



Permanent

STATE OF CALIFORNIA
 DEPARTMENT OF INDUSTRIAL RELATIONS
 DIVISION OF OCCUPATIONAL SAFETY AND HEALTH
 AMUSEMENT RIDE UNIT



Temporary

ACCIDENT INVESTIGATION REPORT

May 16, 2008	Michael King (K3037)	Sacramento	(916)-263-3511
Date/Invest.	Qualified Safety Inspector (Amusement Rides)	Office	Telephone Number

Name of Responsible Party : Brass Ring Amusements, Inc. d.b.a. Midway of Fun

Mailing Address : 650 State Box Road Oroville, Ca. 95965 (530)-532-6886 ext. _____
Street City Zip Telephone Number

Place of Accident : Calaveras County Fair and Jumping Frog Jubilee

Address of Accident : 101 Frogtown Road Angels Camp, Ca. 95222 (209)-736-2561 ext. _____
Street City Zip Telephone Number

See Narrative. May 16, 2008

Name of Injured (List additional injured with narrative.)	Age	Date of Injury	Date of Death
---	-----	----------------	---------------

Name of Injured (List additional injured with narrative.)	Age	Date of Injury	Date of Death
---	-----	----------------	---------------

Nature of Injury : See Narrative.

Attraction Name : YO-YO State Registration Number : C#3041

Trade Name: YO-YO Manufacturer: Chance

Operator/Attendant: See Narrative. Age: Operator/Attendant: Age:

Operator/Attendant: Age: Operator/Attendant: Age:

What occurred to cause the injury ? See Narrative.

Unsafe acts involved : See Narrative.

Unsafe conditions (and/or) Code Violations involved : See Narrative.

Steps taken to eliminate the hazard : See Narrative.

Complete the reverse side of this form.

EVIDENCE

YES

NO

A. Photographs.

Were photographs taken ?

Was a video recording made ?

B. Witnesses.

Were witnesses or other persons interviewed ?
(If yes, complete information below)

See Narrative () ext.
Name Title Address Telephone Number

() ext.
Name Title Address Telephone Number

() ext.
Name Title Address Telephone Number

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Name Title Address Telephone Number

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Name Title Address Telephone Number

() ext.
Name Title Address Telephone Number

Continue in narrative.

C. Other.

I have reviewed this report, and it meets my approval:

Qualified Safety Inspector (Amusement Rides)

Date

Manager, Permanent Amusement Ride

Date

Gen Welsh
Division Chief

3-13-09
Date

Nancy Medeiros
Manager, Permanent Amusement Ride

3-13-09
Date

Department of Industrial Relations
Division of Occupational Safety and Health

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ACCIDENT INVESTIGATION REPORT NARRATIVE

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1	<u>Introduction</u>	1
2	On Friday, May 16, 2008, at approximately 6:08 P.M., an accident occurred at the Calaveras	2
3	County Fairgrounds in Angels Camp, on a temporary amusement attraction called the YO-YO.	3
4		4
5	The Division of Occupational Safety and Health, Amusement Ride Section (the Division) was	5
6	notified by telephone at approximately 6:15 P.M., when the owner, Harry Mason of Brass Ring	6
7	Amusements, Inc., d.b.a. Midway of Fun, called to inform the Division that a catastrophic	7
8	failure had occurred on the YO-YO C# 3041 swing attraction.	8
9		9
10		10
11	The catastrophic failure caused injuries to approximately 21 patrons, apparently all minors.	11
12	Three of the injured patrons required immediate transport to area hospitals. Transportation	12
13	was provided by ambulance and life-flight helicopters.	13
14		14
15	Nancy Medeiros, Senior Engineer for Amusement Rides (SE Medeiros), contacted Michael	15
16	King, Associate Engineer for Amusement Rides (AE King), and assigned him to the	16
17	investigation.	17
18		18
19	Larry Martin, Associate Engineer for Amusement Rides (AE Martin), and Richard Haskell,	19
20	Associate Engineer for Amusement Rides (AE Haskell), were both contacted and dispatched	20
21	to lend assistance to AE King.	21
22		22
23		23
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1	<u>Description of the Attraction</u>	1
2		2
3	The YO-YO attraction is a portable amusement ride attraction that was manufactured by	3
4	Chance Manufacturing (Chance) of Wichita, Kansas. The attraction is transported by a single	4
5	truck. The trailer portion of the attraction is divided into three hinged pieces that become the	5
6	base and structural support for the attraction. The majority of the hydraulic, electrical, and	6
7	mechanical components that make up this attraction are housed in, or attached to, the trailer	7
8	portion of this attraction.	8
9		9
10	The YO-YO is comprised of 32 individual seats. Each seat is suspended by 4 chains attached	10
11	to "T" bars that are affixed to 16 lifting arms located above the riders' heads.	11
12		12
13		13
14	The lifting arms are attached to a central pivot and spider assembly. The spider assembly is	14
15	attached to a hydraulic cylinder that is used to raise and lower the individual seats. The spider	15
16	assembly and hydraulic cylinder are mounted to a tower on a pivot that allows the spider and	16
17	cylinder assemblies to tilt at a 10-degree angle. The tower assembly is supported by the base	17
18	assembly formed by the trailer.	18
19		19
20	The chairs are assembled and suspended in a manner which allows the riders to swing freely	20
21	forward, backwards, and side-to-side. All riders load and unload the attraction simultaneously,	21
22	most of the time without assistance from the operator. Every seat has a seat belt that has one	22
23	end permanently attached to the seat bottom between the rider's legs. The other seat belt end	23
24	has a snap shackle that the rider latches to a lap bar that is attached to the front two	24
25	supporting chains of the individual seat assembly. The seat design, the seat belt, and the lap	25
26		26

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1	bar work in concert with each other to keep the ride seated during the ride.	1
2	While the YO-YO is in the loading and unloading position (not in motion), the seats are	2
3	suspended approximately 24 inches above the ground by chains that are roughly 13½ feet	3
4	long. The seats face forward as the attraction rotates counter-clockwise at an approximate	4
5	speed of 10 revolutions per minute (rpm).	5
6		6
7		7
8	Once the riders are seated, the seat belts, lap bars, and crotch straps are properly secured	8
9	and checked by the operator, and the attraction is started. After starting, the lifting arms begin	9
10	to raise and rotate counter-clockwise until the attraction reaches 10 rpm.	10
11		11
12	As the attraction speed increases, the suspended seats are raised and forced outwards from	12
13	the center of the attraction through the combination of centrifugal forces, the movement of the	13
14	hydraulic cylinder pulling down on the lift arms, and the fixed chain lengths attached to each	14
15	seat.	15
16		16
17		17
18	After the seats have rotated for a pre-determined amount of time, a hydraulic cylinder causes	18
19	one side of the rotating portion of the attraction to tilt on a hinge, raising that portion up about	19
20	10 degrees. The tilting of the rotating portion of the attraction allows the patron to reach a	20
21	height of 23 feet, which coupled with the 10 rpm ride speed, provides the riders with a flying	21
22	and undulating sensation.	22
23		23
24		24
25		25
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1	<u>Attraction Information</u>	1
2		2
3	Attraction Operator:	Brass Ring Amusements, Inc. (d.b.a.
4		Midway of Fun)
5	Attraction Owner:	Harry Mason
6	Date of Accident:	May 16, 2008
7	Location of Accident:	Angels Camp, Ca.
8	Attraction Name:	YO-YO
9	State Identification Number:	C-3041
10	Attraction Manufacturer:	Chance Rides, Inc.
11	Serial Number:	74-3315
12	Seating:	32 Single Seats
13	Loading:	All Simultaneously
14	Year of Manufacture:	1974
15	Drive Type:	Hydraulic (Electrically Driven)
16	Portable Attraction:	Yes
17	Dimensions:	67 ft. Diameter at Ground Level
18		80 ft. Diameter (when seats are
19		23 ft. above the ground)
20		38 ft. Center Height
21	Original California Permit Date:	1986
22	Speed:	10 R.P.M.
23	Attraction Duration:	2 min.
24	Maximum Passenger Weight:	170 lbs.
25		
26		

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1	Minimum Passenger Height:	42 in.	1
2	Direction:	Counter-Clockwise	2
3	Tilt Angle:	10 deg.	3
4	Construction:	Steel, Aluminum, and Fiberglass	4
5			5
6			6
7			7

8 YO-YO C# 3041 Background Information

9 This YO-YO attraction was manufactured in 1974 by Chance Manufacturing Co., Inc (Chance)
10 and Chance assigned it a serial number of 74-3315 when it was built. The Division first
11 inspected this attraction in California in 1986 and assigned it a California State ID of C# 3041.
12 Since the initial inspection by the Division, the attraction has been inspected 23 times in 19
13 years of operation.
14

15
16 This attraction has been operated by four different shows since the Division first inspected it,
17 and was not inspected by the Division from 2001 through 2004 because it was not in
18 operation during those years.
19

20 In 2005, North American Amusements leased this YO-YO from the owner, MLM Amusements,
21 and operated the attraction during the 2005 and 2006 operating seasons.

