

Go - Kart Related Injuries & Deaths to Children

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EXECUTIVE SUMMARY

This report provides a detailed analysis of hazard patterns and victim characteristics associated with go-kart-related injuries for calendar year 1999 and with go-kart-related deaths for 1990 through 1999.

The injury data is from the U.S. Consumer Product Safety Commission's (CPSC) National Electronic Injury Surveillance System (NEISS), an injury data collection system of 101 hospitals (at the time of the study) with emergency departments in the United States and its territories.

An estimated 12,600 children under 15 years old were treated in hospital emergency rooms for injuries associated with go-karts in 1999. A majority of these injuries, an estimated 7,700, occurred between April 1, 1999 and August 31, 1999. About 75 percent of these injuries were to the go-kart operator; most of the operators were males, 8 years old or older. Collision with a stationary object or a moving vehicle, loss of stability, or falling from the go-kart comprised 6,200 injuries during this 5-month period.

The death data is from sources such as death certificates, coroner reports, police or fire department reports, and newspaper clippings. There were 113 go-kart-related deaths to children under 15 years old reported between January 1, 1990 and December 31, 1999. Follow-up investigations of 64 of these deaths indicated that 52 involved the go-kart operators. Within this group, 45 of the victims were between the ages of 8 and 14 years. Collision with a stationary object, collision with a moving vehicle, or loss of stability accounted for 46 fatalities.

Most of the children involved in the go-kart-related injuries or deaths were 8 years old or older, and most were operators. The major hazards associated with the go-kart incidents were collision with a stationary object, collision with a moving vehicle, or loss of stability.

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Introduction

A. Background

The U.S. Consumer Product Safety Commission (CPSC) staff has worked with the Fun-Kart Industry to develop voluntary standards that apply to consumer fun-karts. Two standards were developed, ASTM PS 97 - 97 standard known as "Provisional Standard Safety Guide for Consumer Recreational Use of Fun-Karts", approved in October 1997, and ASTM PS 80 - 98 "Provisional Standard Safety Performance Specifications for Fun-Karts", approved in September 1998. The performance standard became effective on January 1, 1999. In general, the scope of both standards is limited to commercially manufactured fun-karts intended for private use, on suitable off-road terrain, by consumers. The standards do not apply to concession go-karts, race karts, homemade karts, modified karts, pedal powered/ non-powered karts, or karts that are used for commercial purposes. Fun-karts, unless otherwise specified by the manufacturer, are recommended for use by consumers with a minimum age of 8 years, who meet the physical and cognitive capabilities set out by the manufacturer in the material provided with the fun-kart. ASTM terminology relevant to the standards is provided in Appendix C of this report.

In order to understand the circumstances under which injuries or deaths occurred to children, this report provides an update of the incidents associated with all types of go-karts¹, regardless of whether they were commercially manufactured, consumer-modified, customer-built, or homemade; and how they were used (i.e. private, concession, or racing). The report consists of two parts: (1) the analysis of injuries and (2) the analysis of deaths.

The analysis of injuries is based on two data sources, (1) the CPSC's National Electronic Injury Surveillance System (NEISS) [injuries reported from January 1, 1999 through December 31, 1999], and (2) follow-up telephone interviews [conducted from April 1, 1999 through August 31, 1999²].

The follow-up telephone interviews were conducted on a systematic selection of 106 NEISS reported injuries associated with children under 15 years old from April 1 through August 31, 1999. Each interview was completed by using a questionnaire which included structured questions and a request for a descriptive summary of the incident. Seventy interviews (66 percent) were completed. Information collected during these telephone interviews served as a basis for obtaining information on the go-kart operators and the circumstances under which the incidents occurred.

¹ The word "go-kart" is used in the report for these vehicles when types are not specified. The word "fun-kart" is used for the vehicles that were commercially manufactured.

² OMB NO 3041-0029.

The analysis of fatalities is based on information from various sources such as death certificates, coroner reports, consumer complaints, police and/or fire department reports, and newspaper clippings. These sources do not provide a statistically representative sample or a complete count of all deaths that may have occurred during January 1, 1990 through December 31, 1999. Multiple years of data were pooled for the analysis in order to achieve a sufficient number of cases and level of detail necessary to quantify hazard patterns.

B. What is NEISS?

The National Electronic Injury Surveillance System (NEISS) is a tri-level injury data collection system (Surveillance, Telephone Interview, On-site Investigation). It comprised a sample of 101 hospitals² with emergency departments in the United States and its territories. The system serves the Commission primarily in two ways. First, the NEISS provides national estimates of the number and severity of injuries associated with, but not necessarily caused by, consumer products and treated in hospital emergency departments. Second, the system serves as a means of locating victims so that further information may be gathered concerning the nature and probable cause of the incident.

Information gathered from the NEISS and other sources guides the Commission in setting priorities for selecting types of products for further investigation and/or actions that may eventually lead to product modification or the development of safety standards.

C. How Does NEISS Work?

The data collection process begins when a patient in the emergency department of the NEISS hospital is questioned by the hospital staff as to how the injury occurred. At the end of each day, a NEISS coder reviews the records for consumer product-related injuries. When transcribing injury information, the NEISS coder looks up the products involved in a coding manual that gives code numbers for approximately 900 products used in or around the home, for recreation, or otherwise sold for use by consumers. The coder tries to be as specific as possible when assigning a product code. The coder transcribes the information onto a coding sheet and enters the coded data into a computer for transmission to CPSC, where the data are edited to ensure correctly coded entries. Daily summary reports and detailed case printouts are prepared for review by the staff in the Data Systems Division of the Directorate for Epidemiology. The collected data are then incorporated into the permanent database and used for further study.

D. Product Description

A go-kart is a gasoline powered motorized vehicle having four wheels and is sold for the private, recreational, off-road use of consumers. The vehicle normally travels at speeds above 12 mph, but does not exceed 40 mph. The operator sits behind a steering wheel and operates the accelerator and brake by manipulating foot pedals. Go-karts can be found around residences and are used by consumers of all ages in fields, public

² From 1997 through November 1999

parking lots and open areas affording access. The typical go-kart associated with the reported incidents is a vehicle large enough to accommodate one or two individuals. Its frame is usually formed from segments of steel tubing welded together.

Both children and adults have been severely injured or killed in go-kart incidents. The hazards associated with go-karts include the entrapment of long hair or loose clothing in exposed moving parts, turning over, wheels and/or axles coming apart, and collisions with stationary objects and/or other motor vehicles. At this point, some of these hazards have been addressed and standards developed. However, further analysis of information on the numbers of injuries and deaths, and the incident scenarios is needed to determine what revisions, and additional actions, need to be taken.

Results

I. Injury Analysis

As previously stated, the data used in the injury analysis came from two sources: (1) NEISS, and (2) follow-up telephone interviews of NEISS cases. The national estimates of injuries treated in U.S. hospital emergency departments for the year 1999 are based on NEISS. The characteristics of the victims and the go-karts, and the incident scenarios are based on the follow-up telephone interviews of 70 NEISS cases (between April 1, 1999 and August 31, 1999). The responses to the interviews are presented in Appendix A.

A. NEISS, National Injury Estimates for Calendar Year 1999

1. Demographic Data

Based on NEISS, the national estimated number of go-kart-related injuries to children under 15 years old treated in U.S. hospital emergency departments in 1999 was 12,600³ (n=397). An estimated 77 percent of these children were 8 years old or older. Overall, males accounted for an estimated 69 percent of the injuries. Table 1 presents the distribution of the national estimates of injuries to children related to go-karts by age and gender.

Table 1
Distribution of Injured Children Related to Go-Karts by Age and Gender
January 1, 1999 – December 31, 1999

	Age Group		Total
	< 8 Years Old	8-14 Years Old	
Male	1,760	6,940	8,700 (69%)
Female	1,120	2,780	3,900 (31%)
Total	2,880 (23%)	9,720 (77%)	12,600 (100%)

Source: U.S. Consumer Product Safety Commission (CPSC), National Electronic Injury Surveillance System (NEISS), January 1, 1999 – December 31, 1999, Directorate for Epidemiology, Hazard Analysis Division.

³ The 95 % confidence limits are (9,700, 15,500)

2. Diagnosis, Body Part, and Disposition

The most serious treated injuries, an estimated 5,400 (43%), were lacerations, fractures, concussions, internal injuries, and burns. The remaining 7,200 injuries (57%) were divided between: (1) contusions/abrasions, strains/sprains, hematomas, and dislocations, accounting for about 6,200 (49%); and (2) punctures, avulsions, foreign body, or other (such as hypertension, headaches, or aches and pains) accounting for another 1,000 injuries (8%).

Overall, an estimated 3,950 injuries (31%) were to body parts from the neck up, including head, face, eye, ear, or mouth. An estimated 4,900 injuries (39%) were to the upper body parts, including upper trunk, shoulders, arms, hands, or fingers. An estimated 3,470 injuries (28%) were to the lower body parts, including lower trunk, legs, knees, feet, or toes. The remaining estimated 280 injuries (2%) were to multiple body parts or not stated.

Most of the victims (94%) injured in go-kart activities were treated and released from the emergency rooms. The remaining 6 percent of the victims were hospitalized (4%)⁴ or treated and transferred for further treatment (2%).

B. Results from Telephone Interview Survey, April 1, 1999 – August 31, 1999

1. Demographic Data

The estimated number of go-kart-related injuries to children under 15 years old, treated in U.S. hospital emergency departments during this 5-month period, was about 7,700 (n=106)⁵. About 79 percent of the total injuries were to children 8 years old or older. Overall, about 71 percent of the total injured children were males. Table 2 presents the distribution of the injured children during this 5-month period.

