be provided a copy.

15.0 DOCUMENT RETENTION

Documentation including results relating to emergency response are maintained by the President. Records are retained for 10 years after the expiry date of the license to abandon the facility.

16.0 REFERENCES

- [1] SRB TECHNOLOGIES (CANADA) INC., Safety Analysis Report, Revision 3, January 2016.
- [2] SRB TECHNOLOGIES (CANADA) INC., Review of Hypothetical Incident Scenarios, Stephane Levesque, February 22, 2008.
- [3] SRB TECHNOLOGIES (CANADA) INC., Safety Analysis Report, Revision II, July 4, 2006.
- [4] Alpha-Dyne LLC, SAFETY ANALYSIS REPORT, Potential Radiological Impact From Hypothetical Release of Tritium At the SRB Technologies Canada Facility Located at 320 Boundary Road, Pembroke, Ontario, January 15, 1996.
- [5] Alpha-Dyne LLC, SAFETY ANALYSIS REPORT, Potential Radiological Impact From Hypothetical Release of Tritium From a Smoldering Fire Incident At the SRB Technologies (Canada) Facility Located at 320 Boundary Road, Pembroke, Ontario, October 16, 2000.
- [6] Alpha-Dyne LLC, SAFETY ANALYSIS REPORT, Potential Radiological Impact From Hypothetical Release of Tritium From a Smoldering Fire Incident that Causes Structural Failure of the Mezzanine At the SRB Technologies Canada Facility Located at 320 Boundary Road, Pembroke, Ontario, November 6, 2000.
- [7] SRB TECHNOLOGIES (CANADA) INC. letter, Stephane Levesque to Don Howard, "Request Pursuant to Subsection 12(2) of the General Nuclear Safety and Control Regulations: Lessons Learned from Japanese Earthquake", April 29, 2011.
- [8] SRB TECHNOLOGIES (CANADA) INC. letter, Stephane Levesque to Don Howard, "Request Pursuant to Subsection 12(2) of the General Nuclear Safety and Control Regulations: Lessons Learned from Japanese Earthquake", October 11, 2011.

APPENDIX A

EMERGENCY RESPONSE PROCEDURE FORM

1. EMERGENCY RESPONSE INITIATION

Indicate when the emergency response was initiated:

Time: _____
Day: _____
Month: _____
Year: _____

2. NOTIFICATION OF COMPANY STAFF (8.1)

Note how the notification was made:

- Personally became aware
- Notified by other staff
- Notified by Alarm Monitoring Company

3. NOTIFICATION OF RESPONDERS (8.2)

Indicate which responders that have been contacted:

- Pembroke Fire Department
- Ontario Provincial Police

4. ASSESSMENT OF EMERGENCIES (8.3)

Determine emergency scenario that best resembles current emergency:

- Impact of a large rogue vehicle (8.3.1.1)
- Tornado accident (8.3.1.1)
- Smoldering fire (8.3.1.1)
- Breach in security (8.3.1.1)
- Other natural disaster (8.3.1.1)
- Offsite releases (8.3.1.1)

5. ASSISTING EMERGENCY RESPONDERS (8.4)

Briefly list the expected effects of the emergency on:

The environment: _____
The health and safety of persons: _____
The maintenance of security: _____

6. MITIGATE RADIATION EXPOSURE (8.5)

- Confirm evacuation of area (8.5.1)
- Confirm that Self Contained Breathing Apparatus are used (8.5.2)
- Confirm that full protective clothing are worn (gloves, boots, helmets, pant, coats) (8.5.2)
- Ensure that protective clothing and equipment are quarantined after use (8.5.3)

7. MITIGATE THE EFFECTS ON THE ENVIRONMENT (5.6)

Provide advice to responders: _____
Rationale for advice: _____

8. FORMAL NOTIFICATION OF EMERGENCY (8.7)

Formally notify the following stakeholders of the emergency:

- Canadian Nuclear Safety Commission (8.7.1)
- City of Pembroke (8.7.2)
- Provincial member of parliament (8.7.3)
- Federal Member of Parliament (8.7.4)
- Public (8.7.5)

9. ASSESS RADIATION EXPOSURE (8.8)

Develop a list of names and contact details of all emergency response personnel:

- List completed

Ensure emergency response personnel provide urine samples :

- Shortly after incident is under control.
- 1 week after incident.
- 2 weeks after incident.
- 3 weeks after incident.
- 4 weeks after incident.
- 5 weeks after incident.