22 At some time during the 2006 season, the YO-YO attraction was repossessed from MLM by an
23 entity having a financial claim to the attraction and was removed from North American
24 Amusements' premises.
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1 During the North American Amusements 2005 and 2006 operating seasons, while the show 1
2 operated this YO-YO, the attraction was inspected by the Division three times and issued 2
3 operating permits. 3
4 4
5 In 2007, YO-YO C# 3041 appeared on Midway of Fun's application, ride list, and insurance, 5
6 and was subsequently inspected by the Division as the company's attraction during the 2007 6
7 operating season. During the 2007 season the Division inspected the attraction twice and 7
8 issued operating permits. During the 2008 operating season the attraction again appeared on 8
9 Midway of Fun's ride list. Prior to the accident the ride had been operating on its 2007 permit 9
10 and had not yet been inspected by the Division for the 2008 operating year. 10
11 11
12 12
13 13
14 During the course of the approximately 35 years that the YO-YO attraction has been on the 14
15 market, Chance has issued 21 bulletins and communications to the YO-YO owners. 25% of 15
16 those bulletins have dealt directly with lift cylinder components. One of those bulletins, in 16
17 particular, requires the following: 17
18 18
19 *Chance Bulletin # B376R1077-0 Effective Date May 16, 1990* 19
20 20
21 *All YO-YO Owner/Operators are required to remove the sweep cylinder from their YO-YO* 21
22 *attraction and return the cylinder for inspection, rework and certification to Chance every five* 22
23 *years.* 23
24 24
25 25
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1 B376R1077 also requires that an information plate affixed by the manufacturer, to the cylinder, 1
2 containing the following information: Attraction Serial No; Cylinder I.D.; Date of Last Inspection; 2
3 Expiration Date, remain attached to the cylinder. The bulletin states: If at any time any of this 3
4 information is missing, damaged, removed or otherwise illegible then the owner is asked to 4
5 contact Chance Rides, Inc. -Customer Service Department. 5
6
7
8

9 Description of the Accident 9

10 On Friday, May 16, 2008, at the Calaveras County Fairgrounds in Angels Camp, the County 10
11 Fair and Frogtown event was in full swing, and Midway of Fun was in its second day of 11
12 supplying and operating amusement ride attractions at the fair. 12
13

14 The YO-YO attraction was operating with approximately 21 passengers. Seven of the 32 seats 14
15 were not in service because of repair issues that made them unsafe to operate with 15
16 passengers. 16
17

18 At approximately 6:11 P.M., the seats and swing arms on the YO-YO attraction suddenly 18
19 collapsed, causing the riders to hit the ground. At the time of the failure, the attraction was 19
20 approximately halfway through its operating cycle, tilted to 10 degrees on its axis, and rotating 20
21 at 10 rpm in the counter-clockwise direction. 21
22

23 According to witness and rider statements, the attraction made a loud noise that was similar to 23
24 a grinding or crashing sound, and the arms dropped a few inches. Then, as the attraction 24
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1 continued to rotate, the lifting arms suspending the riders' seats abruptly fell. As a result, the 1
2 seats occupied by patrons, hit the ground, the attraction's scenery panels, and the steel 2
3 structure. 3

4
5 This sudden and unexpected descent and de-acceleration of the occupied and un-occupied 5
6 seats also caused many of the patrons to become tangled in the seat support chains of the 6
7 attraction. 7

8
9
10 As the seats hit the ground, the riders sustained cuts, scrapes, bruises, and broken bones. 10

11
12 A few patrons were able to jump out of their seats, while most could not. Those that remained 12
13 seated were dragged on the ground around the attraction. 13

14
15 Witnesses report that the YO-YO made 1½ revolutions dragging the passengers before 15
16 coming to a stop. One witness reported that the physical contact between the patrons, the 16
17 attraction structure, and the ground, was so violent that it caused portions of the attraction to 17
18 become dislodged and rocks and gravel to create a cloud of dust and debris that obscured the 18
19 onlookers' vision. 19

20
21

22 Accident Investigation 22
23 Summary-Chronology 23

24
25

25 May 16, 2008 - May 17, 2008

26 Upon learning of the accident, SE Medeiros contacted Associate Engineer Larry Martin (AE 26

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1	Martin), Associate Engineer Richard Haskell (AE Haskell), and AE King, all of whom are	1
2	amusement ride engineers employed by the Division, and requested that they proceed	2
3	immediately to the fairgrounds. They were informed that there had been a catastrophic failure	3
4	of a YO-YO attraction, and that the take-in report indicated there were numerous patrons with	4
5	injuries.	5
6		6
7		7
8	During the initial phone conversations while the engineers were in transit, the Division learned	8
9	from the Calaveras County Sheriff's Department that the department had set up a command	9
10	post at the fairgrounds and had ordered all the amusement attractions at the fair "shut down"	10
11	until the Division could inspect the attractions and verify their safe operation. The Division	11
12	concurred with the Sheriff's Departments request and subsequently inspected all the rides	12
13	prior to re-opening the attractions at the fair.	13
14		14
15		15
16	The Division was also informed that the YO-YO accident site had been secured and that	16
17	officers were positioned at the attraction. There had been two Midway of Fun employees	17
18	operating the YO-YO attraction at the time of the accident. Both employees had agreed to	18
19	submit to a blood test for the presence of drugs and alcohol, and were being transported. Also,	19
20	during an interview with Officer J. Crabtree of the Calaveras County Sherriff's Department, one	20
21	of the two operators had admitted to Officer Crabtree that he had smoked marijuana the day	21
22	before. His blood test came up positive for marijuana. No other results were detected.	22
23		23
24		24
25	The Division was further informed that two other employees, Gregory Henshaw and Gerald	25
26	Black, had been involved in the erection of the attraction. While being interviewed by Officer	26

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1 Serpa of the Calaveras County Sherriff's Department, Gerald Black stated that he had not had 1
2 any formal training on how to assemble the YO-YO attraction, and that he had not reviewed 2
3 any pre-recorded instructions or read any manuals. When Officer Serpa ran a background 3
4 check, he discovered that one of the employees was wanted on a felony violation of parole. As 4
5 a result, that employee was taken into custody without incident and transported to CCSO jail 5
6 for processing. 6
7
8
9 At approximately 11:30 P.M., AE Martin arrived at the Calaveras County Fairgrounds and held 9
10 a meeting with Sergeant Chris Vilegas, Detective Alan Serpa, and the owner and operator of 10
11 Midway of Fun, Harry Mason. Those in attendance provided input to update the Division 11
12 regarding the events of the evening. AE Haskell arrived shortly after AE Martin and assisted in 12
13 the investigation. 13
14
15 AE Martin was informed that an Incident Command Post was operational, and that the area 15
16 around the attraction had been secured. All persons wishing to gain access into the attraction 16
17 area had to pass the command post to gain entry to the accident scene. 17
18
19
20 Fair employee Jesse Truelock offered to bring a generator with lights, as well as ladders and a 20
21 personnel hoist, to assist with the investigation of the attraction. During the time that the fair 21
22 personnel were gathering this equipment, AE Martin used a flashlight to perform an initial 22
23 survey of the attraction. The chairs for the attraction were scattered on the ground and on the 23
24 deck portion of the attraction, and the scenery panels used to cover the visible portions of the 24
25 trailer had become dislodged from their attachment points and were lying askew. The scenery 25
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1	panels covering the lower section of the tower in the center of the attraction were also open.	1
2	Several of the electrical junction boxes had wiring protruding from them and were found to be	2
3	improperly maintained. The area below the tower of the attraction was saturated with oil, and	3
4	the surrounding structures were coated with an oily film. While some of the oil appeared to be	4
5	freshly-deposited, much of it was mixed with dirt and appeared to be a sludge that had	5
6	accumulated over time, presumably from leaking fittings, hoses, and valves.	6
7		7
8		8
9	A visual inspection from the ground level revealed that the lower portion of the hydraulic	9
10	cylinder did not show any signs of damage, and the hydraulic hoses appeared intact. The	10
11	seats, lap bars, and chains appeared to have been in an acceptable condition prior to the	11
12	accident. The structural base and mechanical assembly of the attraction appeared correct. AE	12
13	Martin was informed that many of the chairs for the attraction had been placed on the	13
14	attraction's deck while patrons were removed to facilitate the on-site medical care.	14
15		15
16		16
17	The attraction was verified to be a Chance YO-YO attraction, serial #74-3315, with the state-	17
18	assigned ID number C# 3041. A 2007 annual permit, #A-28703, was affixed to the attraction,	18
19	located by the manufacturer's data plate. The hydraulic lift cylinder had no identifiable	19
20	markings or identification plate attached.	20
21		21
22	AE Martin requested the manufacturer's manual from Mr. Mason, along with the bulletins.	22
23	Mitch Malone, Midway of Fun's Maintenance and Operations Manager, was able to retrieve	23
24	the manual from the maintenance trailer.	24
25		25
26		26

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1	Detective Serpa asked AE Martin if there was any documentation that the Division would be	1
2	requiring, stating that he was trying to get copies of documents and would ensure that the	2
3	Division would also receive copies. AE Martin informed Detective Serpa that the Division	3
4	would need to see the following documentation:	4
5		5
6		6
7	• Witness statements	7
8		8
9	• List of all injured parties	9
10		10
11	• Training documentation for the personnel who assembled the attraction	11
12		12
13	• Training documentation for the ride operator	13
14		14
15	• YO-YO maintenance log for the attraction,	15
16		16
17	• Daily inspections	17
18		18
19		19
20	• Manufacturer manuals	20
21		21
22	• All manufacturer bulletins	22
23		23
24	AE Martin also informed the detective that the Division would need to interview the Midway of	24
25	Fun personnel who assembled the attraction as well as the ride operators. Detective Serpa	25
26		26