Table 2
Distribution of Injured Children Related to Go-Karts by Age and Gender
Special Telephone Interview Survey
April 1, 1999 – August 31, 1999

Gender	Age Group		Total
	< 8 Years Old	8-14 Years Old	
Male	900	4,600	5,500 (71%)
Female	700	1,500	2,200 (29%)
	1,600 (21%)	6,100 (79%)	7,700 (100%) ⁶

Source. U.S. Consumer Product Safety Commission (CPSC), National Electronic Injury Surveillance System (NEISS), Special Telephone Interview Survey, April 1, 1999 – August 31, 1999, Directorate for Epidemiology, Hazard Analysis Division

⁴ The average rate of hospitalization for all consumer products, for calendar year 1999, was about 4 percent of treated injuries

⁵ 95% confidence limits are (5,200, 10,200). The stratum weights (used in the estimation) were obtained by adjusting the NEISS weights in each stratum for the victims that were not selected for the follow-up interview

⁶ About 16 percent of the total injuries were related to concession go-karts.

During this 5-month period, there was a slightly higher percentage of males and of 8 -14 year olds injured in go-kart-related activities than observed for the entire year 1999.

2. Injury Data

2.1. Diagnoses

The most serious and frequent diagnoses associated with go-karts during this 5-month period, an estimated 6,200 (81%), were lacerations, fractures, internal injuries, concussions, or punctures. The remaining 1,500 injuries (19%) were diagnosed as contusions, abrasions, strains, sprains, hematoma, burns, or other (such as inflamed tissue, headaches, blunt body trauma, hypertension).

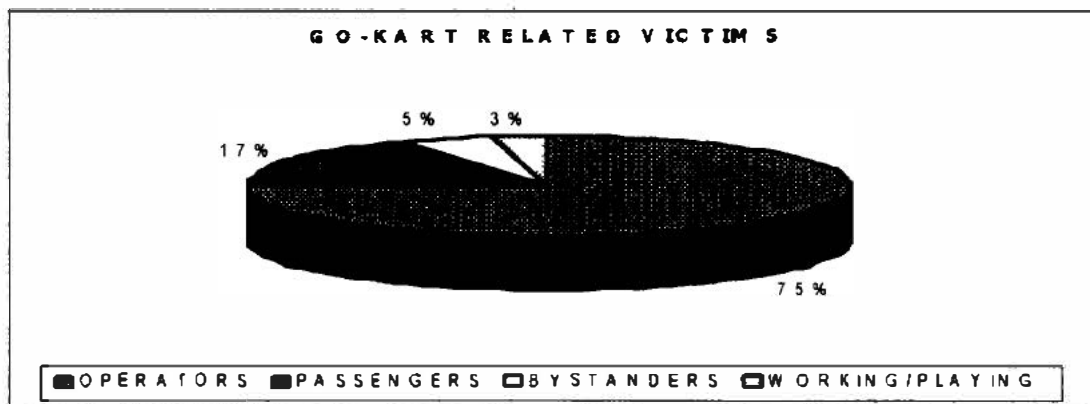
2.2. Body Parts

A little over half of the total injuries or an estimated 3,470 injuries (45%) were to head, face, mouth, or neck. The injuries to upper body parts, including upper trunk, shoulders, arms, hands, or fingers were estimated at 2,500 (32%). The injuries to lower body parts, including lower trunk, legs, knees, feet, or toes were estimated at 1,600 (21%). The remaining 130 estimated injuries (2%) were to multiple body parts or not stated.

3. Victims' Characteristics⁷

An estimated 5,800 injuries (75%) occurred to the operators; 1,300 injuries (17%) to passengers, 350 injuries (5%) to bystanders; and the remaining 250 injuries (3%) to children working on the go-karts or children playing with the karts (Figure 1).

Figure 1



Source: U.S. Consumer Product Safety Commission (CPSC), National Electronic Injury Surveillance System (NEISS), Special Telephone Interview Survey, April 1, 1999 – August 31, 1999, Directorate for Epidemiology, Hazard Analysis Division

⁷ Based on 70 responses in the Special Telephone Survey between April 1, 1999 and August 31, 1999

Among the injured operators –

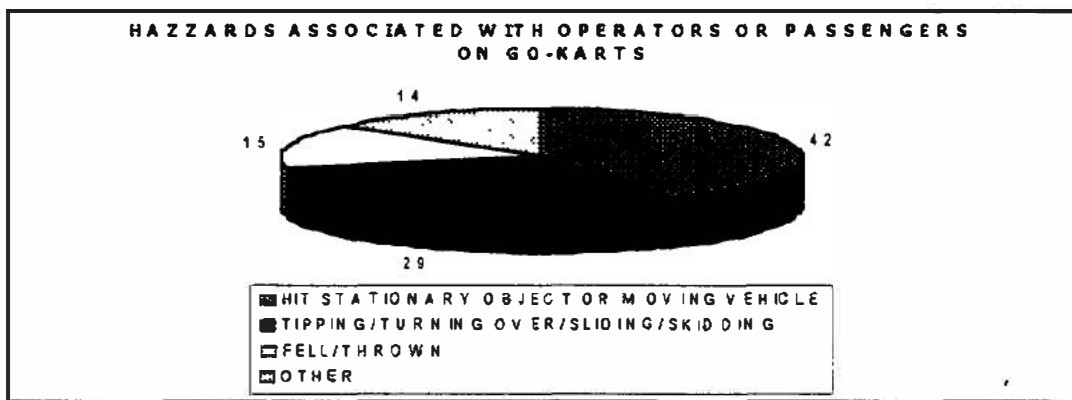
- Eighty percent were children 8 years old and older.
- Seventy-eight percent were males.
- Over half of the operators received injuries to their heads, faces, mouths, or necks. Eighty-one percent of these injuries were lacerations, fractures, or concussions.
- Ten percent of the injured operators were admitted for hospitalization or held for observation.
- Seventeen percent were first-time operators, 28 percent were not, and for the remaining 55 percent it was unknown whether they were first-time operators or not.
- Eighty-one percent rode alone, while 12 percent rode with one or two passengers. The remaining seven percent of the operators were injured while chasing a runaway go-kart.
- Twenty-six percent were supervised by an adult, four percent were not, and 70 percent did not state whether an adult was present.
- Fifty-three percent wore a helmet, 34 percent did not, and for the remaining 13 percent it was unknown whether they wore a helmet or not.
- Twenty-eight percent used a seat belt, 41 percent did not, and 31 percent did not state whether they used a seat belt.
- Based on the available information, about four percent used both a helmet and a seat belt.
- About one percent received injuries from entrapment of body parts in the go-kart moving parts.
- Twenty percent were jumping over an obstacle, performing high-speed stunts, or racing.
- Sixty-three percent of the injuries occurred on a private driveway, yard, lawn, farm, field, racetrack, or wooded area. Twenty-one percent happened in an amusement park or a recreational complex. Fifteen percent occurred on a public road, a vacant lot, or a sidewalk. One percent occurred on an unknown location.

- Fifty-eight percent of the incidents occurred on grass, dirt, gravel or stone; 37 percent of the incidents happened on a paved surface; and 5 percent were unknown.

4. Go-Kart Related Hazards⁸

The three major go-kart hazards associated with operators or passengers were: (1) collision (with a stationary object or a moving vehicle), (2) loss of stability, and (3) falls from go-karts. These hazards comprised 87 percent of the total injuries⁹ to the operators or passengers and 81 percent of the total injuries during this 5-month period (see Figure 2).

Figure 2



Source: U.S. Consumer Product Safety Commission (CPSC), National Electronic Injury Surveillance System (NEISS), Special Telephone Interview Survey, April 1, 1999 – August 31, 1999, Directorate for Epidemiology, Hazard Analysis Division

4.1. Hitting Stationary Objects or Moving Vehicles (3,000 Injuries)

Hitting a stationary object such as a tree, fence, parked vehicle, or a safety barrier accounted for an estimated 72 percent of total injuries in this category. The remaining 28 percent involved hitting a moving vehicle such as an automobile, an ATV, or another go-kart.

About 48 percent of the injuries occurred on private properties such as driveways, yards, lawns or private racetracks. Forty percent happened in amusement parks, or recreation complexes. Eleven percent happened on public roads, parking lots, neighborhood streets. The remaining one percent were unknown.

⁸ Based on 70 responses in the Special Telephone Survey between April 1, 1999 and August 31, 1999

⁹ The other hazards were entrapment, high speed stunt, wheely, jumping over an obstacle, run over, control related, contact with the kart, hit by other object, thermal burn contact

About 42 percent of the incidents happened on a paved surface, 31 percent on a grass/dirt surface, 24 percent on a gravel/stone surface, the remaining 3 percent were unknown.

The speeds of the kart at the time of the incidents were as follows:

- 10-15 mph. ~ 7 percent.
- 30-35 mph. ~ 8 percent
- Medium speed ~ 36 percent
- Fast speed ~ 10 percent.
- Unknown speed ~ 39 percent.

About 91 percent of the injured children were operators and 9 percent were passengers. Among the operators, about 70 percent were 8 years old or older. Over half of the injured operators were males. Based on the available information, about three out of every four injured operators were first time drivers.

Injuries to the head, face, mouth, or neck comprised 57 percent of the total injuries associated with this hazard. Lacerations, fractures, internal injuries, or concussions were the most frequently diagnosed injuries to these body parts, and accounted for about 82 percent. Eight percent of these victims were held for observation or were admitted for hospitalization. Less than one percent of the victims died from their injuries.