Provide a report of bioassay level and dose to:

- Each emergency response personnel of their personal bioassay level and dose.
- Emergency response officials for all emergency response personnel.
- CNSC officials for all emergency response personnel.
- Health Canada officials for all emergency response personnel.

10. ASSESS SPATIAL EXTENT AND LEVEL OF SURFACE CONTAMINATION (8.9)

Assess spatial extent and level of surface contamination of:

- Protective clothing (8.9.1)
- Equipment (8.9.2)
- Facility (8.9.3)
- Environment (8.9.4)

11. DECONTAMINATION (8.5.3)

Decontaminate surfaces to reduce radiation exposure:

- Protective clothing (8.5.3.1)
- Equipment (8.5.3.2)

12. TERMINATION OF EMERGENCY RESPONSE (8.10)

Discuss with emergency response personnel officials termination of emergency response

- Define steps that must be taken to terminate emergency response
- Define steps that must be taken after termination of emergency response

13. DEVELOP CORRECTIVE ACTION (10.0)

Develop corrective action to best remediate the effects from an incident:

- Attached.

14. CONTINUOUS ASSESSMENT OF EMERGENCY PLAN (11.0)

Review the effectiveness of the emergency response procedure that was performed:

- Attached.
- Was an update made to the Emergency Plan as a result of the review.
- If an update to the Emergency Plan was made as a result of the review have copies been provided to the Pembroke Fire Department and CNSC.

APPENDIX B

Earthquakes in Canada

In Canada, the coast of British Columbia is the region most at risk from a major earthquake. Other areas prone to earthquakes are the St. Lawrence and Ottawa River valleys, as well as parts of the three northern territories. Approximately 5,000 mostly small earthquakes are recorded in Canada each year. In the past 100 years, by 2011 at least nine earthquakes in or near Canada have registered a magnitude greater than 7. A few have caused extensive damage. Even a magnitude 6 earthquake could do extensive damage in a built-up area. In fact, a strong quake near one of Canada's major urban areas would likely be the most destructive natural disaster this country could experience.

- Earthquake facts
- What to expect during an earthquake
- Before an earthquake: Facility preparedness checklist
- During an earthquake
- After an earthquake
- Include this page in your emergency plan

Earthquake Facts

- The earth's crust is composed of many large and small segments called tectonic plates. These plates are in constant slow movement. With these movements come small tremors and earthquakes.
- Shallow crevasses can form during earthquakes due to landslides or other types of ground failures.
- Buildings do not automatically collapse in earthquakes.
- Earthquakes cannot be predicted.

What to expect during an earthquake

Small or moderate earthquakes

- These can last only a few seconds and represent no emergency risk.
- You may feel a slight quiver under your feet if you are outside.
- If you are close to its source, you may hear a loud bang followed by shaking.

Large earthquakes

- These can last up to several minutes and constitute a natural disaster if its epicentre is near a densely populated area, or its magnitude sufficiently large for the region.
- The ground or floor will move, perhaps violently.
- Whether far away or close to the source, you will probably feel shaking followed by a rolling motion, much like being at sea.
- If you are far away from the source, you might see swaying buildings or hear a roaring sound.
- You may feel dizzy and be unable to walk during the earthquake.
- Furnishings and unsecured objects could fall over or slide across the floor.
- Unsecured light fixtures and ceiling panels may fall.
- Windows may break.
- Fire alarms and sprinkler systems may be activated.
- Lights and power may go off.

Before an earthquake: Facility preparedness checklist

Go through the facility, imagining what could happen to each part of it, if shaken by a violent earthquake. Address the items in this list as best as possible.

- Teach staff how to turn off the water and electricity.
- Clearly label the on-off positions for the water, electricity and gas.
- Tie the water heater to studs along with other heavy appliances, especially those that could break gas or water lines if they shift or topple.
- Secure top-heavy furniture and shelving units to prevent tipping. Keep heavy items on lower shelves.
- Affix mirrors, paintings and other hanging objects securely, so they won't fall off hooks.
- Locate chairs away from windows. Don't hang heavy pictures and other items over Chair or work area.
- Put anti-skid pads under computers and other small appliances, or secure them with Velcro or other such product.
- Use child-proof or safety latches on cupboards to stop contents from spilling out.
- Keep flammable items and chemicals away from heat and where they are less likely to spill.