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1	informed AE Martin that the operators had been taken to have blood drawn to ensure that they	1
2	were not under the influence of any narcotics, that one of the two employees that had	2
3	assembled the attraction was being arrested for an outstanding felony warrant, and if the	3
4	Division needed to speak with him, he was available at the jail.	4
5		5
6	AE Martin reviewed the manufacturer's manual that was brought over to him by Mr. Malone.	6
7	The manual was in poor condition and had so many loose pages that it was difficult to tell if all	7
8	of the pages were there. As a result, AE Martin decided to access a copy of the manual	8
9	through the Division's data system, available via his laptop.	9
10		10
11	Once the personnel hoist arrived, fair employee Jesse Truelock assisted by operating it and	11
12	took AE Martin up to the top of the attraction. When he arrived, AE Martin could see that the	12
13	rod end of the hydraulic cylinder was in an abnormally low position, did not appear to be	13
14	attached to anything, and had some damaged threads on the end. AE Martin returned to the	14
15	ground and described what he had seen with Mr. Mason and Mr. Malone. They both informed	15
16	him that the end of the hydraulic cylinder rod should be inside the spider cap. From what AE	16
17	Martin saw, it appeared that the cylinder had somehow become detached.	17
18		18
19		19
20	Mr. Mason further stated that the cylinder and the spider cap unit are removed by the owners	20
21	and sent back to Chance to be re-built every five years. AE Martin was informed by Mr.	21
22	Malone and Mr. Mason that: "They were glad that Chance re-built the cylinder and the spider	22
23	assembly." Mr. Malone and Mr. Mason also stated that: "They had not inspected the top	23
24	locknuts or even removed the cap since they had owned and operated the attraction." They	24
25	both stated that: "Chance requires the re-build of the cylinder every five years," and indicated	25
26		26

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1	that they felt only Chance should perform the work on the assembly.	1
2		2
3	Mr. Mason further stated that when Chance sends the cylinder and spider assembly back to an	3
4	owner, the spider assembly is already connected to the cylinder and it is re-installed as a unit.	4
5	He stated that his personnel "do not mess with it." Mr. Malone also stated that Chance does all	5
6	of the work to the spider and the cylinder, and that all the Owner/Operator does is take it off of	6
7	the attraction and then re-install it once the cylinder and spider assembly is returned.	7
8		8
9		9
10	AE Martin requested the documentation for the cylinder indicating that the cylinder had been	10
11	re-built and certified by Chance within the last five years. Mr. Mason stated that he had only	11
12	owned the attraction for about three months, that he had bought it from Joe Blash, and that the	12
13	Division has a copy of the paperwork that shows the cylinder was re-built. Mr. Mason stated	13
14	that he could contact Joe Blash and have a copy faxed over of the certification.	14
15		15
16	AE Martin also requested all the training and maintenance documentation from Mr. Mason. Mr.	16
17	Mason informed AE Martin that most of the documentation for the YO-YO was in Porterville,	17
18	and that he would call and have an employee drive it up.	18
19		19
20		20
21	The Calaveras County Sherriff's Department had already collected the following	21
22	documentation from Mr. Mason and Mr. Malone, and provided these documents to AE Martin.	22
23		23
24	<ul style="list-style-type: none">• Training Checklist for Gary Smith and Mauricio Hernandez.	24
25		25
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1	<ul style="list-style-type: none">Operator's Daily Log for May 14, 15 & 16, 2008.	1
2		2
3	<ul style="list-style-type: none">Erector/Dismantler Training for Greg Henshaw and Gerald Black.	3
4		4
5	<ul style="list-style-type: none">Daily Inspection Sheet for May 14, 15 & 16. 2008.	5
6		6
7	Note: A review of the documents showed that there were seven seats out	7
8	of service at the time of the accident.	8
9		9
10	<ul style="list-style-type: none">Maintenance Record Sheet for the YO-YO (7 items with 9 tasks entered) The	10
11	maintenance had a beginning entry date of 4-3-08 for the first item, and the last entry	11
12	was dated 5-14-08. The entries ranged from painting chairs to fixing cracks, electrical,	12
13	and "greasing" the attraction.	13
14		14
15	<ul style="list-style-type: none">Post Set Up Checklist (1 sheet)	15
16		16
17		17
18	While AE Martin was on site at the attraction, SE Medeiros made and received numerous	18
19	phone calls to the following individuals and entities. Many of the calls involved tracking the	19
20	status of the injured.	20
21		21
22	<ul style="list-style-type: none">The Calaveras County Sheriff's Department and command post, Lieutenants Tim Sturm	22
23	and Gary Kuntz	23
24		24
25	<ul style="list-style-type: none">Midway of Fun Owner Harry Mason	25
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1	• Fair Manager Ray Malerbi	1
2		2
3	• Hospitals: UC Davis Sacramento, Sonora Regional Hospital, Modesto Memorial North,	3
4	Mark Twain, Modesto Doctor's Hospital.	4
5		5
6		6
7	As the investigation unfolded, the Division learned that the first responders to the incident	7
8	included fair patrons as well as staff from the Calaveras County Sheriff's Office, New Melones	8
9	Fire Department, California Department of Forestry, California Fair Services Authority, and	9
10	staff from the fair site of the Frogtown event.	10
11		11
12	The first call for emergency assistance was received by the local authorities at 6:10 P.M. Initial	12
13	reports stated that there were two critical injuries, eight walking wounded, and fifteen others.	13
14	Ground and air transportation was requested. By 7:17 P.M., all wounded passengers had been	14
15	transported from the scene of the accident.	15
16		16
17		17
18	Fair Manager Ray Malerbi and the Sheriff's Department informed the Division that the Sheriff's	18
19	Department would be releasing a press statement concerning the accident.	19
20		20
21	From the sheriff's command post, the department faxed a preliminary list to SE Medeiros of	21
22	the names and phone numbers of the patrons involved in the YO-YO accident. At the same	22
23	time, Jim Rosbrook from the Melons Fire Department provided the following list of patrons that	23
24	had required immediate emergency care and were transported by ambulance or helicopter:	24
25		25
26		26

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1	1 patron	UC Davis Sacramento	1
2	6 patrons	Sonora Regional Hospital	2
3	1 patron	Modesto Memorial North	3
4	4 patrons	Mark Twain	4
5	1 patron	Modesto Doctor's Hospital	5
6			6
7			7
8	Hours later, the Division was able to learn that all of the injured had been treated and released,		8
9	except for two children, one child was admitted to UC Davis and the other to Modesto		9
10	Memorial North, both for overnight treatment and observation. One of the admitted suffered a		10
11	head injury, and the other was awaiting CT scan results and listed in fair condition.		11
12			12
13	By early morning on May 17, 2008, the Division engineers made arrangements to leave, with a		13
14	plan to return later in the day to continue the investigation. The Sheriff's Department informed		14
15	the Division that they would be willing to provide security at the accident site.		15
16			16
17	<u>May 17, 2008</u>		17
18			18
19			19
20	Upon returning to the fairgrounds, both AE Martin and AE Haskell continued examining and		20
21	photographing the YO-YO, particularly the hydraulic lift cylinder and spider bearing. A thorough		21
22	inspection of the cylinder revealed that the cylinder did not have the identifying numbers that		22
23	should be visibly stamped into the wall of the cylinder and did not have the tag that, according		23
24	to Chance, is placed by Chance on the cylinder after the factory completes a 5-year re-build		24
25	certification.		25
26			26

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1	AE King arrived on site and met with Mr. Charley Wiglesworth, who is employed by the	1
2	California Fair Services Authority. Mr. Wiglesworth escorted AE King to the YO-YO attraction	2
3	site where AE King was briefed by AE Martin on the status of the investigation.	3
4		4
5	Throughout the day, AE Martin, AE Haskell, and AE King continued to gather information	5
6	concerning the YO-YO attraction while other attractions were inspected to ensure their safe	6
7	operation. No paperwork was available on site for any of the attractions at the fairgrounds.	7
8		8
9		9
10	That day, Mr. Mason received a fax from Mr. Blash, owner of North American Amusements,	10
11	d.b.a. Shamrock Shows, on May 17, 2008, which he presented to the Division inspectors as a	11
12	copy of the documentation for Mr. Mason's YO-YO	12
13		13
14	The document indicated that Chance had done a Hydraulic Cylinder Test on a YO-YO having	14
15	Cylinder Identification Number GB-45, attraction Serial #74-3317 (with California State ID	15
16	C#3838), that the test had been completed on March 18, 2005, and the test result showing the	16
17	ride had passed was effective until March 18, 2010. The document listed Joe Blash as the	17
18	owner of the YO-YO.	18
19		19
20		20
21	However, this information did not match the identification on Mr. Mason's YO-YO, which was	21
22	Serial # 74-3315, with California State ID C #3041.	22
23		23
24	Since the serial number of the provided document and the serial number of the YO-YO	24
25	attraction involved in the accident didn't match, the Division could not determine whether the	25
26		26

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1	cylinder installed in the attraction had ever been re-built by Chance per Service Bulletin	1
2	#B376R1077-0. As discussed earlier, this service bulletin requires all YO-YO	2
3	Owners/Operators to remove the sweep cylinder from their YO-YO attraction and return the	3
4	cylinder for inspection, rework, and certification to Chance every five years.	4
5		5
6	After communicating with Mr. Laycock at Chance, the Division learned that Chance had no	6
7	record of a YO-YO with Serial # 74-3315, C# 3041, as having ever had its cylinder re-built after	7
8	1997.	8
9		9
10		10
11	During the day, arrangements were made by the Division to continue the YO-YO investigation	11
12	to the next day, May 18, 2008, to allow the manufacturer time to contact their representative,	12
13	Mr. John Shook, and arrange for him to arrive on site. These arrangements were made so that	13
14	the manufacturer could participate in the investigation along with the Owner/Operator, as	14
15	requested by the manufacturer. Chance requested that nothing be removed or disassembled	15
16	until the representative could arrive and participate in the investigation. The Division agreed to	16
17	accommodate the request.	17
18		18
19		19
20		20
21	<u>May 18, 2008</u>	21
22		22
23	While waiting for the Chance representative to arrive at the fairgrounds; throughout the day,	23
24	AE King met with Mr. Malone and Mr. Mason and discussed the attraction, the accident, and	24
25	the events surrounding it. The following summarizes conversations with Mr. Malone and Mr.	25
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Mason:

- Midway of Fun has operated this YO-YO attraction during 2007 and 2008. Mr. Mason stated that he did not own this YO-YO attraction. He said that it belonged to his ex-wife. Later in the day, he made a statement that the attraction was his. AE King asked Mr. Mason who owned the YO-YO attraction. Mr. Mason said that the attraction was technically his wife's, but that he takes responsibility for it, and that he has it listed on his itinerary and insurance. Mr. Mason said that he was in the process of getting the title for it.
- Mr. Malone stated that the YO-YO attraction was not in very good shape when Midway of Fun took possession of it. Mr. Malone said that it had needed a lot of work. Mr. Malone said that there had been problems with the hydraulic system, and that there were several places that needed to be welded.
- Mr. Mason stated that the attraction was operated by North American Amusements in 2005 and 2006. Prior to operating the attraction, North American Amusements sent the hydraulic cylinder to Chance for the required 5-year re-build.
- Mr. Malone oversees the maintenance and operation of all attractions operated by Midway of Fun. Mr. Malone took AE King to the maintenance shop to review the manual and maintenance records for this attraction. The manual for this attraction was available. The historical maintenance documentation for this attraction was sparse. Mr. Malone said that the maintenance documentation that is kept by Midway of Fun is

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1	typically minimal; usually just enough to satisfy the California code requirements. Mr.	1
2	Malone said that he had had previous experience with YO-YO attractions, and that he	2
3	personally inspected the visible portions of the spider assembly and greased it each	3
4	time the attraction was erected. Mr. Malone also said that the cover to the spider	4
5	assembly had not been removed since the attraction had been operated by Midway of	5
6	Fun. Mr. Malone felt that the internal inspection of the spider assembly should be	6
7	performed by the manufacturer during the required re-build every 5 years.	7
8		8
9		9
10	AE King performed a physical inspection of the YO-YO attraction. The inspection revealed the	10
11	following items:	11
12		12
13	• The attraction's electrical wiring and terminations appeared to be neglected. AE King	13
14	found 14 areas that included missing covers, exposed conductors, and improper	14
15	connections.	15
16		16
17	• The hydraulic system had leaks and was missing several pressure gauges.	17
18		18
19		19
20	• Several of the hydraulic components were painted different colors and appeared to be	20
21	substitute parts taken from other equipment and installed on this attraction.	21
22		22
23	• The main hydraulic cylinder did not have the original manufacturer's identification tag	23
24	installed as required by the manufacturer.	24
25		25
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1	• There had been several welding repairs made to the attraction. Slag had not been	1
2	removed, preventing a thorough inspection.	2
3		3
4	• Portions of steel had been replaced on the base of the attraction.	4
5		5
6	• The main hydraulic unit used to power this attraction was designed to assist during the	6
7	set-up and removal of the attraction, and to provide motion for the attraction. A	7
8	temporary hydraulic pump, which was not part of the design, was lying in the “possum	8
9	belly” of the attraction close to the main hydraulic unit. Mitch Malone stated that the	9
10	temporary hydraulic unit was being used to set the attraction up.	10
11		11
12		12
13	Upon Mr. Shook’s arrival, both Mr. Shook and AE King inspected the external portions of the	13
14	spider assembly, the exposed shaft of the hydraulic lift cylinder, and the surrounding structure.	14
15	At the time of this inspection, the spider assembly was still connected to the lifting arms via the	15
16	lifting straps. During the inspection, the following items were observed:	16
17		17
18	• The spider assembly was found to be disconnected from the hydraulic cylinder.	18
19		19
20		20
21	• There was evidence of metal-to-metal contact between the spider assembly and the	21
22	structure that houses the hydraulic cylinder.	22
23		23
24	• The fasteners that secure the top cover to the spider assembly still had paint on them	24
25	and did not appear to have been recently removed.	25
26		26

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1	Mr. Shook and AE King removed the top cover of the spider assembly while the attraction was	1
2	still in an upright position. The removal of the cover allowed for a closer inspection of the	2
3	spider bearing assembly and revealed the following:	3
4		4
5	<ul style="list-style-type: none">• The top portion of the bearing cavity had a large amount of grease in it.	5
6		6
7		7
8	<ul style="list-style-type: none">• There appeared to be two different types of grease in the visible portion of the top	8
9	portion of the bearing cavity. Some of the grease was a turquoise color, and some of it	9
10	was red. The two different greases did not appear to have mixed. Indicating that the top	10
11	grease was relatively new.	11
12		12
13	<ul style="list-style-type: none">• After a visual inspection, the grease on the inside of the top part of the cover was wiped	13
14	from the inside cover top and sides in order to see if there had been any prolonged	14
15	metal-to-metal contact. A visual inspection did not reveal any markings of significance.	15
16		16
17		17
18	<ul style="list-style-type: none">• There were two lock nuts with a lock washer in between them that had come off of the	18
19	threaded end of the cylinder rod.	19
20		20
21	<ul style="list-style-type: none">• The lock washer was missing the internal tab that is used to keep it indexed with the	21
22	hydraulic cylinder shaft.	22
23		23
24	<ul style="list-style-type: none">• The bearings and bearing spacer were intact.	24
25		25
26		26

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ACCIDENT INVESTIGATION REPORT NARRATIVE

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1	<u>May 19, 2008</u>	1
2		2
3	On May 19, 2008, Mr. Malone stated that he was unaware of the manufacturer's recent	3
4	Service Bulletin, #B376CRM146-A, released March 21, 2006, regarding the inspection of the	4
5	locknuts on the sweep cylinder. This inspection required the Owner/Operator to remove the	5
6	cap once a year and inspect the lock nuts. This was to be performed immediately upon receipt	6
7	of the bulletin, and annually thereafter.	7
8		8
9		9
10	Arrangements were made to lay the attraction down in the transporting position in order to	10
11	facilitate the next stage of the investigation, which would involve the dismantling of the spider	11
12	bearing assembly. Prior to the attraction being "laid down", the "T" bars were removed and the	12
13	lifting arms were tethered together with a cinching strap. The attraction tower was lowered to	13
14	its transport position	14
15		15
16	The Division received a request from Marc Bernstein, Investigator with the U.S. Consumer	16
17	Product Safety Commission (CPSC) out of San Bruno, California, and his supervisor, Valery V.	17
18	Ceasar, Senior Compliance Officer, Bethesda, Maryland, asking if it would be possible to	18
19	accompany the Division on the next site visit and observe the inspection investigation at the	19
20	YOYO.	20
21		21
22	The Division agreed to the request.	22
23		23
24		24
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May 20, 2008

Arrangements were made to meet at the fairgrounds on May 23, 2008 with all the concerned parties present in order to dismantle the spider assembly.

May 22, 2008

Steve Laycock with Chance was contacted by SE Medeiros and AE King via telephone. At the time of the telephone call, the Division had not yet been able to identify the number on the lift cylinder in the YOYO. The Division asked where the serial number should be stamped into the cylinder housing, what information is contained on the identification tag, and where the tag is located when it leaves Chance. They were told that the stamped numbers on the cylinder are above the lower hydraulic fitting and the tag is installed directly to the cylinder by a nylon cable tie. The Division learned that most of the hydraulic cylinders are returned to the factory for re-build with the spider assembly attached. Chance reworks the spider assembly by inspecting the assembly, replacing the bearings and lock washer, and re-installing it onto the cylinder.

May 23, 2008

The following individuals gathered at the Calaveras County Fairgrounds to observe or participate with the removal, disassembly, and inspection of the spider assembly:

Ray Rieger Rieger Loss Control Services LLC

Mr. Mason Midway of Fun

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1	Mr. Malone	Midway of fun	1
2	Nick Shelly	Sac Legal Video	2
3	Jon Saul	Tom Minder and Associates	3
4	Mr. Shook	Safety Certified	4
5	Thomas Caton	Consumer Product Safety Commission	5
6	Marc Bernstein	Consumer Product Safety Commission	6
7	Mak Kumagai	Consumer Product Safety Commission	7
8	Mike King	DOSH-Amusement Rides	8
9	Nancy Medeiros	DOSH-Amusement Rides	9
10	Brian Baudendistel	DOSH/Bureau of Investigations	10
11			11
12			12
13	In order to access the spider bearings, it was necessary to dismantle the lifting arms from the		13
14	spider. This was done by Mr. Malone, with the aid of Mr. Shook, while the process was		14
15	observed by the group. Once completed, the external portions of the spider assembly, the		15
16	hydraulic cylinder well, and the hydraulic cylinder rod were inspected in an attempt to locate		16
17	the missing internal indexing tab from the lock washer. The lock washer indexing tab was		17
18	located in the machined keyway of the hydraulic cylinder rod, in excess grease.		18
19			19
20			20
21	The spider assembly was removed from the attraction and disassembled. The bearings and		21
22	bearing spacer were removed from the spider assembly. Grease samples were taken and put		22
23	into separate containers. The spider assembly, bearings, and related parts were inspected and		23
24	photographed by all parties. Lastly, the individual components were labeled and bagged.		24
25			25
26			26