4.2. Tipping, Turning Over, Sliding, or Skidding (2,100 Injuries)

Tipping or turning over comprised 97 percent of the total estimated injuries associated with this category. Sliding or skidding were associated with the remaining three percent of these injuries. About 42 percent of these injuries were associated with body parts hitting an object or the kart; 30 percent occurred when the victim was trapped or remained in the kart; 27 percent were associated with falling or being thrown from the kart; and one percent occurred when the kart turned over and rolled down an embankment or a slope.

Overall, bumps, ruts, trees, or fences contributed to about 62 percent of the instability incidents. No obstacles were involved in 29 percent of the incidents. The remaining nine percent were unknown.

Almost all of these injuries (97%) occurred on private properties such as driveways, yards, lawns, fields, or private racetracks. The remaining three percent occurred on public properties such as amusement parks, streets, or sidewalks.

Rough surfaces such as grass, dirt, gravel, stones, or a combination of these surfaces contributed to about 79 percent of the incidents. The remaining 21 percent occurred either on paved surfaces (12%) or were not stated (9%).

The reported speeds at the time of the incidents were as follows:

- 15 mph. ~ 1 percent
- 20 – 30 mph. ~ 12 percent
- Medium speed ~ 5 percent
- Fast speed ~ 31 percent
- Unknown speed ~ 51 percent.

About 95 percent of the estimated injuries occurred to operators; and about 5 percent were to passengers. Among the operators, almost all (99%) were 10 years old or older; and almost all (99%) were males. Based on the available information, none of the operators were first time drivers.

Injuries to the head or face accounted for about 50 percent of all injuries, upper body parts (including arm, hand, or finger) accounted for about 48 percent, and all body parts about 2 percent. Fractures, lacerations, and concussions were the most frequently diagnosed injuries and accounted for about 75 percent of these injuries. About 11 percent of the injuries were treated and admitted for hospitalization. None of the victims died from their injuries.

4.3. Falls From Go-Karts (1,100)

Bumps, ruts, or series of ruts contributed to 17 percent of these estimated injuries. About 83 percent of the ground surfaces were paved surfaces. As the result of falls, about half of the victims were run over by the karts and another half contacted objects such as a tree, a fence, ground, or part of the kart. More than half of the injuries occurred in the victims' neighborhoods.

About 83 percent of these estimated injuries occurred to passengers. Within this group, about 82 percent were between 2 and 3 years old. Overall, 80 percent of the passengers were females. None was wearing a helmet or a seat belt.

About 83 percent of the estimated injuries occurred when there were at least two riders in the kart. In about 68 percent of these cases, falling from the kart resulted from making a quick turn or from actions taken to avoid hitting an object, a person, or an animal.

Almost all of the injuries (99%) were to the head or face. The remaining one percent were to upper body part such as upper trunk, shoulders, arms, hands, or fingers. Lacerations (84%), concussions (15%), or fractures (1%) were the diagnoses associated with falls from go-karts. All of the victims were treated and then released from the emergency rooms.

5. Product Information¹⁰

The Directorate for Economic Analysis of CPSC estimated that the expected useful life of a go-kart is about 5 to 9 years. Examination of the product age of go-karts belonging to the victims' households indicated that about 97 percent of them were 5 years old or less. Overall, about 79 percent of the involved karts were commercially manufactured.

II. Fatality Analysis

A. Location and Time Zone

Between January 1, 1990 and December 31, 1999, a total of 113 go-kart related deaths to children under 15 years old were identified from Death Certificate and Incident Files of the U.S. Consumer Product Safety Commission (CPSC)¹¹. Figure 3 shows the distributions of the deaths by time zone and age of victim. A breakdown of deaths by states and time zones - Eastern, Central, Mountain, and Pacific - is shown below.

<u>Time Zone</u>	<u>State</u>	<u>Frequency</u>
Eastern	Florida	17
	Georgia	4
	Indiana	3
	Kentucky	1
	Michigan	4
	North Carolina	7
	New Jersey	2
	New York	2
	Pennsylvania	3
	South Carolina	4
	Virginia	7
	West Virginia	2
	Subtotal	56
Central	Alabama	6
	Arkansas	1
	Illinois	3
	Kansas	5
	Louisiana	3
	Missouri	2
	Mississippi	5
	Oklahoma	1
	South Dakota	1
	Tennessee	2

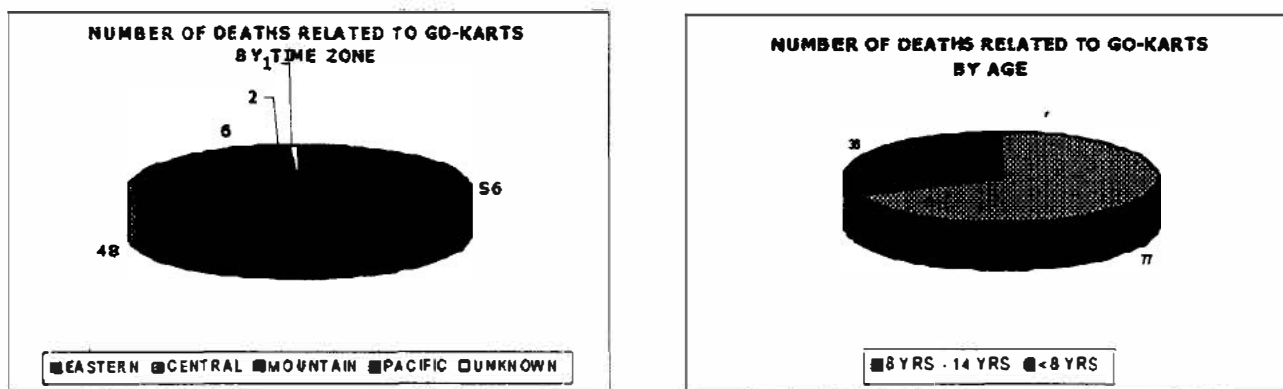
¹⁰ Based on 70 responses in the Special Telephone Survey between April 1, 1999 and August 31, 1999

¹¹ The deaths presented in this report are not a statistical sample of all deaths in the U S. Therefore, information obtained from follow-up investigations of these deaths does not represent all death scenarios that may have occurred in the U S over this period

	Texas	19
	Subtotal	48
Mountain	Arizona	3
	Colorado	2
	Utah	1
	Subtotal	6
Pacific	California	1
	Oregon	1
	Subtotal	2
Unknown		1
	Total	113

Seventy-seven deaths were to children between the ages of 8 and 14 years old. The remaining 36 deaths were to children under 8 (Figure 3). Males accounted for 87 of the 113 cases.

Figure 3



Source U S Consumer Product Safety Commission (CPSC), Death Certificate and Potential Injury Incident Files, Directorate for Epidemiology, Hazard Analysis Division

In order to obtain specific information concerning the nature and probable causes of these deaths, 64 incidents were assigned for telephone and/or on-site follow-up investigations during this 10-year period. The findings based on these investigations are summarized below. The incident scenario for each of the 64 deaths is presented in Appendix B.

B. Follow-Up Investigations (64 deaths)

Forty-three investigations of deaths were completed by telephone, 10 investigations were conducted on-site, and the remaining 11 investigations were based on the police or coroner reports.

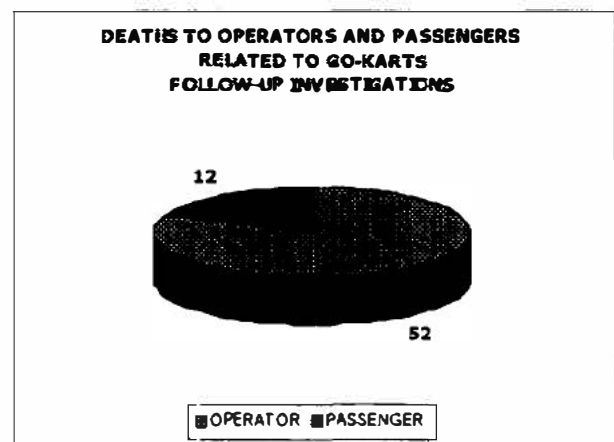
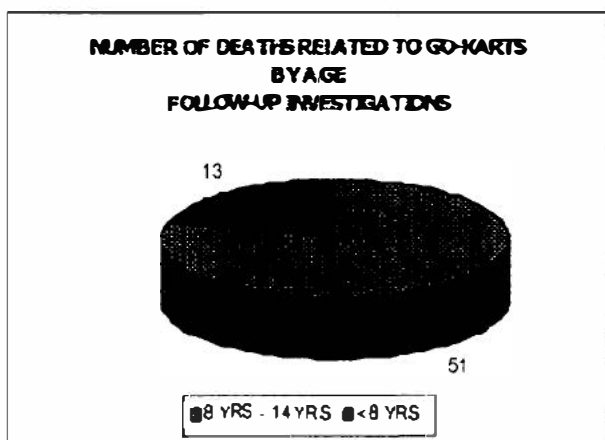
1. The Victims

Fifty-one victims were between the ages of 8 and 14 years old. The remaining 13 victims were younger than 8 (Figure 4). Forty-five victims were male. Fifty-two victims were operators while 12 victims were passengers (Figure 4).

