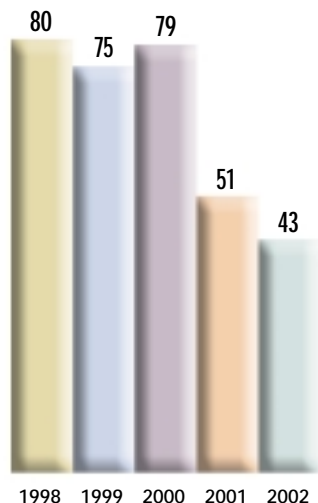


# AMUSEMENT DEVICES

FIGURE 5  
**FIVE-YEAR TREND –  
AMUSEMENT DEVICE INCIDENTS**  
NUMBER OF INCIDENTS



An amusement device is a mechanical device or structure used to entertain members of the public by moving them or causing them to be moved. Typical examples include roller coasters, ferris wheels, merry-go-rounds, go-karts, water slides and bungee-type rides and devices.

## HIGHLIGHTS

### ■ Incident Statistics:

> For the past three years, analysis has shown that the majority of all reported amusement device incidents (74% in 2002) occur on three types of devices: water slides, go-karts and roller coasters.

> 72% of all reported amusement device incidents in 2002 were due to a range of rider-related causes.

### ■ TSSA Response:

TSSA and its industry partners has formed a Risk Reduction Group (RRG) designed to investigate and address root causes of amusement device incidents. The RRG will focus particular attention on better understanding of rider related factors.

In addition to continuing the program at the three major fairs in the province, TSSA's successful RideSmart<sup>®</sup> program will continue to enhance its activities on public education with a focus on water slides and go-karts.

## BACKGROUND

TSSA is responsible for regulating the safety of approximately 1,200 amusement devices operating throughout Ontario. TSSA reviews and registers designs, licenses devices when they meet technical code and safety requirements, conducts inspections, investigates incidents, trains and certifies tradespeople who work in the industry, and licenses all owners of amusement devices and rides operating in the province.

In addition, TSSA regularly develops and delivers public education programs on safety as it relates to amusement devices.

## TRENDS

### Incidents (Figure 5)

In 2002, TSSA received reports of 43 amusement device incidents which was 16% fewer than 2001 (51 incidents). The decrease between 2001 and 2002 can be directly attributed to a marked drop in operator-related incidents. The percentage of operator-related incidents dropped from 13% of all incidents in 2001 to 5% in 2002.

This positive result was influenced by a variety of TSSA/industry initiatives including enhanced operator training, TSSA/industry partnerships with amusement device owners to investigate and address causal factors contributing to amusement devices incidents, and the successful expansion of the RideSmart<sup>®</sup> safety education program. In 2002, in addition to ongoing safety communications to riders of amusement devices, TSSA began targeting RideSmart<sup>®</sup> safety messages to operators.

FIGURE 6  
**FIVE-YEAR TREND – AMUSEMENT  
 DEVICE SERIOUS INJURIES**  
 NUMBER OF SERIOUS INJURIES

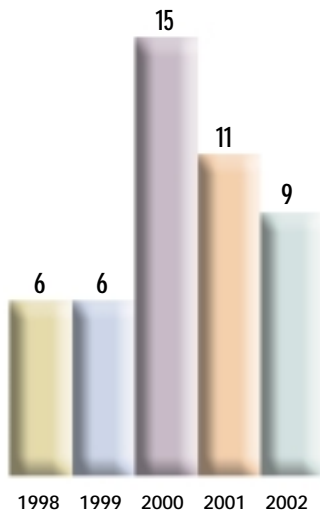
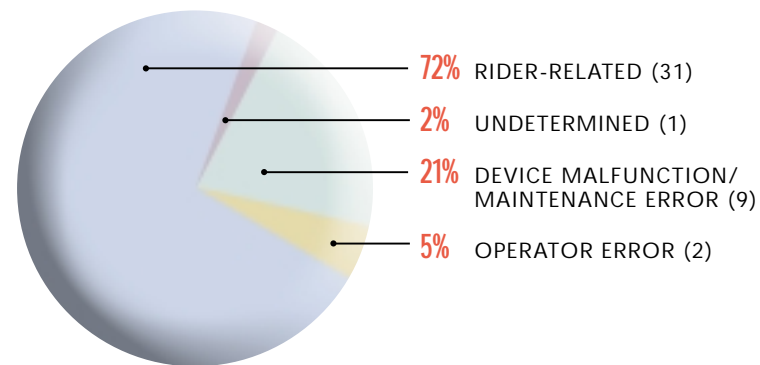


FIGURE 7  
**AMUSEMENT DEVICE INCIDENTS BY CAUSE**



Over the past three years, water slides, Go-Karts and roller coasters together accounted for the majority of all amusement device incidents (74% in 2002, 53% in 2001 and 77% in 2000). In 2002, 18 of the 43 reported amusement device incidents occurred on water slides (42%), seven occurred on Go-Karts (16%) and another seven on roller coasters (16%).