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1	After several layers of paint were removed from the cylinder, the cylinder marking could be	1
2	seen and identified as GB28, matching the serial number of this YO-YO C# 3041, serial	2
3	number 74-3315.	3
4		4
5	All components of the spider assembly were transported to the Division's Northern California	5
6	Amusement Ride office and placed in the evidence room with the intent to preserve the	6
7	evidence so that a thorough analysis could be performed by a third party laboratory.	7
8		8
9		9
10	<u>May 27, 2008</u>	10
11		11
12	Mr. Shook arrived at the Division's Northern California office to take additional photos of the	12
13	lock nuts, lock washer, and tab that were removed from the YO-YO attraction. Mr. Shook	13
14	stated that he had turned in a report to Chance with his findings, and revealed that he could	14
15	discuss his findings, but could not provide the Division with a written report. Mr. Shook stated	15
16	that he thought the attraction had not been lubricated properly, and that the bearing in the	16
17	spider assembly may have become over-tightened on the shaft. He said he believed that the	17
18	lubrication in the spider assembly eventually became ineffective, and when that happened, the	18
19	whole assembly (bearings, spacer, lock nuts, and lock washer) turned on the shaft, causing	19
20	the tab on the lock washer to sheer off in the keyway of the hydraulic cylinder shaft. After the	20
21	lock washer failed, the lock nuts were free to become loose and unwind. He stated that the tab	21
22	could have been broken for the past 6 months. Mr. Shook also said that he believed the	22
23	bearings were new and had most likely been replaced during the previous winter, since the	23
24	bearing rollers did not show the degree of wear of that would be expected from longer term	24
25		25
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ACCIDENT INVESTIGATION REPORT NARRATIVE

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1 use. 1
2
3 The fair manager, Ray Malerbi, requested that the YO-YO attraction be removed from the 3
4 fairgrounds. The Division contacted Mr. Mason via the telephone and requested that he help 4
5 transport the YO-YO attraction to a California Highway Patrol yard in Sacramento. Also 5
6 discussed was the possibility of completing a failure analysis on the failed YO-YO parts. Mr. 6
7 Mason refused to transport the attraction and informed the Division that he was going to seek 7
8 advice from his counsel. 8
9
10
11 AE King and SE Medeiros had a phone conversation with Mr. Laycock regarding the cylinder 11
12 used on the YO-YO involved in this accident. Mr. Laycock stated that it is the position of 12
13 Chance that the cylinder on this attraction, GB 28, had not been in their shop since 1997, and 13
14 it was no longer within the authorized 5-year operating period. Mr. Laycock stated that the 14
15 failure that occurred on this attraction is very similar to one that had happened in Texas a few 15
16 years earlier. The Division requested information from Chance regarding the Texas accident. 16
17 Mr. Laycock stated that the Texas accident and this accident shared several characteristics, 17
18 particularly the galling that was found between the mating surfaces of the lock nuts, bearing 18
19 spacer, and the locking washer. Mr. Laycock theorized that the components from the Texas 19
20 accident lacked proper lubrication, which caused increased friction between the mating 20
21 surfaces. Mr. Laycock stated that, even when there appears to be a generous amount of 21
22 lubrication, lubricating intervals must be maintained to avoid equipment failure.¹ 22
23

24 ¹ Note: Further information was provided on March 10, 2009 to the Division by Mr. Laycock concerning the 24
25 Texas YOYO accident in the form of a report produced by SEA, Ltd. The report addresses the cause of the Texas 25
26 YOYO accident, which occurred on March 12, 2006 and includes review of a report by Dr. Hal Watson, Jr., P.E. 26
The SEA report was requested by Chance on July 22, 2008, for the purpose of reviewing file material related to

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ACCIDENT INVESTIGATION REPORT NARRATIVE

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1	the Texas YOYO accident. The report lists the following conclusions:	1
2	<ul style="list-style-type: none">• The subject YO-YO rode was operating normally when the main hub spider unexpectedly decoupled from the sweep lift cylinder rod. This caused the sweep arms to descend and contact the round stop bar, in turn lowering the riders' seats. Since the tilt function was operating at the time, some of the seats contacted the ground as the YO-YO ride slowed to stop.	2
3		3
4	<ul style="list-style-type: none">• The cause of the decoupling was a poor fit between the rod, spacer, and inner ring of the upper bearing.	4
5		5
6	<ul style="list-style-type: none">• The poor fit allowed the rotating spacer to transfer torque to the stationary locknuts and lockwasher assembly.	6
7		7
8	<ul style="list-style-type: none">• The torque magnitude increased over time, eventually causing the tab on the lockwasher to shear off.	8
9		9
10	<ul style="list-style-type: none">• The cause of the loose fit between the rod, spacer, and inner ring was due to an incorrect form of the spacer.	10
11		11
12	<ul style="list-style-type: none">• The oxidized grease observed on the spacer is an indication that it had been involved in a previous failure.	12
13		13
14	<ul style="list-style-type: none">• Under normal application conditions the spacer would not experience significant wear, but it may have been previously damaged.	14
15		15
16	<ul style="list-style-type: none">• There was no evidence of a poor or inappropriate design.	16
17	Other findings in the report indicate that the cylinder rod, the bore of the upper inner ring bearing, and the rollers of the inner ring bearing and many other parts in the assembly had visible fretting and moisture corrosion. This information is what the report concludes indicated a poor fit between the rod, spacer, and bore of the upper bearing. The report goes on to state that if the tab of the lockwasher had sheared off during the installation, the bearing assembly most likely would have failed sooner. The last installation date for the sweep lift cylinder and main hub spider by Chance was on April 15, 2004. During that installation and rebuild Chance's employee dismantled the main hub spider and replaced the roller bearings, seals, locknuts, and lockwasher. The spacer, bearing housing, and cover because they are considered to be non-wearing parts would have been visually examined and reused if no noticeable changes were detected.	17
18		18
19	This particular Texas YO-YO had a bearing failure in 2001 and at that time the roller bearings, seal, locknuts, and a lockwasher, but not a replacement spacer were installed. According to SEA's report: It is possible that the spacer was damaged in 2001, which caused it to become an "incorrect form" after the 2001 bearing failure, and during the rebuild went undetected.	19
20		20
21	SEA's comments, in relation to Dr. Watson's expert report indicates the following:	21
22	<ol style="list-style-type: none">1. Dr. Watson's report: "The defective part was the lock washer... What happened in this case is the inner tab of the lock washer was damaged, nearly completely sheared off, probably by someone applying a wrench to one or both of the lock nuts and inadvertently over rotating the lock washer relative to the cylinder rod, causing the key slot to shear off the tab."	22
23		23
24	SEA's response: As previously mentioned in this report, the observance of fretting corrosion on the spacer and inner ring objectively show that there was a poor fit between the rod, spacer, and bore of the upper bearing. If the tab of the lockwasher had sheared off during the installation, the bearing assembly most likely would have failed sooner.	24
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1	2. Dr. Watson's report: "A loads and stress analysis had been done in 1974 by James Hupt, P.E. for Chance Rides. His calculations show that the spider bearing had a predicted life of 2,100 hours of full load operation, which would be about 5,000 hours of mixed load operation. This would translate to only about 2-1/2 years of operation of the ride at an amusement park like Six Flags. Yet there was no warning, instruction or recommended period of inspection of the spider bearing by Chance Rides prior to the accident"	1
2		2
3		3
4		4
5	SEA's Response: Using the basic rating life according to ISO 281:1990 with a rotation of 10 rpm would grossly oversize the bearing for this application. In slow rotation applications such as the YO-YO ride, the permissible load is not determined by the material fatigue but the amount of plastic deformation on the roller path caused by the load. The life is theoretically infinite as long as the factor of safety between the static radial load rating and the static equivalent radial load is greater than or equal to one. SEA calculated a minimum factor of safety of three. SEA reviewed the 2006 Daily Ride Report for the Texas Tornado YO-YO ride and calculated the running time for the YO-YO ride at the park to be approximately 4800 hours over 5 years.	5
6		6
7		7
8		8
9	3. Dr. Watson's report: "The sweep lift cylinder was recommended to be reworked by Chance Rides every 5 years. This recommendation was followed by the park. However, the spider bearing rework and inspection which should have been done at the same time, was not done."	9
10		10
11	SEA's Response: As discussed in the earlier analysis, the roller bearings, seals, lockwasher, and locknuts were replaced during the rework of the sweep lift cylinder.	11
12		12
13	4. Dr. Watson's report: "The connection assembly of the lock nuts and lock washer is a critical one for the safety of the ride and should have been flagged in a FEMA (Failure Effects and Mode Analysis) analysis of failure modes and either prevented by engineering a better connection or adding a redundancy measure such as a spring clip or cotter pin at the end of the threaded rod. This would have been more effective than the use of Loctite thread adhesive."	13
14		14
15		15
16	The SEA report concludes: The use of locknuts with a locking washer is standard in the industry and recommended by Timken and SKF, two of the world's largest roller bearing manufactures and leaders in the industry. According to Chance Rides manufacturing, Inc. Bulletin No. B376CRM146-A, this subject design has been used on over 95 YO-YO amusement rides during 35 years of production. In conclusion, the main hub spider decoupled from the sweep lift cylinder due to a poor fit between the rod, spacer, and IR of the upper bearing. The source of the poor fit was an incorrect form of the spacer. There was no evidence of a poor or inappropriate design.	16
17		17
18		18
19		19
20	Mr. Laycock also stated that the components used in the spider assembly are available from most bearing supply companies.	20
21		21
22		22
23	Mr. Laycock questioned the type of lubrication that was used in the failed spider assembly. He felt that the type of grease that was used in the failed spider assembly is different from the lubrication that is installed at the factory during the re-building process. This is based on the	23
24		24
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1	observation that the lubrication on top was teal in color, and is a water proof type lubricant that	1
2	contains additives and is commonly found in boat bearings. The lower lubricant was red and	2
3	would have been the type used by Chance. There was comment that there may not have been	3
4	a sufficient amount of lubrication to effectively purge the grease in the bearings. Mr. Laycock	4
5	explained that by adding new lubrication, as required weekly on the YO-YO, the new grease	5
6	would push out the old.	6
7		7
8		8
9		9
10	<u>May 28, 2008</u>	10
11		11
12	The Division contacted Mr. Laycock to ask about the interlock links that are installed on the	12
13	newer YO-YO attractions. He explained that their purpose is to link the lifting arms together in	13
14	the event of a single lifting arm failure. Mr. Laycock explained that he was unsure if the	14
15	engineering or design would have been strong enough to prevent an accident that is caused	15
16	by the failure of the entire spider assembly. Chance does not offer the interlock design as an	16
17	option for retro-fit on older attractions.	17
18		18
19		19
20	The Division compared pictures of an unused locking washer supplied by Chance to the lock	20
21	washer that was removed from the failed attraction. The lock washers appear to be the same.	21
22	The Division asked Mr. Laycock how Chance notifies owners about service bulletins for the	22
23	YO-YO attraction. He replied that Chance mails bulletins to attraction owners from a list that is	23
24	maintained by their office. The lists are not always up-to-date because owners do not always	24
25	notify the manufacturer of ownership or address changes.	25
26		26