Among the operators:

- Thirty-nine were males and 13 were females.
- Forty-five were between the ages of 8 and 14 years old.
- Ten were first time drivers, 17 were not, and in 25 cases the status was unknown.
- Fifteen were supervised by an adult, 29 were not, and 8 cases were unknown.
- Forty-two were driving alone, while 10 had at least one passenger.
- Nine were wearing helmets, 24 were not, and 19 cases were unknown.
- Seven were using seat belts, 16 were not, and 29 cases were unknown.

Figure 4



Source. U.S. Consumer Product Safety Commission (CPSC), Death Certificate and Potential Injury Incident Files, Directorate for Epidemiology, Hazard Analysis Division

Overall, 42 victims died in incidents associated with only an operator; 20 victims died with an operator and a passenger on the kart; and 2 victims died with three people on the kart.

2. Diagnosis and Body Part

Forty deaths resulted from head or neck injuries. Amputation, crushing, internal injuries or fractured skulls were the diagnoses to these body parts. An additional 13 deaths resulted mostly from internal injuries to the chest area. The remaining 11 deaths (including 3 that were not stated) resulted from internal injuries to the abdominal area or burns, anoxia, or drowning.

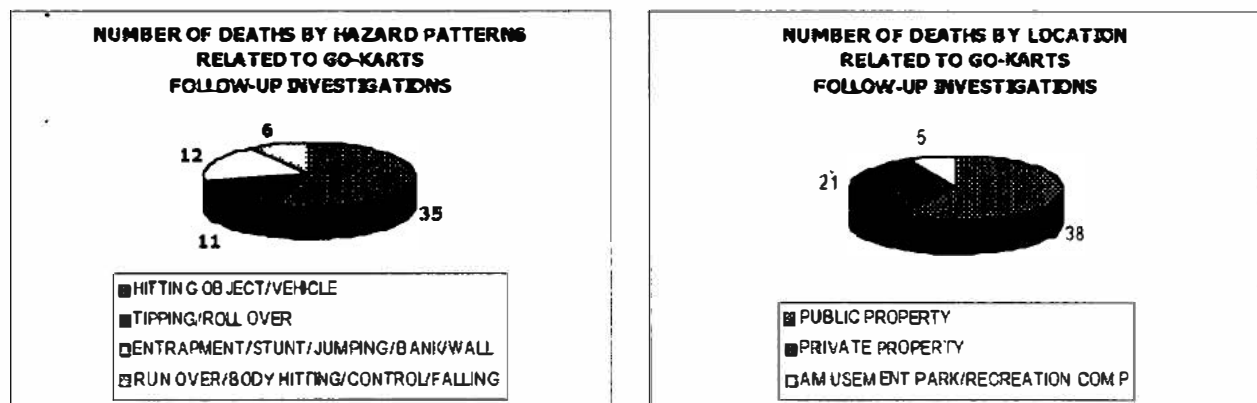
3. Hazard Patterns

Thirty-five deaths were associated with hitting a stationary object or a moving vehicle. Tipping/roll over resulted in 11 deaths¹². Twelve deaths were caused by hair or clothing entrapment (4), jumping over an obstacle (4), or going over bank/wall (4). The remaining 6 deaths were the result of being run over (1), high-speed stunt (1), body part hitting an object (1), control related (1), or falling/ being thrown from the kart (2). See Figure 5.

4. Location

Thirty-eight deaths occurred on a public property such as a street, a playground, or a parking lot. Twenty-one deaths occurred on a private property such as a driveway, a yard/lawn, a field, a wooded area, or dirt trail. Five deaths occurred at an amusement park, a recreational complex, or a racing track (Figure 5).

Figure 5



Source: U.S. Consumer Product Safety Commission (CPSC), Death Certificate and Potential Injury Incident Files, Directorate for Epidemiology, Hazard Analysis Division

¹² One of the victims was a passenger who died from third degree burns when a fun-kart caught fire after turning over

5. Product Identification

Examination of the product type indicated that 32 deaths were associated with commercially manufactured fun-karts¹³, 12 deaths involved homemade go-karts, 4 deaths involved concession go-karts, and the remaining 16 deaths had no information on the go-karts involved.

Among the commercially manufactured fun-karts, 12 fun-karts were a single-seated type, 4 fun-karts were a 2-seated type, and 16 fun-karts had no information on the seat capacity.

At least one safety device, such as a seat belt, roll bar, chain guard, wheel guards, etc. was found on 13 of the involved commercially manufactured fun-karts while 19 of the remaining fun-karts had no safety device (8) or no safety information (11).

III. Conclusion

The analysis of injury and death data shows that a majority of injured children were between the ages of 8 and 14 years old. Most of them were the male operators. Younger injured children were more likely to be passengers. These victims sustained injuries when falling or being thrown from the kart, and the incidents occurred most often when there were multiple riders in the kart.

Hitting a stationary object or a moving vehicle was the most frequent hazard pattern followed by tip-over incidents. A major contributing factor to tipping or turning over was driving a go-kart over bumps, ruts, or holes. Making a sharp turn; jumping over an obstacle; undertaking a high-speed stunt; and avoiding an object, person, or animal also contributed to tipping or turning over. Hair or clothing entrapment in the exposed chain/belt drive, wheel, or axle drive resulted in fatalities. Thermal burns from fire or flame also caused deaths to the operators or passengers of go-karts.

¹³ The word "fun-kart" is used for the vehicles that were commercially manufactured for consumer use only

APPENDIX A

Telephone Interviews and Responses, April 1, 1999 Through August 31, 1999

Children under 15 Years Old¹⁵

The national estimated number of injuries to children under 15 years old treated in U.S. hospital emergency departments for the 5-month period, April 1, 1999 through August 31, 1999, was 7,700.

1a Who was the respondent?

Victim	=	2.1%
Father	=	42.1%
Mother	=	46.7%
Relative	=	6.5%
Victim & parent	=	2.1%
Parent (not specified)	=	0.6%

2. How did the injury occur ?

Hit stationary object/moving vehicle	=	39.1%
Tipping/turning over/sliding/skidding	=	26.7%
Fell/thrown	=	13.9%
Child playing	=	4.8%
Stunt/wheely/jumping over obstacle	=	3.6%
Control related/product came apart	=	1.6%
Contact with karts	=	1.6%
Entrapment	=	0.8%
Run over	=	0.6%
Other ¹⁶	=	7.3%

¹⁵ OMB NO 3041-0029.

¹⁶ Hit by eye glasses when turning too sharply, by hammer while building the kart, injured while remaining in the kart, or grabbing a moving kart.

3. Does the go-kart belong to the victim's household, to another household, was it rented or something else?

Victim's household	=	51.2%
Another household	=	31.5%
Rented	=	16.0%
Borrowed	=	0.6%
Don't know	=	0.6%

4. Did your/victim's household purchase the kart or build it? Did you purchase the kart new or used? (For the kart belonging to the victim's household only).

Purchased new	=	52.1%
Purchased used	=	24.2%
Built (custom made)	=	4.0%
Homemade	=	18.4%
Purchased (nos)	=	1.2%

5. About how old is the go-kart? (For purchased kart only)

Less than 5 years old	=	85.9%
5 years old and older	=	10.4%
Don't know	=	3.7%

6. Had the go-kart been changed or modified in any way since you obtained it? (For purchased kart only)

Yes	=	16.3%
No	=	56.8%
Don't know	=	26.9%

7. How was the kart changed or modified ? (For modified kart only)

Don't know	=	21.3%
Added/changed a seat belt	=	53.5%
Modified body for looks or safety	=	11.2%
Repaired/replaced wheels, motor, etc.	=	14.0%

8. Who did the modification?

Relative	=	62.1%
Other ¹⁴	=	19.2%
Don't know	=	18.7%

9. Does the kart have any safety devices such as steering wheel with a pad, chain/belt guard, wheel guards, engine guard, stepboards, or brush bar with headrest or any thing else? (For purchased kart only)

Steering wheel pad	=	0.4%
Chain guard	=	1.3%
Belt guard	=	4.5%
Brush bar	=	1.3%
Seatbelt	=	1.3%
Steering wheel pad, chain/belt guard, wheel guards, engine guard, stepboards, brush bar, roll bar, and seatbelt	=	11.6%
Steering wheel pad, chain guard, wheel guard engine guard	=	1.3%
Steering wheel pad and chain guard	=	1.3%
Steering wheel pad, engine guard, roll bar, wheel guard, brush bar	=	0.4%
Chain guard, belt guard, seatbelt, roll bar	=	4.8%

¹⁴ Former go-kart racer, or professional mechanics

Chain guard, roll bar	=	10.1%
Brush bar, seatbelt	=	4.8%
Steering wheel pad, chain/belt guard, and stepboards	=	2.4%
Steering wheel pad, roll bar with pad, and seat belt	=	1.3%
Steering wheel pad, chain/belt guard, wheel guard, engine guard, and stepboards	=	1.3%
Steering wheel pad, chain guard, roll bar, and brush bar	=	4.8%
Steering wheel pad, chain/belt guard, engine guard, and rollbar	=	4.2%
Chain/belt guard, engine guard, wheel guards, roll bar, and seat belt	=	4.8%
None	=	4.2%
Don't know	=	34.0%

10. Was the victim a driver, a passenger, a bystander, or involved in some other way?

Driver	=	75.0%
Passenger	=	17.1%
Bystander	=	4.5%
Playing on/building/pushing/starting a fun-kart	=	3.3%

Note: The following questions applied to injuries related to a driver or a passenger only.

11. Including the driver, how many persons were riding in the kart at the time of the incident?

One person	=	71.7%
Two persons	=	18.2%
Three persons	=	10.1%

12. Was anyone else (other than the injured person being discussed) injured in the incident or involved in some other way?

