DIRECTOR’S SAFETY ORDER

IN THE MATTER OF:
THE TECHNICAL STANDARDS AND SAFETY ACT 2000,
S.O. 2000, c. 16
- And -
ONTARIO REGULATION 209/01 made under the
Technical Standards and Safety Act 2000
(Elevating Devices)

Subject: Actions To Mitigate Hazards & Causes for Detachments on "Tube Tows"
Sent to: ALL Ski Lift Industry Stakeholders - CONTRACTORS IN GROUP 8 & ALL Existing TUBE TOW Owners / Operators

1. INTRODUCTION

This Order is intended to alert all ski industry stakeholders in Ontario to take immediate action to mitigate causes for inadvertent detachments of “tube tows” – secondary carriers and hazards encountered by the detached tubes. This order is in conjunction with Director’s Safety Order ED-178-03.

Causes for inadvertent detachment of tubes and types of hazards encountered by the detached tubes were analyzed using the following sets of information:

- accidents/incidents information reported in the 2002-2003 ski season. Injuries varied from bruises to minor cuts, and one serious injury to a child;
- information gathered as a result of the Director’s Ruling 178/03 “Actions & Reporting of Detachments on Tube Tows – Secondary Carriers” issued on 24 February 2003. Twenty-one detachments were reported over two weeks period. Three riders were injured. Bleeding lips, loose teeth, minor whiplash, and broken nose were the type of injuries; and
- at the time of issuance of the Director’s Ruling 178/03, the TSSA inspectors tested 19 tube tows in Ontario according to the pre-established testing criteria by detaching tubes to verify ability to clear tow path in accordance with the requirements of Clause 8.2.4 and to bring runaway tube to a safe stop by means of crossfall/containment area along the tow path in accordance with Clause 8.2.5. These clauses are referenced in the CSA Z98. All 19 tube tows failed to comply with Clauses 8.2.4 and/or Clause 8.2.5. In some cases when tubes collided against tip of containment barriers, these tubes were either pushed against other tubes on the tow path and/or parts of tube tow.

This safety order was developed in consultation with the Ontario Ski Industry stakeholders with a view to:

- minimize detachment of tubes; and
- bring the detached tube from runaway to a safe stop.
2. ORDER REQUIRING IMMEDIATE ACTION

2.1 General

2.1.1 All existing and new tube tows shall conform with the requirements of the Section 2 of this Safety Order.

2.1.2 The word “tube(s)” has the same meaning as “secondary carrier(s)” used in Clause 8 of CAN/CSA-Z98-01 Standard including Supplement 1.

2.2 Connection of Tubes To Haul Rope

2.2.1 Manufacturers/designers of tube tows must verify that the type of tube attachment connection is compatible for their grip design.

2.2.2 Manufacturers/designers of tube tows must allow for a safety margin that will ensure that the tubes will not detach as a result of changes of tension force on the tether connecting the towing attachment to the tube. Changes of tension force on tether due to uneven tow path, foreseeable movement of passengers in tubes, passengers feet dragging on snow while seated in an acceptable position in tubes and acceleration/deceleration feature of tube tows shall be considered.

2.2.3 For tube tows with automatic detachment at predetermined unloading point, manufacturers/designers of tube tows shall specify minimum and maximum weight restrictions of tube users.

2.2.4 The designer/manufacturer shall specify the following: (Clause 8.5.2 of CAN/CSA-Z98-01 Passenger Ropeways and Conveyors Standard including its Supplement 1)

   a) acceptable orientation of attachments while unloaded and loaded from a specific reference point;
   b) the minimum and maximum clearance measured from the snow surface for the haul rope and/or attachments;
   c) user size; and
   d) loading and unloading requirements.

2.3 Stop & Start Characteristics of Tube Tows

2.3.1 “Acceleration and deceleration shall be smooth over the full range of design loads and operating conditions so that secondary carriers shall not become detached or jerked because of any change in rate of acceleration or deceleration.” (Clause 8.4.2 of CAN/CSA-Z98-01 Passenger Ropeways and Conveyors Standard including its Supplement 1)

2.3.2 “Decelerating the ropeway over the full range shall not cause any secondary carrier to become detached.” (Clause 8.13.1.2 of CAN/CSA-Z98-01 Passenger Ropeways and Conveyors Standard including its Supplement 1)
2.4 Tubes & Towing Attachments

2.4.1 Tubes

2.4.1.1 Tube sizes shall match tow path design so that a detached tube will slide clear of the uphill path of any of the following tubes.

2.4.1.2 Tubes shall be designed to accommodate the passenger size.

2.4.2 Towing Attachments

2.4.2.1 The length of tube towing attachment shall be designed to maintain a minimum operational clearance from the snow along the tube tow-path and hauling rope while the tube is being hauled along the tow path.

2.4.2.2 “Attachments shall be designed to prevent sliding along the haul rope when

   a) subjected to twice the pull required to move a loaded tube along the tow path at the steepest point; and
   b) a tube is empty.” (Clause 8.15.1 of CAN/CSA-Z98-01 Passenger Ropeways and Conveyors Standard including its Supplement 1)

2.4.2.3 “Attachments shall be designed to prevent fingers, gloves, or clothing from being caught between the attachment and the haul rope.” (Clause 8.15.2 of CAN/CSA-Z98-01 Passenger Ropeways and Conveyors Standard including its Supplement 1)

2.4.2.4 “Fastening of the attachments to the haul rope shall not impair the strength of the rope.” (Clause 8.15.3 of CAN/CSA-Z98-01 Passenger Ropeways and Conveyors Standard including its Supplement 1)

2.4.2.5 “All attachments to the haul rope and components for pulling tubes shall have a factor of safety of not less than 5 based on ultimate strength of the unit and the maximum force that would be applied when hauling a fully loaded tube up the steepest point on the tow path.” (Clause 8.15.4 of CAN/CSA-Z98-01 Passenger Ropeways and Conveyors Standard including its Supplement 1)

2.4.2.6 Factor of safety of all attachments to the haul rope and components for pulling tubes shall be based upon their impact strength at low temperatures.