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1	Chance also maintains a website that is provided for owners, operators, and persons involved	1
2	with amusement ride attractions. According to Mr. Laycock, the information on the website is	2
3	kept current and provides interested parties access to technical information and support,	3
4	including manuals, field inspection guides, and bulletins pertaining to Chance rides. Mr.	4
5	Laycock stated that Mr. Mason has received several passwords for gaining access to their	5
6	website.	6
7		7
8		8
9	Mr. Mason called and requested an update on information that the Division had obtained	9
10	regarding the hydraulic cylinder and spider assembly. Mr. Mason was told that Chance is	10
11	showing that the last time the cylinder and spider assembly installed in the failed attraction was	11
12	re-built was in 1997. Mr. Mason was informed that AE King would be delivering a letter	12
13	requesting a list of documents to be provided to the Division the following day in Antioch.	13
14		14
15	The Division made the decision to have the YO-YO attraction transported from the fairgrounds	15
16	to a secure and guarded facility in Sacramento, despite Mr. Mason's refusal to assist.	16
17		17
18		18
19		19
20		20
21	<u>May 30, 2008</u>	21
22		22
23	AE King met with the trucking company at the fairgrounds to haul the YO-YO attraction from	23
24	the fairgrounds to the CHP yard in Sacramento. During transport, one of the tires on the YO-	24
25	YO attraction trailer had a blow-out. After the tire was replaced, the attraction was delivered to	25
26		26

Permanent

ACCIDENT INVESTIGATION REPORT NARRATIVE

Temporary

1	the CHP yard in Sacramento and was placed in a lock-up yard in the back corner of the lot.	1
2	The storage yard is secured by a locked gate. It is inside another storage yard that is located	2
3	behind a rolling access gate that is inside of a manned entry gate.	3
4		4
5		5
6	<u>June 2, 2008</u>	6
7		7
8		8
9	Mr. Laycock contacted the Division and requested the status of the failure analysis of the	9
10	bearings. Mr. Laycock was informed that the bearings had not been sent out because final	10
11	arrangements had not yet been made. Mr. Laycock requested that the Division send Chance	11
12	the bearings before sending them to the third party failure analysis laboratory selected by the	12
13	Division. The Division informed Mr. Laycock that the bearings could not be released from the	13
14	Division's custody to Chance. However, if possible, his experts could arrange to work with the	14
15	third party laboratory. Mr. Laycock initially accepted this offer, but later declined.	15
16		16
17	Mr. Laycock requested that the Division verify the bearing numbers used in the spider	17
18	assembly. The bearing numbers were sent via email.	18
19		19
20		20
21	The Division and Mr. Laycock discussed the amount of grease that was found in the bearing	21
22	cavity of the spider assembly. Mr. Laycock stated that if the spider assembly had recently been	22
23	re-built, he would not be surprised if the cavity was not full of grease. He also said that if the	23
24	re-build was performed several years prior, the entire cavity of the spider assembly would be	24
25	packed full of grease.	25
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Permanent

ACCIDENT INVESTIGATION REPORT NARRATIVE

Temporary

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June 4, 2008

Mr. Laycock phoned the Division and wanted to know what the color of Mr. Blash's YO-YO C# 3838 was. Mr. Laycock stated that Ray Rieger had called him and asked if the cylinders may have been swapped between attractions. Mr. Laycock said that Chance does not paint the cylinders during a re-build. If the re-build requires a new housing, they may paint it black. The Division informed Mr. Laycock that Blash's cylinder was teal, with additional colors underneath.

June 6, 2008

The Division prepared the evidence from the evidence room for transport to the third party failure analysis company.

September 23, 2008

The Division received approval to take items from the evidence locker to Anamet for failure analysis.

September 24, 2008

The Division removed items from evidence room and transported them to Anamet for failure analysis.

ACCIDENT INVESTIGATION REPORT NARRATIVE

Permanent

Temporary

1	<u>December 22, 2008</u>	1
2		2
3	Anamet finalized the failure analysis of the YO-YO parts and provided the Division with their	3
4	report.	4
5		5
6	<u>Division File Review.</u>	6
7		7
8	Review of the Division's files reveal the following:	8
9		9
10	<u>YO-YO C#3041</u>	10
11		11
12	On May 5, 2005, Division amusement ride inspector, Phil Lindquist (AE Lindquist), inspected	12
13	the ride for North American Amusements, Owner Joe Blash, and issued a temporary operating	13
14	permit with one requirement. On the May 5, 2005 field sheet the ride is identified as having	14
15	serial number 74-3315 with a new cylinder identified as GB 45 743317, and a cylinder	15
16	expiration date of 3-18-10. The requirement issued by the inspector called for taking a seat out	16
17	of operation because it was missing an insert.	17
18		18
19		19
20	On August 16, 2005, AE Lindquist conducted a follow-up inspection for the outstanding	20
21	requirement, listed above, and issued an Annual Permit to YO-YO C# 3041.	21
22		22
23	On October 4 and 5, 2006, AE Lindquist inspected YO-YO C# 3041 and issued a temporary	23
24	operating permit. The ride was issued 4 requirements unrelated to the hydraulic cylinder. On	24
25	the field sheet the ride serial number is listed as 74-3315. The items listed for correction were:	25
26		26

Permanent

ACCIDENT INVESTIGATION REPORT NARRATIVE

Temporary

1	(1) Lockable disconnect switch within reach of the operator.	1
2	(2) An electrical device installed in order to require manual restarting of the ride after a power	2
3	failure.	3
4	(3) Entrance and exit gates installed.	4
5	(4) The control box being used was not the control box manufactured by Chance and needed	5
6	to be replaced by one that was.	6
7		7
8		8
9	The above items were not re-inspected by the Division because the YO-YO was repossessed	9
10	by an entity with a financial claim to the attraction. The temporary permit subsequently expired.	10
11		11
12	In April of 2007 YO-YO C# 3041 was inspected by AE Lindquist. At the time, the ride was	12
13	being operated by Midway of Fun and was issued a temporary permit requiring that a hydraulic	13
14	hose at the cylinder head be replaced. On May 31, 2007, AE King conducted a follow up	14
15	inspection to clear the requirement and issued an annual permit. AE King's field sheet	15
16	indicates that, according to information placed in the file by AE Lindquist in 2005, the cylinder	16
17	had been rebuilt.	17
18		18
19		19
20	<u>YO-YO C# 3838</u>	20
21		21
22	The ride was inspected by AE Lindquist on April 24, 2002, and noted on the field sheet is	22
23	information indicating that the cylinder had been rebuilt on 4-9-02. The file records the ride	23
24	serial number as 74-3317, with a cylinder rebuild by the manufacturer that occurred on 4-9-02,	24
25	with an expiration date of 4-9-07. The cylinder I.D. is listed as GB 45.	25
26		26

ACCIDENT INVESTIGATION REPORT NARRATIVE

Permanent

Temporary

1	The file indicates that, from 2002 through 2008, AE Lindquist inspected the ride ten times.	1
2	Three of those inspections occurred after the YO-YO's hydraulic lift cylinder expiration date of	2
3	4-9-07, including an inspection leading to issuance of an annual permit to the YO-YO in April	3
4	2008, just days before the accident on C#3041 of May 16, 2008.	4
5		5
6		6
7	<u>Failure Analysis</u>	7
8		8
9	<u>Physical Inspection of the YO-YO</u>	9
10	<u>Materials Engineering & Laboratory Testing</u>	10
11		11
12	Initially, after the accident, and during the Division's physical investigation of the YO-YO's	12
13	hydraulic lift cylinder and spider assembly, the Division was able to identify a damaged lock	13
14	washer located between two lock nuts, and surmised that the two lock nuts which were	14
15	threaded onto the cylinder rod had "backed off" and released the cylinder, causing the sweep	15
16	arms on the YO-YO to collapse. It appeared that the damaged lock washer's broken inner	16
17	indexing tab had broken and failed to retain the lock nuts in their desired fixed position.	17
18		18
19	The Division speculated that, after the inner tab broke on the washer, the top lock nut and the	19
20	lock washer worked their way up the hydraulic cylinder shaft. This distance appears to have	20
21	been approximately 1 ½ inches, since the top lock nut is only three threads below the end of	21
22	the cylinder rod end when in its properly-fixed position. While this was occurring, the lower lock	22
23	nut remained fastened in place and was the only mechanical component keeping the spider	23
24	bearing assembly attached to the hydraulic cylinder shaft. It should be noted that this attraction	24
25		25
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Permanent