Yes, driver	=	0.2%
Yes, passenger	=	5.4%
No	=	93.7%
Don't know	=	0.7%

13. Did the accident occur on a road, a yard/ lawn, or some other location?

Driveway	=	12.7%
Yard/lawn	=	42.9%
Field/farm/wooded area	=	2.6%
Parking lot	=	5.9%
Amusement track/recreation complex	=	17.4%
Racing track	=	3.1%
Public/neighborhood street	=	14.0%
Don't know	=	1.4%

14. Was the ground surface grass, dirt, sand, gravel or stone, paved, or something else?

Grass	=	15.6%
Dirt	=	15.2%

Gravel/stone	=	14.4%
Paved surface	=a	42.3%
Grass and Dirt	=	7.7%
Don't know	=	4.7%

15. About how fast was the kart going at the time of the accident?

Fast	=	15.2%
Medium	=	24.1%
Slow	=	0.7%
<5 mph.	=	0.2%
10a20 mph.	=	7.3%
30-35 mph.	=	3.8%
Not running	=	7.1%
Don't know	=	41.6%

16. Did the kart hit an obstacle such as a bump, rut, a tree, fence, or vehicle?

Yes, bumps, ruts, or series of ruts	=	15.1%
Yes, tree, fence, pole, or trailer home	=	21.4%
Yes, parked vehicle	=	12.7%
Yes, moving vehicle	=	2.4%
Yes, other go-kart	=	5.7%
Yes, safety barrier	=	2.9%
No	=	36.5%
Don't know	=	3.3%

17. At the time of the accident, was the victim jumping, performing high-speed stunt, or racing?

Yes, jumping	=a	1.3%
Yes, high-speed stunt	=a	5.9%
Yes, racing	=a	9.2%
Stopping	=a	2.3%
Avoid hitting object or person	=a	12.7%
Stepping on brake while turning	=a	2.6%
No	=a	54.3%
Don't know	=a	11.7%

18. When the accident happened, was the driver wearing any safety protection such as helmet, goggles, gloves, long sleeved shirt, long heavy pants, or ankle-length boots?

Yes, helmet	=a	31.7%
Yes, helmet and goggles	=a	0.7%
Yes, helmet and gloves	=a	2.2%
Yes, helmet, goggles, and gloves	=a	0.4%
Yes, helmet, goggles and long pants	=a	2.6%
Yes, helmet, long sleeve shirt, and heavy pants	=a	2.2%
Yes, helmet, heavy pants, and ankle boots	=a	2.6%
Yes, helmet, gloves, and neck brace	=a	0.7%
Yes, helmet, goggles, gloves, heavy pants, long sleeve shirt, and ankle boots	=a	0.2%
Yes, long sleeve shirt and long heavy pants	=	0.7%
Yes, long heavy pants	=	1.3%

No = 41.8%

Don't know = 12.8%

19. Did any clothing, hair, or other body part get caught in the go-kart?

Yes, clothing = 0.2%

Yes, body part (not hair) = 0.7%

No = 99.2%

20. At the time of the accident, was the victim sitting on the seat, leaning over though still on the seat, or was s/he completely off the seat? (For Q. 19 = 'yes')

Sitting on the seat = 100%

21. Exactly where on the go-kart did the victim's clothing, hair, or other body part get caught? (For Q. 19 = 'yes')

Chain drive /sprocket =a 100%

22. What were the weather conditions at the time of the injury?

Sunny/Clear = 84.1%

Raining = 0.7%

Dark = 3.1%

Don't know = 12.1%

23. In your opinion, what caused the accident?

Product failure = 6.3%

Careless = 2.6%

Environmental condition = 2.3%

Lost control = 13.2%

Unfamiliar with the kart = 7.5%

Hit by other kart	=	6.3%
Driving too fast	=	2.6%
Hit hay bales	=	2.1%
Panicked	=	10.0%
Lacked experience	=	10.3%
Freak accident	=	5.0%
Reckless	=	3.1%
Inadvertent contact	=	2.3%
Other ¹⁵	=	10.1%
Don't know	=	16.3%

¹⁵ Improper use of vehicle, too many riders, engine idle too high, or low air in tire

APPENDIX B

INCIDENT SCENARIOS OF GO-KART RELATED DEATHS, 1990-1999 (64 CASES)

(a) Commercially Manufactured Fun-Karts

- 900802HCN2187 A 12-year-old male sustained severe internal injuries after a rolled over fun-kart struck him in the back. He died within an hour of the incident. He was wearing a helmet and other safety equipment, but was not wearing a seat belt. **The victim was a rookie racer and this was his first year of racing. He had previously raced his fun-kart in five or six other races in the same year. The incident occurred at the County Fair. During the 10th or 11th lap the victim was on the inside track coming out of turn two. His kart started to skid and the front wheels dug into the dirt track and flipped end over end. The victim was thrown from the kart and the kart's high metal protection bar, behind the racer's seat, struck him full force in the back. The race track is about one-eighth mile oval design with dirt surface slightly banked from outside towards the infield. The track was lighted and the lights may have been on when the accident occurred about 8 p.m. The kart was purchased used.**
- 910422HCC1217 A 7-year-old male driver died and 8-year-old female passenger suffered brain injuries when the fun-kart he was driving onto a paved highway was struck by a pick-up truck. Neither victim wore a helmet. **The driver and his passenger were riding the fun-kart, belonging to the passenger, around the track in the yard of the passenger. They left the track and drove across the yard toward an embankment ditch and a paved two-lane state highway. At the edge of the yard the kart went over the edge of the embankment and proceeded onto the highway into the path of a pick-up truck.** According to the Highway Patrol Officer, the fun-kart was commercially manufactured. It appeared to be relatively new but its rear drive tires had no treads. It was a single, wide seat which provided room for more than one person.
- 920326HCC2132 A 10-year-old male died of head, chest, and neck trauma when the fun-kart flipped forward over a mound of dirt and landed on him. He was not wearing a helmet or other protective gear. **The victim was riding the fun-kart and at least one, maybe two, friends were riding 3-wheel ATV's. The victim and friends had been attempting to jump a dirt mound about 15 feet long, 4 feet wide, and about 3 feet high. When the victim tried to go over with his fun-kart at a fast speed, the front bumper struck the side of the mound and the kart flipped over forward. The victim was thrown over the mound and the kart came down on top of him.**

- 920612HCC2186 A 9-year-old male died of head and internal injuries when he ran into the back end of a utility trailer on private land. **The victim was visiting his aunt and uncle who had purchased a fun-kart the previous year. He drove the kart into the back of the parked utility trailer and was hit in the head and in the chest area by the trailer's bumper.** It had been modified by the owner so that it could not go any faster than 15 mph.
- 920918HCC2255 A 13-year-old female died of basal skull fracture when she fell backwards onto a blacktop from the rear of a 5 Hp fun-kart. **The victim was standing on the back of the kart, holding onto the metal cage which covered the rear mounted engine. The 12-year-old driver was driving the kart slowly on the neighborhood street. The driver was wearing a helmet; the victim was not. As they were making a turn, the hand which was holding onto the kart slipped and the victim fell backwards and struck her head on the blacktop surface.**
- 921030HCC1890 A 13-year-old male sustained fatal head injuries when the fun-kart he was operating at a high speed went over a dirt jump and overturned. **The victim's friend rode the fun-kart over a dirt pile, "a jump" and the right wheel assembly came off. The victim reinserted the bolt in order to engage the wheel assembly to the strut. Since the nut could not be found, he inserted the bolt back with only the bolt head holding the wheel assembly to the strut. The victim decided to take a ride over the jump before returning home. According to his friends, the victim was going very fast when he negotiated the jump. The kart was airborne about one foot above the ground. The bolt holding the wheel assembly came out and as the front of the kart impacted the ground, the blunt end of the strut dug into the dirt causing the kart to cartwheel end over end and to flip over sideways upon the victim. The victim was wearing a hard shell open face helmet at the time but the chin straps were not secured.**
- 921118HCC1904 An 8-year-old male died due to anoxic brain death when the fun-kart he was driving overturned and pinned him underneath. He was not wearing a helmet or other safety equipment and was unsupervised. **The victim was riding a fun-kart, belonging to his neighbor, through different yards near his neighbor's residence. He was riding alone and was unsupervised. The kart flipped and pinned him underneath. According to the Deputy Coroner, the site of the accident was a yard with grass. There were no trees, roots, or holes which would have caused the kart to flip over. He noticed that the right steering rod was broken near the right wheel. He later found a part of the broken steering rod in the**

area where the accident occurred. **The speed of the fun-kart at the time of the accident was unknown.** The product was a single-seat fun-kart with a 5HP engine. It was purchased new by the victim's neighbor.