2.4.2.7 The designer/manufacturer shall specify the maximum tension force on all attachments to the haul rope and components for pulling tubes along their tow path.

2.4.2.8 The designer/manufacturer shall specify procedures for inspection of all attachments to the haul rope and components for pulling tubes to verify their safety. Inspection procedures shall include criteria to evaluate the necessity of their replacement.

2.4.2.9 “Attachments on the haul rope shall be repositioned in accordance with the designer’s instructions.” (Clause 8.15.5 of CAN/CSA-Z98-01 Passenger Ropeways and Conveyors Standard including its Supplement 1)
2.5 Tow Path, Crossfall and Containment Barriers

2.5.1 Means to protect passenger in a tube against contacting any part of tube tow including grips shall be provided along the entire length of the tow path.

2.5.2 Means shall be provided to keep tubes on the pre-defined tow path.

2.5.3 Tow path shall have an upward slope only, except for the unloading area. (Clause 8.2.1 of CAN/CSA-Z98-01 Passenger Ropeways and Conveyors Standard including its Supplement 1)

2.5.4 The tow path shall be designed and maintained to guide tubes so that no part of a tube is beneath any obstructions under any loading condition unless a minimum vertical clearance of 2 m is maintained. (Clause 8.2.3 of CAN/CSA-Z98-01 Passenger Ropeways and Conveyors Standard including its Supplement 1)

2.5.5 The tow path shall have a crossfall and sufficient width to ensure that, should a tube inadvertently detach, the detached tube will slide clear of the uphill path of any following secondary carrier. (Clause 8.2.4 of CAN/CSA-Z98-01 Passenger Ropeways and Conveyors Standard including its Supplement 1)

2.5.6 The maximum number of passengers to be loaded on any tube shall not exceed the manufacturer’s design of both tube tow and tube. The capacity shall be posted at the loading area. (Clause 8.3.1 of CAN/CSA-Z98-01 Passenger Ropeways and Conveyors Standard including its Supplement 1)

2.5.7 Tubes shall remain in contact with the tow path at all times. (Clause 8.7 of Passenger Ropeways and Conveyors Standard including its Supplement 1)

2.5.8 The designer shall specify the method to verify the haul rope tension. (Clause 8.17 of CAN/CSA-Z98-01 Passenger Ropeways and Conveyors Standard including its Supplement 1)

2.5.9 Containment barriers shall be in place along the crossfall of the tow path to stop and control any detached tube. (Clause 8.2.5 of CAN/CSA-Z98-01 Passenger Ropeways and Conveyors Standard including its Supplement 1)

3. CLARIFICATION

3.1 Section 2 of this Director’s Order is not intended to replace any requirements under Section 8 “Ropeways for Secondary Carriers” of CAN/CSA-Z98-01 Passenger Ropeways and Conveyors Standard including its Supplement 1.

3.2 In this Safety Order the applicable requirements under Section 8 of the CSA Z98 have been supplemented with the new requirements to enhance safety of tubes being hauled by tube tows. The new requirements introduced in Section 2 of this Safety Order have been highlighted by shading them.
3.3 Sub-sections 2.5.5 and 2.5.9

These two subsections are intended to ensure that, should a tube inadvertently detach, it is channeled to a safe run out area without colliding against other tube(s) on the tow path, tube tow device and any other obstructions. The following examples clarify the intent of these subsections:

- tow path shall be designed so detached tubes slide clear of the tow path to prevent the detached tube from colliding with other tubes on the tow path.
- crossfall shall be designed to channel the runaway tube to a safe run out area within containment zone
- the containment barrier(s) along the tow path is considered an obstruction if it becomes an obstacle and adversely affects the safety of passenger in the tube while stopping the runaway tube.
- tow path, crossfall and containment barrier(s) along the entire tow path shall be designed to prevent the runaway tube from being pushed against obstructions, such as other tubes, any part of the tube tow, etc.

4. COMPLIANCE

4.1 Documentation shall be submitted to the TSSA in accordance with the requirements of Sections 15 and 16 of the Elevating Devices Regulation # 209/01 made under the Technical Standards and Safety Act, 2000 for registration to demonstrate compliance of this Safety Order.

4.2 Documentation, submitted in accordance with the subsection 4.1, shall include acceptance tests and inspection procedures to demonstrate compliance with this Safety Order.

4.3 Upon registration of documents under subsection 4.1 of this Safety Order, the tube tow shall be inspected for compliance verification in accordance with Section 8 of the Elevating Devices Regulation # 209/01 made under the Technical Standards and Safety Act, 2000.

4.4 Verification process to ensure compliance to the Director’s Order shall depend on the work done to the tube tow to achieve the objective of the Order. Section 26 of the Code Adoption Document shall apply with respect to alteration undertaken in order to comply with the Director’s Order.

4.5 Before an existing or a new rope tow is placed in operation, compliance with this Safety Order shall be demonstrated in accordance with subsections 4.1, 4.2, 4.3 and 4.4.

This order is being made pursuant to the Technical Standards and Safety Act. Failure to comply with this order is an offence punishable upon conviction, to a fine of not more than $50,000, or imprisonment for a term of not more than one year or both, or if the person is a body corporate to a fine of not more than $1,000,000.

Ted Dance, Director, TSS Act 2000, (Elevating Devices)