ACCIDENT INVESTIGATION REPORT NARRATIVE

Temporary

1	and the spider assembly both rotate in a counter-clockwise direction, while the hydraulic	1
2	cylinder remains in a fixed position. Both lock nuts are threaded onto the rod end by "screwing"	2
3	them in a clockwise direction. It is conceivable that the ride's counter-clockwise rotations	3
4	worked against the tightened lock nut and became a contributing factor in enabling the	4
5	remaining lock nut to loosen its grip and "unscrew". Also of consideration would be the	5
6	vibrations imposed by the attraction's movement.	6
7		7
8	There are damaged threads visible on the end of the threaded rod, indicating that the lower	8
9	lock nut was only attached to the hydraulic cylinder rod end by a few threads before enough	9
10	force finally pushed the lock nut off of the threaded portion of the hydraulic cylinder. This is the	10
11	point when the accident occurred.	11
12		12
13	The Division also discovered unusual wear patterns and galling on the lower lock nut surface	13
14	that was in contact with the top surface of the bearing spacer. These marks are discussed in	14
15	the Anamet failure analysis.	15
16		16
17		17
18	In order to determine what caused the index tab to break on the washer, and to fully	18
19	understand all contributing factors and their possible sequencing, the Division decided to retain	19
20	the services and expertise of a failure analysis lab capable of using advanced scientific	20
21	methods. After the Division performed a competitive bid process, and funding was approved,	21
22	the Division retained the services of Anamet, Inc. to perform a third party analysis of the failed	22
23	spider assembly. On September 24, 2008, the parts necessary for the analysis were	23
24	transported to Anamet.	24
25		25
26		26

Permanent

ACCIDENT INVESTIGATION REPORT NARRATIVE

Temporary

1	Anamet is a company located in Hayward, California that provides materials engineering	1
2	analysis and laboratory testing, including the American Association of Laboratory	2
3	Accreditation, A2LA, accredited mechanical testing, and inorganic chemical analysis	3
4	procedures to a diverse base of industry, legal, and government entities. Anamet also	4
5	performs all aspects of failure analysis and forensic engineering to determine the root cause of	5
6	mechanical, metallurgical, or corrosion failures and, when required, provides expert opinions in	6
7	court. Anamet also offers materials and product testing in accordance with industry standards	7
8	such as ASTM, ASME, and MIL, as well as customized tests to meet a wide range of client	8
9	requirements.	9
10		10
11	Anamet examined photographs and other supplied information that included, but was not	11
12	limited to, the manufacturer's ride manual, communications, and service bulletins. A new lock	12
13	washer, obtained from the manufacturer, and the components that make up the spider	13
14	assembly, including all of the grease and rags that were used during the removal of the failed	14
15	spider assembly, were delivered to Anamet, Inc. Anamet used the following laboratory	15
16	procedures:	16
17		17
18	1) Visual examination, including under magnification using stereoscopes	18
19		19
20	2) Chemical analysis and hardness testing	20
21		21
22	3) Scanning electron fractography and energy dispersive X-ray spectroscopy	22
23		23
24	4) Metallography	24
25		25
26		26

ACCIDENT INVESTIGATION REPORT NARRATIVE

Permanent

Temporary

1	After an examination of the supplied materials and information, the main focus of Anamet's	1
2	investigation was directed to the failed lock washer. The lock washer had 19 outer tabs, and	2
3	one inner tab. The inner tab was designed to fit in a machined slot in the hydraulic lift cylinder.	3
4	One of the outer tabs was bent to fit into a slot of the upper locknut. The fixed position of the	4
5	lock washer, by way of the inner tab, and the bent outer tab into the upper locknut was	5
6	designed to keep the bearing assembly at a fixed position on the hydraulic cylinder shaft.	6
7	When the hydraulic cylinder was retracted, the arms were raised, and this, in turn, raised the	7
8	seats and patrons. The lock washer failed and allowed the lock nuts to turn off of the hydraulic	8
9	cylinder. This combination allowed the lifting arms, patrons, and empty seats to fall to the	9
10	ground in an unexpected and uncontrolled manner.	10
11		11
12		12
13	Anamet provided the following conclusions:	13
14		14
15	(1) <i>The sweeps of the C-3041 YO-YO folded or "collapsed" from a raised position when it</i>	15
16	<i>was not supposed to, sending chairs and riders to the ground. This occurred because the</i>	16
17	<i>sweep lift cylinder bearing assembly/spider slipped out of the cylinder rod and lost the</i>	17
18	<i>power to pull the sweeps' top ends down.</i>	18
19		19
20		20
21	(2) <i>The sweep lift cylinder bearing assembly/spider was secured to the cylinder rod using two</i>	21
22	<i>lock nuts and a lock washer in between them. At the time of the C-3041 YO-YO failure on</i>	22
23	<i>May 16, 2008, it had been operating with a lock washer that had a broken inner tab. This</i>	23
24	<i>broken inner tab of the lock washer was the cause of the chairs/riders coming down to</i>	24
25	<i>the ground without control, injuring the riders.</i>	25
26		26

ACCIDENT INVESTIGATION REPORT NARRATIVE

Permanent

Temporary

- 1 (3) The lock washer was supposed to prevent the two lock nuts from backing off the thread 1
2 engagement with the cylinder rod. The lock washer had 19 outer tabs and one inner tab. 2
3 One of the outer tabs was bent 90° upward to engage a slot of the upper lock nut and the 3
4 inner tab was bent 90° downward to engage the keyway of the cylinder rod. This design 4
5 could "immobilize" the upper lock nut and could prevent both lock nuts from backing off 5
6 the cylinder rod if installed properly. 6
7
8
9 (4) The lock washer was made of soft iron sheet metal, 0.09-inch in thickness. The inner tab 9
10 of the lock washer fractured due to overload during a single overload event. The fracture 10
11 faces consisted of elongated dimples, which occur in overload fractures of ductile 11
12 materials. This could happen only during a lock nut torque down. No evidence of fatigue 12
13 cracking was found. 13
14
15 (5) The inner tab of the failed lock washer of the C-3041 YO-YO was broken while the sweep 15
16 lift cylinder bearing assembly/spider was being installed onto the cylinder rod or during 16
17 the last torque down. The inner tab of the lock washer broke because the lock washer 17
18 flange turned clockwise while the upper lock nut was being torqued down. The inner tab 18
19 that was fixed in the cylinder rod keyway broke away from the lock washer inner face as it 19
20 rotated with the upper lock nut during the torque down. Thread imprints on the fracture 20
21 face indicate that the lock washer rotated clockwise about 1/2-inch while the inner tab was 21
22 being kept captive in the keyway. 22
23
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ACCIDENT INVESTIGATION REPORT NARRATIVE

Permanent

Temporary

- 1 (6) With the inner tab broken, the lock washer lost the very function of preventing the upper 1
2 lock nut from turning counter clockwise due to vibration induced self-loosening and due to 2
3 the cylinder rod up and down movements, which controlled sweep's vertical movements. 3
4 4
5 (7) With the upper lock nut loosened up because of the ineffective lock washer, the lower 5
6 lock nut also loosened up. Both lock nuts and the lock washer backed off the cylinder rod 6
7 until the last two threads remained engaged with the lower lock nut when the upward 7
8 force caused them to strip, allowing the bearing housing/spider to slip out of the cylinder 8
9 rod. 9
10 10
11 11
12 (8) The inner tab of the lock washer failed partly because the lock washer was made of soft 12
13 iron that was low in hardness. As the upper lock nut torqued down against the lock 13
14 washer, the machining marks on the bottom end of the upper lock nut formed imprints on 14
15 the soft lock washer flange top face. The imprints increased the friction between the 15
16 faying surfaces and promoted the lock washer to turn clockwise together with the upper 16
17 lock nut. Since the keyway of the cylinder rod kept the inner tab from rotating, it broke off 17
18 as the lock washer flange rotated, which provided the single overload event for the inner 18
19 tab. 19
20 20
21 21
22 (9) The lock washer flange top face and the bottom face each had one set of machining mark 22
23 imprints. This would indicate that the inner tab fractured during the last torque down, 23
24 probably during the installation of the bearing assembly/spider onto the cylinder. If the 24
25 upper lock nut was subsequently retightened, a new lock washer was used. When the 25
26 26

ACCIDENT INVESTIGATION REPORT NARRATIVE

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1 *last torque down occurred cannot be determined from this metallurgical evaluation alone.* 1

2

3 (10) *Since the lock nuts hide the lock washer inner tab and it takes only a small force to break* 3

4 *it, its failure during a lock nut torque down may not be noticed. The only way to maintain* 4

5 *the inner tab integrity was to monitor the lock washer rotation during a torque down,* 5

6 *which was apparently not done. The YO-YO manufacturer only cautioned about torque* 6

7 *values higher than 50 ft-lbs might damage the lock washer tabs during an annual* 7

8 *tightness check and did not caution against the effects of the lock washer rotation being* 8

9 *more deleterious on the inner tab integrity during any torque down.* 9

10

11

12 (11) *Whether the C-3041 YO-YO operator complied with the five-year inspection/certification* 12

13 *requirement of the sweep cylinder or not has not been determined. This is outside the* 13

14 *scope of this report. It appears, however, that the sweep "collapse" of the C-3041 YO-YO* 14

15 *was due to the broken inner tab of the lock washer and that the performance of the* 15

16 *sweep cylinder was not a factor in this failure.* 16

17

18

19 Herguth Laboratories Analytical Ferrography 19

20 C#3041 Upper Bearing Grease Analysis 20

21

22 On March 10, 2009 the Division employed the services of Herguth Laboratories, Inc. for an 22

23 analysis of the bearing grease contained in YO-YO C#3041's bearing cavity at the time of the 23