#### Serious Injuries and Fatalities (Figure 6)

TSSA received reports of nine serious injuries on amusement devices in 2002, down from 11 in 2001. TSSA is pleased to report that there have been no fatalities involving amusement devices over the past five years.

Seven serious injuries were rider-related, the malfunctioning of a go-kart lap belt caused one serious injury, and one serious injury involved an operator being hit by a passenger-carrying unit before the stoppage of a ride. Six of the serious injuries involved children or young adults below the age of 19.

#### CAUSAL ANALYSIS (Figure 7)

In 2002, TSSA received more complete data related to causal factors and as a result was able to improve causal analysis of incidents. This was achieved through an operator communications program conducted by TSSA and industry partners, and the positive response of ride operators, who have become more disciplined in their approach to reporting. As a result, in 2002 there was only one amusement device incident in which cause was unable to be determined (down from nine in 2001).

Rider-related causes factored into almost three-quarters of all reported amusement device incidents in 2002. Of 43 incidents, 31 (72%) were rider-related. Two of the 43 incidents (5%) involved some degree of operator-related factors. Nine incidents were related to device malfunction or maintenance-related issues.

Typical causal factors for amusement device incidents are as follows:

- > On water slides (18 incidents), rider-related incidents (rider's body parts hitting against the device) accounted

- for the majority of incidents. Cause typically included:
  - loss of balance; and
  - riders being in unsafe positions while traveling down the slide.
- > Six of the seven Go-Kart incidents involved collisions.
  - Rider-related factors included horseplay and unsafe driving.
  - Device malfunction, caused by inadequate maintenance, was also a factor in two Go-Kart incidents.
- > Roller Coasters accounted for seven of the incidents of which:
  - Four were caused by device malfunction or maintenance error (e.g. Failure caused by lack of maintenance of bolts connecting the passenger carrying nits (PCU) and PCU failure resulting from cold weather conditions)
  - Three incidents involved a combination of rider and operator error.

FIGURE 8

## AMUSEMENT DEVICE INCIDENTS BY AGE GROUP

NUMBER OF INCIDENTS

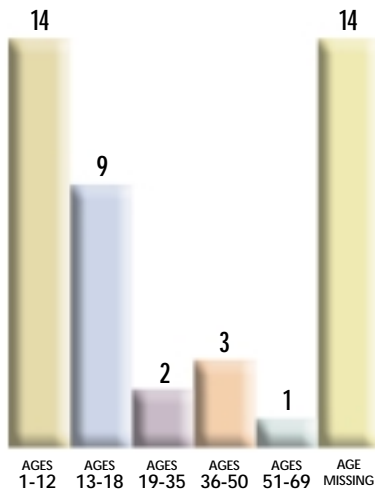


Figure 8 illustrates the most prevalent age group involved in amusement device incidents in 2002 was riders under 12 (14 out of 43 incidents, or 32%), down from 43% in 2001.

### TSSA RESPONSE

TSSA is taking the following corrective actions to reduce amusement device incidents involving rider and operator errors, and mechanical issues:

#### Public Education Programs: RideSmart®

In 2002, TSSA successfully expanded its RideSmart® program with RideSmart® Rest Stops - stations at exhibitions and amusement parks where safety information was delivered to parents and riders in a comfortable, child-friendly setting. Going forward, TSSA is strategically targeting RideSmart® activities to reach riders of water slides and Go-Karts, the devices on which the majority of incidents occur.

#### Operator Education and Communications Programs: RideSmart®

TSSA's RideSmart® Operator Reward program and the support materials we provided to operators were successful in significantly reducing operator error on amusement devices in 2002. TSSA has initiated a strategy that is focused on encouraging operators to become more directly involved in communicating rider safety, in order to reduce rider-related incidents. TSSA inspectors are also educating every amusement device operator and owner in Ontario on the importance of incident reporting to ensure that we have the best information available to understand safety issues.

#### Improved Analysis of Root Causes

TSSA will focus on a program of technical skills improvement for inspectors, incident investigators and other relevant staff, with particular attention to causal analysis training. A Risk Reduction Group (RRG), comprising TSSA and industry stakeholders, has been formed to investigate and address causal factors contributing to amusement device incidents. The RRG will pay particular attention to key issues such as rider-related factors and corresponding design/mechanical issues, and will develop action plans to address them.

#### Enhanced Licensing Requirements for Amusement Device Mechanics

Revisions to regulations and requirements for licensing of amusement device mechanics take effect in 2003 to ensure that only qualified and trained personnel perform the roles as defined in the regulations.

#### Ensuring Safety Compliance

Inspectors will continue to carry out inspections of all amusement devices found at carnivals, fairs, amusement parks and other commercial venues to ensure compliance with the national standard and applicable safety legislation and issue directives and orders for non-compliant devices. New devices are inspected prior to start-up, and thereafter at the start of every new season or following a device modification.