- 921222HCC3069 A 9-year-old female died from multiple head injuries when she drove a fun-kart under a pipe fence. **The victim was driving a fun-kart on a county gravel road near her home. When she drove closer to the fence bordering the family's front yard and the gravel road, she inadvertently depressed the throttle lever instead of the brake lever. The vehicle with the victim ran under the fence. The victim's head contacted the pipe fence and her neck was broken. According to the Sheriff's Deputy, he did not recall whether the victim was wearing a helmet at the time of the accident.** It was purchased new. The engine size is believed to be a 3.5HP.
- 930525HCC2176 A 14-year-old male sustained fatal blunt chest trauma after a fun-kart flipped over and landed on top of him. He was wearing a helmet but was riding in the seat unrestrained. **The victim was riding the fun-kart alone in a stadium parking lot about 1 mile from his home. It was reported that he hit a hot spot on the asphalt surface and lost control of the kart.** The fun-kart was purchased used from the owner who had the kart manufactured specifically for him. It was a 7 HP engine fun-kart with a fiberglass body, no seat belt, and weighed about 300 pounds. Originally, the kart was purchased with an 11HP engine that was replaced with a new 7 HP engine. The father stated that the victim was familiar with the operation of the fun-kart and he drove it on a daily basis.
- 931214HCC1062 A 14-year-old male died of massive head trauma when the fun-kart he was driving rolled over with him trapped inside the kart. He was not wearing a helmet at the time of the accident. **The victim and his friend were taking turns driving in a circle around the lawn. As the victim attempted to make a right hand turn around the tree, the left tire of the fun-kart "dug in" to the grass causing the kart to roll over with the victim trapped inside.** The kart was a 5 HP.
- 940831HCC2217 A 6-year-old female died as a result of a fractured neck when her fun-kart was struck by an on-coming car. **The victim was driving a fun-kart around her aunt's front yard, lost control of the kart, and proceeded out of the yard into the two-lane street. She was hit by the car in the on-coming lane. She was wearing a safety helmet at the time of the incident. The state trooper stated that the victim had never driven a fun-kart prior to the accident.** The

- fun-kart had been purchased brand new by the victim's aunt about one week before the accident from the local dealer.
- 941201HCC0029 An 8-year-old female driver died from multiple internal injuries when her fun-kart was hit and run over by a pick-up truck. **The victim and her father were riding a 2-seat fun-kart on a public road at dusk without any lights on the kart. The pick-up tried to pass the kart on the left. At the same moment the driver of the kart turned left into their driveway. The front end of the truck hit the left side of the kart and went on top of it.**
- 941212HCC3031 A 13-year-old male passenger died from head injuries when a fun-kart struck a metal chain string across a school service road. **The boys were driving a fun-kart down a service road on the school property. The metal chain strung across the road was used to block vehicles from the road. The driver failed to notice the chain and struck it with the front of the kart. Both the driver and the victim were ejected from the kart. They both were wearing helmets. The victim died at the scene from cranial injuries. It was equipped with a roll bar.**
- 950525HCC2127 A 14-year-old male died from internal injuries when his fun-kart collided with a bus. He was not wearing a safety helmet. **The victim was driving a fun-kart on paved city streets. He failed to stop for a stop sign at the intersection. He drove into the side of a city passenger bus and was thrown under the bus.** There was no seat belt on the kart.
- 950526HCC2137 A 10-year-old male died from broken neck when his fun-kart collided with a pickup truck on a dirt road. He was wearing a helmet at the time of the accident. **The victim was driving his fun-kart from the family driveway towards the dirt road. Local authorities thought that the victim was going at about 10-20 mph when he exited the driveway. At the same time a pickup truck, reportedly going about 40 mph, was moving along the dirt road. The victim's fun-kart struck the side of the pickup truck. The impact with the truck broke his neck.**
- 950623HCC2154 A 13-year-old male died of blunt head trauma when he drove a fun-kart into the path of a truck. **According to the victim's mother, the accident occurred at his friend's home and he was not wearing a helmet at the time of the accident. Prior to the accident, the victim and his friend were driving the 2-seated fun-kart down a two-lane, asphalt street, county road. At the end of the street was a stop sign. The victim failed to stop for the stop sign and made a turn to go left. A pickup truck driving in a southbound**

direction, collided with the fun-kart. The 2-seat fun-kart was purchased used, at least 10 years old, had no seat belt or harnesses, and had a 5 HP engine.

- 951020HCC2008 A 5-year-old male passenger died from third degree burns and inhalation injuries when a fun-kart caught fire after turning over. **According to the private investigator's report and his interview of the witness, the victim and another 10-year-old male (the driver of the fun-kart) were riding the kart past his house on the private road. A moment later the fun-kart came back and was leaning on its side to the right and disappeared from his view. He knew then that the kart had turned over. He saw the flames coming from the ditch. He ran to the ditch and grabbed the first child and tore off his burning shirt. He then assisted the other child who was also engulfed in flames. Neither boy was wearing a helmet. According to an engineer, as the fuel tank hit the cement block and split open at a seam, it spilled fuel all over both victims which was then ignited by a spark from friction or from the hot engine. The product did not have a restraint system or guards for the chain and axle drive system. The product was purchased new for a Christmas present for a friend of the victims.**
- 960508CCC5162 A 14-year-old male died from severe head injuries as a result of a high speed stunt/wheely. **According to the sheriff's report, the witness stated that the victim was driving a fun-kart in a vacant parking lot. He was driving very fast and was doing donuts. He was not wearing a helmet and was not wearing a seat belt which was installed on the kart. The fun-kart flipped over and the driver was ejected. The driver struck his head on the pavement. The kart continued to flip over and the roll bar struck the driver on the head. The fun-kart was owned by his mother. It was a 18-20 horsepower engine. It was equipped with a seat belt and roll bar.**
- 960906CWE5001 A 13-year-old female died of a broken neck when her hair became entangled in the chain drive sprocket of the fun-kart. **According to the father of the victim, the victim had long hair and was required by her parents to put the hair up in a pony-tail and wear a helmet when using the fun-kart. The victim's brother, the owner of the kart, stated that the motor was still running and his sister's head was pulled back behind the seat between the roll bar. Her hair had been caught in the drive sprocket. The helmet was found about 50 feet from the site of the accident. It had an 8HP engine.**
- 961002HCC5670 A 10-year-old male died of massive head injuries when a fun-kart struck a curb and turned over on top of him. **According to a**

witness, the victim came around the street corner fast and after that she heard the crash and saw the kart on top of the victim. Based on the police investigation, the fun-kart struck a curb and became airborne approximately 17 feet and landed on the victim. It was purchased new with a 5 HP engine.

961002HCC5671

A 13-year-old male died of severe head injuries in an overturned fun-kart. According to the father, the victim was operating one of the family fun-karts around the riverside camping area as darkness approached. He was an experienced operator and had driven the family fun-karts for many years. He was wearing a helmet and seat belt. The surface of the area was rough, hard, and dried. When the father and the victim's younger brothers did not hear the fun-kart engine, and when the victim did not answer their calls, the father and his sons went in search of him. They found the overturned vehicle with the victim still in the driver's seat. It appeared the kart, out of control, flipped end-over-end, smashing the victim's head in the process. It was purchased new about 18 months before the accident.

970122HCC7264

A 10-year-old male died of traumatic brain injuries after his fun-kart went into the path of a van on a public road. According to the sheriff's report, the victim was driving the fun-kart on a public road. He ran through the intersection without stopping at a stop sign. The van hit the kart almost head on and then ran over both the boy and the kart. The report had no information on safety gear that the victim may have been wearing or the safety devices on the kart

980211HCC0055

A 10-year-old male was decapitated at the eyebrow level when he drove a fun-kart into the side of a flat bed truck directly in his path. According to the medical examiner's investigator the victim and his friend whose father owns a fun-kart were playing with the kart in a parking lot. They were being supervised by the owner of the kart. The victim, who had never operated a fun-kart before, received a brief explanation of the operation of the vehicle from the friend to whom the kart belonged. The victim took off on the kart and began accelerating very rapidly, driving in a direct line towards a parked flat bed trailer. He was not restrained by safety harness nor was he wearing a helmet. The witnesses believed the accident was caused by the victim mistaking the accelerator for the brakes. Police investigators related that the fun-kart was a second or third hand product and no owners manual was available. No identifying data was on the kart

with the exception of the Vehicle Identification Number, no warning label. The vehicle was found to be sound in all aspects.

- 980317HCC0192 A 13-year-old female drowned when she crashed through a fence and landed in a creek while riding a fun-kart. **According to the witnesses, the victim, against the warnings of the owner and her friends, decided to ride the fun-kart down the street. She was buckled in but not wearing a helmet. She rode around the block once before she lost control, rode through a chain linked fence, and landed in the creek. It was powered by a 5 HP engine.**
- 980415HCC0299 A 12-year-old female driver died from severe head injuries when her fun-kart collided with an automobile at the intersection of a dirt road in front of her house and a 2-lane asphalt road. **According to the sheriff's report and medical examiner's report, the victim and her neighbor, a passenger, were riding a fun-kart up and down the dirt road in front of the driver's house. The children were not wearing helmets or seat belts. According to the passenger, the victim seemed to be driving recklessly and had almost tipped the kart over. As she was swerving to avoid potholes in the dirt road without slowing down, the fun-kart darted into the junction of a 2-lane asphalt street. The driver of the automobile traveling southbound on the 2-lane street swerved to the left in an attempt to avoid a collision. There was no indication that the fun-kart driver had braked the kart. The right front of the automobile collided with the left front of the fun-kart, ejecting both children onto the street. The passenger was treated for a bump to the back of her head and neck pain and released.**
- 980611CWE7169 An 8-year-old female died of a lacerated liver when a fun-kart she was driving ran off the roadway into an area of trees and bushes. **According to the Sheriff's Office, the victim and her father were riding a fun-kart belonging to a relative on a roadway. The victim was driving and the father was seated in the passenger seat beside her. The roadway circled around a trailer court with 4 curves to bring it back to the entry point. During one of the accelerations, the kart jerked violently to the side and ran off the road way, across a small grassy area, and into an area of trees and bushes. It was powered by a 5 HP engine. There was a roll bar over the engine.**
- 981116HCC2062 A 13-year-old male died of head and chest injuries after his fun-kart collided with an automobile. **According to law enforcement personnel, the victim was riding his fun-kart at the bottom of the hill near an intersection near his home. He crossed the centerline of the street to make a left turn onto another street.**