During an earthquake

Wherever you are when an earthquake starts, take cover immediately. Move a few steps to a nearby safe place if need be. Stay there until the shaking stops.

If you are indoors: "DROP, COVER, HOLD ON"

- Stay inside.
- Drop under heavy furniture such as a table, desk or any solid furniture.
- Cover your head and torso to prevent being hit by falling objects.
- Hold onto the object that you are under so that you remain covered.
- If you can't get under something strong, or if you are in a hallway, flatten yourself or crouch against an interior wall.
- Stay away from windows, and shelves with heavy objects.

If you are outdoors

- Stay outside.
- Go to an open area away from buildings.

AVOID the following in an earthquake

- Doorways. Doors may slam shut and cause injuries.
- Windows, bookcases, tall furniture and light fixtures. You could be hurt by shattered glass or heavy objects.
- Downed power lines – stay at least 10 metres away to avoid injury.

After an earthquake

Stay calm. Help others if you are able.

- Be prepared for aftershocks.
- Listen to the radio or television for information from authorities. Follow their instructions. Place telephone receivers back in their cradles; only make calls if requiring emergency services.
- Check facility for structural damage and other hazards. If you suspect facility is unsafe, do not re-enter.
- If you have to leave the facility. Post a message in clear view, indicating where you can be found.
- Do not light matches or turn on light switches until you are sure there are no gas leaks or flammable liquids spilled. Use a flashlight to check utilities and do not shut them off unless damaged. Leaking gas will smell.
- Do not flush toilets if you suspect sewer lines are broken.
- Carefully clean up any spilled hazardous materials. Wear proper hand and eye protection.
- Place a HELP sign in your window if you need assistance.
- Beware of secondary effects. Although ground shaking is the major source of earthquake damage, secondary effects can also be very destructive. These include landslides, saturated sandy soils becoming soft and unstable, flooding of low-lying areas.

APPENDIX C

Floods in Canada

Floods are the most frequent natural hazard in Canada. They can occur at any time of the year and are most often caused by heavy rainfall, rapid melting of a thick snow pack, ice jams, or more rarely, the failure of a natural or man-made dam.

- Flood facts
- Preparing for a flood
- During a flood
- After a flood
- Cleanup
- Include this page in your emergency plan

Flood facts

- A heavy rainfall can result in flooding, particularly when the ground is still frozen or already saturated from previous storms.
- Flash flooding – in which warning time is extremely limited – can be caused by hurricanes, violent storms or dams breaking.
- All Canadian rivers experience flooding at one time or another. The potential for flood damage is high where there is development on low-lying, flood-prone lands.

If a flood is forecast

- Turn off furnaces and the outside gas valve.
- Take special precautions to safeguard electrical, natural gas or propane heating equipment.
- If there is enough time, consult your electricity or fuel supplier for instructions on how to proceed.

If flooding is imminent

- Move furniture, electrical appliances and other belongings to floors above ground level.
- Remove chemicals from the flood area to prevent pollution.
- In some cases, the facility may be protected with sandbags or polyethylene barriers.
- Do NOT attempt to shut off electricity if any water is present. Water and live electrical wires can be lethal. Leave the facility immediately and do not return until authorities indicate it is safe to do so.

During a flood

- Keep your radio on to find out what areas are affected, what roads are safe, where to go and what to do if the local emergency team asks you to leave the facility.
- Keep your Emergency Plan close at hand.

If you need to evacuate

- Vacate the facility when you are advised to do so by local emergency authorities. Ignoring such a warning could jeopardize the safety of your co-workers or those who might eventually have to come to your rescue.
- Take your Emergency Plan with you.
- Follow the routes specified by officials. Don't take shortcuts. They could lead you to a blocked or dangerous area.
- Time permitting, leave a note informing others when you left and where you went.

After a flood

Restore the facility to good order as soon as possible to protect your health and prevent further damage to the facility and its contents.

Re-entering the facility

- Do not return to the facility until authorities have advised that it is safe to do so.
- If the main power switch was not turned off prior to flooding, do not re-enter the facility until a qualified electrician has determined it is safe to do so.
- Use extreme caution when returning to the facility after a flood.
- Appliances that may have been flooded pose a risk of shock or fire when turned on. Do not use any appliances, heating, pressure, or sewage system until electrical components have been thoroughly cleaned, dried, and inspected by a qualified electrician.
- The main electrical panel must be cleaned, dried, and tested by a qualified electrician to ensure that it is safe.