- The car came over the hill and approached the rear of the kart at a high rate of speed. When it collided with the kart, the victim was thrown from the kart and was pinned under the car.**
- 990312CCC2317 A 10-year-old male died of suffocation due to strangulation when his neck scarf became entangled in the rear axle of a fun-kart. **According to the police report, the victim had been driving his fun-kart around the farmhouse property alone prior to the accident. His father found him lying beside the kart with one end of the scarf wrapped around the victim's neck and the other end wrapped around the kart axle.**
- 990608HCC0520 An 11-year-old male died of head injury when he was ejected from a fun-kart and struck his head on the lawn. **According to a police official, the victim was running alongside a two seat fun-kart which two other young males were riding in the vicinity of their homes. He jumped onto the side of the kart and hung onto the roll cage. This caused the driver to lose control of the kart resulting in a clockwise spin and tipping of the vehicle. The victim lost his grip at this time and was ejected over the top of the vehicle striking the ground head first.** The involved fun-kart was a two seat newer model with a roll cage but no seat restraint system. It had an 8 HP engine.
- 990830HCC2634 A 10-year-old female died of internal injuries to her abdomen when she was ejected from the passenger seat for a fun-kart. **According to a police officer, the 15-year-old driver ran a stop sign and pulled into the path of a pickup truck. The victim, a passenger, was ejected and died of internal injuries to her abdomen.** The fun-kart was described as very old, at least 10 years old. The seat was completely worn off, and the cage was bolted on the unit. Numerous alterations had been made to the kart over the years. There were no safety features on the kart, including no seat belt. It was powered by 5 HP engine.
- 991004CCC3003 A 10-year-old male died of closed head injuries when his fun-kart struck a parked motor home. **According to the investigating officials, the victim was driving a fun-kart for the first time and was not familiar with the vehicle. The owner's son explained the operation of the gas pedal and brake pedal to the victim. He told the police that the victim drove the kart into the street in front of their house. He also told the police that the victim might have depressed the throttle pedal instead of the brake. The kart accelerated and struck the motor home parked in the neighbor's yard. The victim's face struck the bumper of the**

motor home. He was wearing a bicycle helmet at the time of the accident. It was powered by a 5HP engine.

991101HCC2037 An 11-year-old male died of a broken neck when his fun-kat turned over and pinned him to the ground. According to the State Police Department reports (which included a copy of the medical examiner's investigation report), the victim attempted to jump over a pile of wood chips. The wood chip pile was 14 feet wide and 21 inches high at the highest point. The kart turned over on top of him pinning him to the ground. He was not wearing a helmet but was using a seatbelt. The fun-kart was purchased used by the victim's family. There was no roll bar or harness system other than a seat belt. It was powered by a 5 HP engine.

Concession Go-Karts

900820HCC2295 A 13-year-old female died of massive skull fracture when a concession go-kart threw her out and came down on the victim. The victim was riding a go-kart in a recreational place. Her vehicle hit tires that were located beside the track. The vehicle's front end went up and threw the victim out and came down to rest on her. The victim did not have a safety belt or a helmet on at the time of the accident.

910709HCC2224 A 6-year-old female died two days later of crushing injuries from the concession go-kart steering wheel and her mother's body at [REDACTED]. The mother was driving the kart with the victim on her lap. On the second lap she approached a turn and did not negotiate the turn. The kart struck the bumper rail system head on at a partial right angle. This caused the driver to lunge forward and crush the child between her body and the steering wheel. The bumper rail is made of 2x8 sections of lumber with tires anchored to the cement curbing. According to the police detective, he suspected that the victim was steering the kart with her mother operating the gas and brake pedals. The kart was a concession go-kart with engine, wheel chain/belt guards, roll bar with a head rest, steering wheel with pad, and a 5 HP engine.

930615HCC2185 An 8-year-old male died from head injuries after the concession go-kart he was driving at a commercial go-kart track flipped and landed on him. An adult was watching the victim driving around the track. This track was ringed by car tires, which were used as bumpers or guardrails to keep the drivers on the track. At one point the victim struck the tires along the inner edge of the track, causing the kart to flip over and landed on top of him.

930929HCC1779 A 7-year-old male died from a ruptured aorta when his father's body may have pressed him into the steering wheel. **According to the father's statement, they often rode the go-kart at this recreational facility. Each time they would sit in the same kart. The kart had a single seat, steering wheel with pad, and a shoulder harness/seat belt. Helmets were available on an optional basis, but were not used by them. According to the employees, each rider was required to use the shoulder harness/seat belt before starting out onto the track. The father claimed that he was never instructed to do so. The father stated that while going at a moderate speed into the second lap the car hit the bumper rail. The victim was thrown against the steering wheel. The father, who was the only witness to the accident, did not state whether his body was thrown against the victim and the steering wheel. The kart came with a roll bar, shoulder harness, and a head support.**

(C) Homemade Karts

910108HCC1106 A 13-year-old male was fatally injured from rupture of the aorta when his homemade kart was struck broadside by a car passing through the intersection. **While operating a homemade kart at approximately 20 miles per hour at dusk, the victim approached an intersection of paved state roads. He did not stop for the stop sign and drove into the path of an automobile.** The kart was built from different automobile and metal parts. It was powered by a 5 HP gasoline engine.

920615HCC0193 A 10-year-old male died of cranial cerebral injuries due to blunt force trauma of the head when his homemade kart flipped forward on top of him. The victim was not wearing a helmet but he did use a seat belt. **The victim was driving the kart along a dirt trail towards an embankment which was about 2 feet and 1 inches above the dirt trail. When he drove up the incline of the embankment, the kart became airborne. The father stated that it looked as if his son lost control of the kart. The kart traveled about 8 feet in the air before it struck the ground.** The kart was homemade. It was built by the victim's father prior to Christmas 1991. It was described as a unit made from tubular steel with a motorcycle type engine located on the back part of the unit. It did not have an overhead roll bar.

930602HCC3203 A 7-year-old male died of blunt force injuries to the abdomen when he hit a curb while driving a homemade kart. He was wearing a helmet at the time of the accident. **The victim was driving around a curve in the church parking lot without a seatbelt about 10mph.**

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- He failed to negotiated a turn and subsequently hit a 6-8 inch curve. He was thrown into the steering wheel.** The product is a single-seat, homemade fun-kart with a lawn mower engine. It is low to the ground, with only a few inches of ground clearance. It does not have any safety straps.
- 940110HCC1082 An 11-year-old female died from chest trauma injuries when her fun-kart crashed into a parked truck. **The victim was riding her homemade kart (with a lawn mower engine) in the front yard of her grandfather's farm. The medical examiner speculated that the victim probably went under the truck, hitting her chest on the truck bed. Details about the kart are unknown.**
- 941201 HCC3024 A 13-year-old male died from blunt force injuries to his upper trunk when he drove a fun-kart into the front bumper of his father's parked car. **The victim was driving a fun-kart at his father's automotive shop. He drove out of the shop driveway at a high speed and attempted to make a right hand turn. He was unable to make the turn, instead, he drove the kart into the right front bumper of his father's car. The kart went under the bumper and his chest was caught between the kart's high back seat and the car's bumper.** It is unclear whether the kart was homemade or purchased. His father had several high powered fun-karts in his shop. The kart was powered by a 5 HP engine.
- 950526HCC2136 An 11-year-old male died of skull fracture when his homemade fun-kart collided with a car. He was not wearing any safety protection including a helmet. **According to the authorities, the victim was riding alone at the time of the accident. The victim pulled out of a private drive onto an asphalt county road into the path of a car.** According to the reporting officer who was at the scene, the fun-kart appears to be homemade from various bits and pieces with a 5 HP engine.
- 950713HCC4088 A 10-year-old male died of blunt head and neck trauma when he drove a homemade fun-kart into a low-slung chain and pole. **The victim and a passenger, the owner of the kart, were riding a fun-kart in a high school parking lot. According to the police, they probably did not see the chain until it was too late. Neither boy was wearing a helmet. The victim had driven his friend's fun-kart in the parking lot several times. The children were supervised by the passenger's father at the time of the accident.** The father of the owner had built the kart for his son. It had side by side seats and no safety devices such as lap belts, safety harness or roll bar.

- 950807HCC2180 A 9-year-old female died of traumatic head injuries when her hair was caught in the drive shaft of a homemade fun-kart causing her head to strike the metal assembly. She was not wearing a helmet at the time of the accident. **According to the uncle, the family had set up a race course in the parking lot of the local school. The victim had reached the end of the course and attempted to turn around. While turning around, she leaned to the left; this allowed her hair to get caught in the drive shaft assembly pulling her head backwards. Her head hit the metal assembly.** The go-kart was built by the victim's father who had purchased the frame used and installed a new engine and drive system. The kart did not have any protective covering or shield surrounding the drive shaft assembly.
- 960925HCC5650 An 11-year-old male died of injuries sustained when a homemade go-kart with a riding lawn mower frame overturned on him. **The coroner stated that the victim was driving too fast while turning sharply on a fairly level, gravel lot.**
- 980204HCC3574 A 2-year-old female died of trauma injuries to her head and face when a go-kart she was riding in as a passenger hit a pickup truck. **According to the sheriff office's report, the victim had been riding on the go-kart in between the legs of the driver. For some unknown reason, the go-kart ran into the rear of a parked pickup truck. The go-kart did not have a roll bar or seatbelt. The roadway area was packed dirt and wet. There were no skid marks made by the kart. It appeared from the tire marks that the go-kart driver had been driving up and down the roadway before the accident.** According to the driver, go-kart was a homemade kart. He had put a 5 HP industrial engine on it. He had experienced trouble with the kart before the accident. He said the throttle had been sticking and the brakes were not very good. He also said the bolt in the steering had come apart earlier and had been fixed.
- 990820HEP7522 An 11-year-old male passenger died from internal organ injuries when the go-kart he was riding went under a parked van. **According to the traffic official, the victim and his older brother, the driver of the kart, had taken the kart out for a drive. The van driver saw them weaving on the street and pulled up to the right curb to keep from hitting them. The kart hit the curb on one side of the street and then veered across the street and went under the parked van.** The kart was a two-seater and had an old body with different parts that varied in age.
- 991202HCC3051 A 10-year-old male died of severe head injuries when his homemade go-kart collided with a truck. **According to official reports, the**

accident took place on the intersection of level, paved streets. There were no stop signs or traffic controls posted for either street at the intersection. The go-kart was traveling at a high rate of speed and collided with a pickup truck which was making a left turn.

(D) Not Specified Karts

- 914001HCC0008 A 13-year-old male was killed when he was struck in the chest by a broken limb. The limb transected his aorta. **According to the Coroner's office investigator, the victim and his male passenger were riding a 2-seated go-kart in a wooded area near their homes. As they were travelling at an undetermined speed, the victim was struck by a "tree-like limb" in the chest. The victim was pronounced dead at the hospital.** The go-kart was powered by a 4 HP engine. A fishing line string was connected to the gasoline feed mechanism. The line was pulled to increase the gasoline/speed.
- 920706HCN2247 A 7-year-old male died due to massive head injury when he accidentally drove a fun-kart over the embankment. **The victim was visiting grandparents and was using a go-kart that belonged to some neighbors in the area. It was his first time driving the kart. According to the witness, the victim was turning around to look at some other children when the kart ran off an embankment and flipped out into the road.** The go-kart was about 3-4 years old. No additional information was available.
- 920903HCC3239 An 8-year-old male died due to head and chest injuries when a go-kart flipped over on top of him while attempting jumps over car ramps. **The incident occurred in the yard of a residence. While jumping a go-kart over car ramps, the kart front end dug into the dirt and flipped over on top of him.**
- 940506HCC1771 An 8-year-old male died of head injuries incurred from hitting the steel bumper of a parked truck. **He was under the supervision of his father while driving a go-kart in a parking lot of junked vehicles. He reportedly had approximately one year of experience driving the kart. While driving about the lot and out of sight of his father, the kart engine was heard to race loudly, followed by the sound of impact with a vehicle. The victim was found wedged beneath the bumper of a large parked truck.**
- 940506HCC1772 A 5-year-old male died from head injuries two days after the go-kart he was driving overturned. **The victim was driving a go-kart in the yard of his home under his father's observation. The kart hit a**

root protruding from the ground, causing him to lose control of the kart. The kart flipped and the victim hit his head on a tree or on nearby cement.

- 940913HCC2222 An 8-year-old male sustained fatal head and chest injuries when the go-kart that he was driving struck the axle on a tractor trailer. According to the police report, the victim was operating the go-kart in a parking lot located in the front of a commercial plaza. The victim lost control of the kart and crashed into an axle of a parked tractor trailer truck. The mother stated that it was the first time the victim had operated a go-kart.
- 941212HCC3032 A 9-year-old female died from traumatic asphyxiation 3 days after her hair got caught in the sprocket of a go-kart. According to the Sheriff's Office, the victim was driving the kart on a public dirt road near a friend's house. The go-kart was owned by the family of the boy who was riding as a passenger. The victim's long straight hair flowed through the opening in the motor and got caught in the sprockets. The victim was pulled back over her seat as her hair was wound around the inside motor. The victim's entire length of hair, all the way up to her head, was caught. The kart came to a stop without crashing. The passenger's father cut the victim loose; however, the victim had stopped breathing at this point. He revived the victim but she died 3 days later. The go-kart had many safety features including all the guards and a roll bar. However, there was an opening in the motor about half an inch wide.
- 950525HCC2118 A 12-year-old female died from head injuries when her go-kart collided with a motorcycle. The victim attempted to make a right hand turn out of her driveway onto the paved road. At the same time, a motorcycle was travelling down the road on the victim's left. The motorcycle struck the left side of the kart. The victim was not wearing a helmet at the time of the accident.
- 950601HCC2140 A 6-year-old female died of severe head injuries after driving her go-kart into the bottom of her parent's mobile home trailer. According to the next door neighbor, he had purchased and bought home a go-kart for the father of the victim to give to her that day. Several children, including the victim, whose ages ranged from 4 to 12 years old, had been riding the kart, prior to the accident. The victim's mother stated that the victim unintentionally increased the speed from about 3 mph to about 15 mph and panicked. She could not let go of the throttle or accelerator, lost control, and crashed into the parent's mobile home trailer. The

kart was purchased used from a friend of the neighbor. It was about 7 years old with a 7 HP engine.

- 950814HCC1169 A 4-year-old female died of chest injuries when her go-kart was run over by a 4-wheel ATV. **According to the police, the victim was sitting between her father's legs in a go-kart as he drove on a private road. The victim's uncle was in a 4-wheel ATV and riding on the same road heading towards the go-kart. There was a blind corner in the road and the ATV collided with the go-kart, riding on top of the kart and hitting the victim in her chest area.**
- 950925HCC1194 A 3-year-old male died of multiple chest injuries after he was crushed against the steering wheel of a go-kart. **According to a police officer, the victim was a passenger, seated on his brother's lap. His brother was driving the go-kart in their gravel driveway. As the kart approached the end of the driveway, the driver appeared to lose control, due to the gas pedal sticking, and collided with a tractor that was parked in front of the house. The impact threw the driver forward into the victim whose chest was crushed against the steering wheel.**
- 960227CAA7058 A 5-year-old male died of head injuries when his go-kart struck a large tree. He was not wearing a helmet or seatbelt. **The victim and his 9-year-old brother were taking turns riding the kart on a muddy, rough, area adjacent to their backyard under their father's supervision. He lost control of the kart and struck a large tree.** The kart had been purchased used shortly before the accident. No identification of the manufacturer, model, horsepower, or safety devices because the product was disposed of by a neighbor.
- 980414HCC2473 A 12-year-old male died of blunt force injury to the neck while riding a go-kart on a playground. **He made contact with a wire strung across the playground and his neck was caught in the wire.** No other information related to the incident because of many legal matters pending.
- 980415HCC3754 A 12-month-old female passenger died of multiple internal injuries when the go-kart she was in ran into a culvert. **The victim was riding a 2-seat go-kart with her brothers. She was sitting on the lap of the driver, 15-year-old brother, while her 10-year-old brother was riding in the passenger seat beside the driver. While the operator was driving the go-kart up the embankment, the kart hit a hole that forced the kart off the course and into a ditch. The driver tried to jump off but the victim was holding onto the steering wheel. When the kart hit bottom the driver**

was thrown on top of the victim. The go-kart had a seat designed to carry two occupants. It had a roll bar frame extended from the front of the kart to the back. No further information was available.

980706CMC8141 A 10-year-old male driver died of serious injuries when the go-kart he was driving in his driveway crashed head-on with a car. **According to the staff of the County Fire and Rescue Squad, the younger brothers, ages 10 and 6, were riding their go-kart down a long driveway and the older brother, age 16, was driving a car in the opposite direction. It appeared that the younger two brothers had just passed the crest of a hill and had started on its decline when their kart collided head on with the car. The children were thrown from the kart on impact. The children were not wearing helmets at the time of the accident. The kart driver was fatally injured and the 6-year-old suffered serious head and internal injuries.** The go-kart appeared to be an older model. It had two seats and a roll bar. No other information was available.

980827HCC2808 A 12-year-old male died of head trauma and neck fracture after his go-kart collided with a car on a city street. **According to the police, the victim was driving the go-kart at a high rate of speed on a city street. He was traveling west and the automobile was traveling south when the incident occurred. The victim drove the kart through a stop sign and into the intersection of a street, where he collided with the automobile. He was not wearing a helmet or seat belt. He was partially thrown from the kart into the street.** The go-kart was purchased used with a single seat and a roll bar. No other information was available.

APPENDIX C

Terminology (ASTM)

The following terms are used in the ASTM standards with the indicated definition and interpretation.

1. **Fun-Kart:** A motorized vehicle with four wheels, sold commercially as consumer goods and intended for private personal recreational use by the consumers for off road use on suitable terrain, as recommended by the manufacturer.
 2. **Concession Go-Kart:** An amusement ride which is operated within the containment system of a defined track, and which simulates competitive motor sports, which is used by members of the general public for a fee. It has a maximum capacity of two persons and no cargo capacity.
 3. **Race Kart:** Go-karts designed for the sole purpose of racing on tracks, streets, or other areas of competition, and not to be used by the general public in an amusement facility setting.
 4. **Containment System:** A device installed on the concession go-kart track which defines the boundaries of the track and whose primary purpose is to contain the vehicles within the defined boundary.
 5. **Track:** A defined path for the operation of a concession go-kart that is hard surfaced, and fitted with a containment system to define the path of travel.
 6. **Pit:** A defined station for the purpose of loading and unloading driver and passenger during the initiation and conclusion of the ride cycle.
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bcc: Ahmed
Roegner
Whitfield
Adler
Chron