Ensure building safety

- Make sure the building is structurally safe.
- Look for buckled walls or floors.
- Watch for holes in the floor, broken glass and other potentially dangerous debris.

Water

- Flood water can be heavily contaminated with sewage and other pollutants. It can cause sickness and infections.
- If through colour, odour or taste you suspect that your drinking water has been contaminated, don't drink it.

Cleanup

Maintain good hygiene during flood cleanup. Minimize contact with floodwater or anything that may have been in contact with it.

Water

- Remove water from your flooded facility slowly and monitor for tritium contamination.
- Use pumps or pails to remove standing water, then a wet/dry shop vacuum to mop up the rest.

Heating and appliances

- Do not heat the facility until all of the water is removed.
- If you use pumps or heaters powered by gasoline, kerosene or propane, buy and install a carbon monoxide sensor. Combustion devices can produce large amounts of lethal carbon monoxide if they're not tuned-up or are improperly ventilated.
- Do not use flooded appliances, electrical outlets, switch boxes or fuse-breaker panels until they have been checked by your local utility.
- Whether you use a wood, gas or electrical heating system, have it thoroughly inspected by a qualified technician before using it again. Replace the furnace blower motor, switches and controls if they have been soaked.
- Flooded forced-air heating ducts and return-duct pans should be either cleaned or replaced.
- Replace filters and insulation inside furnaces, water heaters, refrigerators and freezers if they have been wet.

Dirt and debris

- Remove all soaked and dirty materials as well as debris.
- Break out walls and remove drywall, wood paneling and insulation at least 50 centimetres above the high-water line.
- Hose down any dirt sticking to walls and furniture then rinse several times.
- Wash and wipe down all surfaces and structures with unscented detergent and water then rinse.

Structures

- Ventilate or dehumidify the facility until it is completely dry.
- Rinse and then clean all floors as quickly as possible.
- Clean all interior wall and floor cavities with a solution of water and unscented detergent.

Carpets and furniture

- Carpets must be dried within the first two days. Carpets soaked with sewage must be discarded immediately.
- Remove residual mud and soil from furniture, appliances, etc.
- If items are just damp, let the mud dry and then brush it off.
- To test if material is dry, tape clear food wrap to the surface of the item. If the covered section turns darker than the surrounding material, it is still damp. Dry until this no longer occurs.

Mould

- Mould can lead to serious health problems.
- If you are cleaning up in a room where mould is present, wear a face mask and disposable gloves.
- To minimize mould growth, move items to a cool, dry area within 48 hours and set up fans.
- Wet mould will smear if wiped. Let it dry and then brush it off outdoors.
- You can also kill mould spores by lightly misting the item with isopropanol (rubbing alcohol).

Food and medicine

- All undamaged canned goods must be thoroughly washed and disinfected.
- Dispose of all medicines, cosmetics and other toiletries that have been exposed to flood water.
- Dispose of all contents of freezer or refrigerator.

What to discard

All insulation materials and particleboard furniture that have been exposed to flood water.

What is salvageable

- Frames of high-quality furniture can often be saved. However, they must first be cleaned, disinfected and rinsed, then dried by ventilation away from direct sunlight or heat. Drying too quickly can cause warping and cracking.

Before occupying the facility

Once the flood waters have receded, you must not permanently occupy the facility until:

- The regular water supply has been inspected and officially declared safe for use.
- Every flood-contaminated room has been thoroughly cleaned, disinfected and surface-dried.
- Adequate toilet facilities are available. (For more information, consult your local health authority.)

APPENDIX D

Chemical releases

Hazardous chemicals are sometimes accidentally released during manufacturing, storage or transportation, such as during a train derailment. Here are some things to consider when there is a chemical release.

Listen for official advice

Emergency responders are trained to identify hazards and provide appropriate guidance to the public. In some situations, you should seal yourself inside the building you are in (see Shelter-in-place). Other times, you may be instructed to go to higher elevations or evacuate the area. You'll want to have your Emergency Plan close at hand.

In enclosed areas

If you suspect that a chemical substance has been released in a closed area such as a building, try to avoid breathing any of the fumes and evacuate as quickly as possible. Immediately contact the fire department. Decontamination might be required before you can receive medical attention. Heed advice from local officials.

Medical treatment

Exposure to a chemical substance may require quarantine and the attention of medical authorities. Because the type of chemical may not be known right away, treatment is based on symptoms. Keep track of things like breathing and heart rate, perspiration, dizziness, skin tone, deliriousness. Tell medical personnel and public health agencies about these or any other symptoms.

APPENDIX E

Power outages

Most power outages will be over almost as soon as they begin, but some can last much longer, up to days or even weeks. Power outages are often caused by freezing rain, sleet storms and/or high winds which damage power lines and equipment. Cold snaps or heat waves can also overload the electric power system.

During a power outage, you may be left without heating/air conditioning, lighting, hot water, or even running water. If you only have a cordless phone, you will also be left without phone service. If you do not have a battery-powered or crank radio, you may have no way of monitoring news broadcasts. In other words, you could be facing major challenges.

You can greatly lessen the impact of a power outage by taking the time to prepare in advance. You and your co-workers should be prepared to cope on your own during a power outage for at least 72 hours.

- Preparing the facility
- During a power outage
- After the power returns

Preparing the facility

- Consideration should be taken to install a non-electric standby heater. Choose heating units that are not dependent on an electric motor, electric fan, or some other electric device to function.
- If the standby heating unit will use the normal house oil or gas supply, have it connected with shut-off valves by a certified tradesperson.
- Before considering the use of an emergency generator during a power outage, check with furnace, appliance and lighting fixture dealers or manufacturers regarding power requirements and proper operating procedures.

During a power outage

- First, check whether the power outage is limited to the facility. If the power of the neighboring facilities is still on, check your own circuit breaker panel or fuse box. If the problem is not a breaker or a fuse, check the service wires leading to the facility. If they are obviously damaged or on the ground, stay at least 10 meters back and notify your electric supply authority. Keep the number along with other emergency numbers near a telephone.
- If the power of the neighboring facilities is also out, notify your electric supply authority.
- Turn off all tools, appliances and electronic equipment, and turn the thermostat(s) for the facility heating system down to minimum to prevent damage from a power surge when power is restored. Also, power can be restored more easily when there is not a heavy load on the electrical system.
- Turn off all lights, except one inside and one outside, so that both the facility and hydro crews outside know that power has been restored.
- Listen to your battery-powered or wind-up radio for information on the outage and advice from authorities.

If you have to evacuate

Evacuation is more likely during winter months, when plummeting temperatures can make the facility inhabitable. Although the facility can be damaged by low temperatures, the major threat is to the plumbing system. If a standby heating system is used, check to see that no part of the plumbing system can freeze.

If the facility must be evacuated, protect it by taking the following precautions:

- Turn off the main breaker or switch of the circuit-breaker panel or power-supply box.
- Turn off the water main where it enters the facility. Protect the valve, inlet pipe, and meter or pump with blankets or insulation material.
- Drain the water from your plumbing system. Open all taps, and flush toilets several times. Open the drain valve. Drain your hot water tank.
- Note: If you drain a gas-fired water tank, the pilot light should be turned out call the local gas supplier to re-light it.
- Do not worry about small amounts of water trapped in horizontal pipes. Add a small amount of glycol or antifreeze to water left in the toilet bowl, and the sink and bathtub traps.

After the power returns

- Do not enter a flooded facility unless you are sure the power is disconnected.
- Do not use flooded appliances, electrical outlets, switch boxes or fuse-breaker panels until they have been checked and cleaned by a qualified electrician.
- Switch on the main electric switch (before, check to ensure appliances, electric heaters, microwaves, computers, etc. were unplugged to prevent damage from a power surge).
- Give the electrical system a chance to stabilize before reconnecting tools and appliances. Turn the heating-system thermostats up first, followed in a couple of minutes by reconnection of the fridge. Wait 10 to 15 minutes before reconnecting all other tools and appliances.
- Turn on the water supply.
- Make sure that the hot water heater is filled before turning on the power to it.

APPENDIX F

Tornadoes in Canada

Tornadoes are relatively common in Canada, but only in specific regions: southern Alberta; Manitoba and Saskatchewan; southern Ontario; southern Quebec; the interior of British Columbia; and western New Brunswick. Tornado season extends from April to September with peak months in June and July, but they can occur at any time of year.

- Tornado facts
- Warning signs of a potential tornado
- What to do during a tornado
- Include this page in your emergency plan

Tornado facts

- Canada gets more tornadoes than any other country with the exception of the United States.
- Tornadoes are rotating columns of high winds.
- Sometimes they move quickly (up to 70 km/hour) and leave a long, wide path of destruction. At other times the tornado is small, touching down here and there.
- Large or small, they can uproot trees, flip cars and demolish houses.
- Tornadoes usually hit in the afternoon and early evening, but they have been known to strike at night too.

Warning signs of a potential tornado

Warning signs include:

- Severe thunderstorms, with frequent thunder and lightning
- An extremely dark sky, sometimes highlighted by green or yellow clouds
- A rumbling sound or a whistling sound.
- A funnel cloud at the rear base of a thundercloud, often behind a curtain of heavy rain or hail.

Canada's tornado warning system

Environment Canada is responsible for warning the public when conditions exist that may produce tornadoes. It does this through radio, television, newspapers, its internet site, as well as through its weather phone lines.

- If you live in one of Canada's high-risk areas, you should listen to your radio during severe thunderstorms.
- If you hear that a tornado warning has been issued for your area, find shelter and follow the instructions below.

What to do during a tornado

- Take shelter in an inner hallway or room, ideally in the basement or on the ground floor.
- Stay away from windows.
- Beware of flooding from downpours and be prepared to move.

In all cases

- Get as close to the ground as possible, protect your head and watch for flying debris.
- Do not chase tornadoes, they are unpredictable and can change course abruptly.
- A tornado is deceptive. It may appear to be standing still but is, in fact, moving toward you.

APPENDIX G

Wildfires in Canada

Wildfires are a natural hazard in any forested and grassland region in Canada. The regions with the highest wildfire occurrence are British Columbia, and the Boreal forest zones of Ontario, Quebec, the Prairie provinces, and the Yukon and Northwest Territories.

- Wildfire facts
- How to prepare for a wildfire
- If you see a wildfire approaching the facility
- What to do during a forest fire or wildfire
- Include this page in your emergency plan

Wildfire facts

- Approximately 8,000 wildfires occur each year in Canada.
- The average area burned in Canada is 2.5 million ha/year.
- Fires caused by lightning represent 45% of all fires, but because they occur in remote locations and often in clusters, they represent 81% of total area burned.
- Human-caused fires represent 55% of all fires. They occur in more populated areas and are usually reported and extinguished quickly.

How to prepare for a wildfire

If the facility is surrounded by brush, grassland or forest, follow these instructions to prepare the facility for potential wildfires.

- Check for, and remove, fire hazards in and around the facility, such as dried out branches, leaves and debris.
- Keep a good sprinkler in an accessible location.
- Learn fire safety techniques.
- Have fire drills on a regular basis.
- Maintain first-aid supplies to treat the injured until help arrives.
- Have an escape plan so that all employees know how to get out of the facility quickly and safely.
- Make sure all employees are familiar with the technique of "STOP, DROP, AND ROLL" in case of clothes catching on fire.
- Make sure every floor has smoke detectors.
- Consult with your local fire department about making the facility fire-resistant.

If you see a wildfire approaching the facility

If you see a fire approaching the facility, report it immediately by dialing 9-1-1. If it is safe, and there is time before the fire arrives, you should take the following action:

- Close all doors in the facility.
- Cover vents, windows, and other openings of the facility with duct tape and/or precut pieces of plywood.
- Turn off propane or natural gas. Move any gas tanks in the gas storage area.
- Turn on the lights in the facility. Inside the facility, move combustible materials such as furniture away from the windows.
- Place a ladder to the roof in the front of the facility.
- Evacuate employees to a safe location.
- Stay tuned to your local radio station for up-to-date information on the fire and possible road closures.

What to do during a forest fire or wildfire

- Monitor local radio stations.
- Be prepared to evacuate at any time. If told to evacuate, do so.
- Keep all doors and windows closed at the facility.
- Remove flammable drapes, curtains, awnings or other window coverings.
- Keep lights on to aid visibility in case smoke fills the facility.
- If sufficient water is available, turn sprinklers on to wet the roof and any water-proof valuables.