24 accident. The analysis revealed the following: 24

25

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ACCIDENT INVESTIGATION REPORT NARRATIVE

Permanent

Temporary

1	The ferrous debris consists of normal rubbing, fatigue, corrosive wear particles, red and dark	1
2	metallo-oxides. Fatigue wear particles are generally less than 5 um with length to thickness	2
3	ratio greater than 5. Their surfaces are rough and the particles are shaped like chunks of coal	3
4	rather than platelets. Red oxides are red/orange particles and are an indicator of moisture in	4
5	the system and/or of poor lubricant condition. Dark metallo-oxides often show flecks of free	5
6	metal on their surfaces. They are caused by heat and may be evidence of lubricant starvation	6
7	or severe wear. Corrosion is a fine deposit of less than 1 um size particles at the exit of	7
8	ferrogram. They are formed by corrosive attack on metal surfaces and depletion of lubricant	8
9	additives. The foreign contaminants are primarily inorganic crystalline (dirt). The "other" in the	9
10	ferrogram represents the percent approximation of non-ferrous white metals observed. The	10
11	sample is rated abnormal due to the amount of wear particles observed and to the high ratio of	11
12	large to small particles.	12
13		13
14		14
15		15
16	Chance Manufacturer Specifications and Requirements for YO-YO Owners	16
17		17
18		18
19	As mentioned earlier in the report, there have been 21 bulletins and communications released	19
20	by Chance that apply to YO-YO attractions. Most of these communications are titled "Service	20
21	Bulletins". One of them, dated March 21, 2006 (Bulletin #B376CRM146-A), describes, in detail,	21
22	an inspection of the sweep lift cylinder bearing assembly required of all YO-YO owners.	22
23		23
24	According to Mr. Mason and Mr. Malone, this inspection was not done.	24
25		25
26		26

ACCIDENT INVESTIGATION REPORT NARRATIVE

Permanent

Temporary

1	Mr. Malone and Mr. Mason both stated that they had not inspected the top lock nuts, or even	1
2	removed the cover of the spider assembly, since this YO-YO attraction had been in their	2
3	possession. Both commented that Chance requires the re-build of the cylinder every five	3
4	years, and they felt that only Chance should be the one to perform the work on the spider	4
5	assembly.	5
6		6
7		7
8	On May 19, 2008, Mr. Malone stated that he was unaware of the manufacturer's bulletin	8
9	requiring the inspection of the lock nuts on the sweep cylinder.	9
10		10
11	Bulletin #B376CRM146-A was released to communicate a required inspection of the "sweep	11
12	lift cylinder bearing assembly", also referred to as the "spider assembly". This service bulletin	12
13	defined the procedure for inspecting the sweep lift cylinder bearing assembly and its	13
14	connection to the sweep lift cylinder. The inspection was to be performed immediately upon	14
15	receipt of the bulletin, and then annually thereafter.	15
16		16
17		17
18	A copy of this bulletin is attached.	18
19		19
20	<u>Chance Bulletin #B376CRM146-A Effective Date March, 21, 2006</u>	20
21		21
22	<i>Bulletin #B376CRM146-A contained these detailed instructions:</i>	22
23		23
24	1. <i>Remove the eight (8) cap screws that secure the cover to the bearing housing.</i>	24
25	<i>Remove the cover.</i>	25
26		26

ACCIDENT INVESTIGATION REPORT NARRATIVE

Permanent

Temporary

1	2.	<i>Thoroughly clean cover in the area indicated in the illustration on page 3. Inspect the</i>	1
2		<i>area for signs of wear, scratches, or other damage. If there is no sign of damage to</i>	2
3		<i>the cover, proceed to the next step.</i>	3
4	3.	<i>(omitted from bulletin)</i>	4
5	4.	<i>Clean the grease off the cylinder rod and locknuts to gain access to these parts for</i>	5
6		<i>inspection</i>	6
7	5.	<i>Measure the cylinder rod protruding past the upper locknut as shown on page 3.</i>	7
8		<i>There must be 1/8" to 1/4" of the cylinder rod protruding past the upper locknut</i>	8
9		<i>(approximately 3 full threads). If this measurement is correct, proceed to the next</i>	9
10		<i>step.</i>	10
11	6.	<i>Check the upper locknut for tightness as follows:</i>	11
12			12
13			13
14		<ul style="list-style-type: none"><i>Do not bend the tab on the lock washer out of the slot in the upper locknut.</i>	14
15		<ul style="list-style-type: none"><i>Use a spanner wrench to turn the locknut slightly in each direction. Do not use</i>	15
16		<ul style="list-style-type: none"><i>more than 50 ft-lbs. of force or the lock washer tab can be damaged.</i>	16
17		<ul style="list-style-type: none"><i>Observe the slot with the bent lock washer tab for movement of the nut.</i>	17
18		<i>If there is no movement of the nut, proceed to the next step.</i>	18
19			19
20			20
21	7.	<i>With the assistance of two helpers to MANUALLY rotate the sweeps as instructed in</i>	21
22		<i>the Operation Manual. Observe the components from above while the ride is turning</i>	22
23			23
24		<ul style="list-style-type: none"><i>The inner race of the upper bearing must remain stationary in relation to the</i>	24
25		<ul style="list-style-type: none"><i>cylinder rod.</i>	25
26			26

ACCIDENT INVESTIGATION REPORT NARRATIVE

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- *The spacer must remain stationary in relation to the cylinder rod*
- *Listen for any unusual noises from the bearing. Look for any unusual movement of any component.*

8. *Stop turning the ride. Use a 0.002" feeler gauge to look for clearance between the spacer and the inner race of the upper bearing as shown. Check this around the entire circumference of the spacer. There should be zero clearance at all locations.*

9. *Apply silicone sealant to the flange of the cover and install it. Tighten the cover cap screws to 5-6 ft-lbs.*

This inspection must be performed immediately upon receipt of this bulletin, then annually there after.

IF ANY VARIATIONS FROM THE CONDITIONS DESCRIBED IN THIS BULLETIN ARE FOUND, do not operate the ride. Contact the Customer Service Department at Chance Rides Manufacturing, Inc. immediately for instructions on the necessary repair procedure. DO NOT ATTEMPT TO REPAIR THESE COMPONENTS EXCEPT AS SPECIFICALLY INSTRUCTED BY CHANCE RIDES MANUFACTURING, INC.

IF THE CONDITION AND INSTALLATION OF THE SWEEP LIFT CYLINDER BEARING COMPONENTS ARE AS DESCRIBED, the ride can be operated normally.

Permanent

ACCIDENT INVESTIGATION REPORT NARRATIVE

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1	<i>All work must be performed by qualified personnel, capable of understanding the function of</i>	1
2	<i>the parts and their proper installation. Use only those components authorized, specified or</i>	2
3	<i>provided by Chance rides Manufacturing, Inc. All applicable OSHA safety standards and safe</i>	3
4	<i>industry practices must be observed.</i>	4
5		5
6	<i>Observe all safety information contained in the manufacturer's manuals. Make available this</i>	6
7	<i>bulletin and all related technical information to personnel using the equipment.</i>	7
8		8
9		9
10	<u>Chance Service Bulletin # B376R1077-0 Effective Date May 16, 1990</u>	10
11		11
12	<i>This bulletin details the 5 year re-build required by Chance:</i>	12
13		13
14	<i>Chance Rides, Inc. requires inspection of all YO-YO amusement ride sweep cylinders to be</i>	14
15	<i>completed within five (5) years after the ride was originally put into service and every five (5)</i>	15
16	<i>years thereafter, as outlined in this bulletin.</i>	16
17	<i>To complete the five (5) year inspection procedure all YO-YO owner/operators must remove</i>	17
18	<i>the sweep cylinders from their rides as outlined in SECTION II of this bulletin. Upon removal,</i>	18
19	<i>the cylinder shall be returned to Chance Rides, Inc. for inspection, rework and certification.</i>	19
20		20
21		21
22	<i>Chance Rides, Inc. rework consists of the following new parts:</i>	22
23		23
24	<i>1. New rod</i>	24
25	<i>2. New piston</i>	25
26		26

ACCIDENT INVESTIGATION REPORT NARRATIVE

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1	3. <i>New seal kit</i>	1
2		2
3	<i>Upon inspection, if the bore of the cylinder is greater than the manufacturer's specifications,</i>	3
4	<i>the cylinder must be replaced.</i>	4
5		5
6	<i>DO NOT OPERATE THE RIDE AFTER THE EXPIRATION DATE OF THE CYLINDER.</i>	6
7		7
8	<i>Note: If the cylinder identification markings are damaged, removed or are otherwise illegible,</i>	8
9	<i>contact the Chance Rides, Inc. Customer Service Department.</i>	9
10		10
11	<i>The following information is steel-stamped into the barrel:</i>	11
12		12
13	<i>Part Number</i>	13
14	<i>D.P. Number</i>	14
15	<i>Cylinder I.D. Number</i>	15
16		16
17	<i>Tag on cylinder contains the following: Chance Rides, Inc.</i>	17
18		18
19		19
20	<ul style="list-style-type: none"><i>Ride Serial No.</i>	20
21	<ul style="list-style-type: none"><i>Cylinder I.D. No</i>	21
22	<ul style="list-style-type: none"><i>Date of Last Insp.</i>	22
23	<ul style="list-style-type: none"><i>Expiration Date</i>	23
24		24
25		25
26		26

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1	<u>Chance Bulletin #B376CRM146-B Effective Date: September 4, 2008</u>	1
2	<u>Service Bulletin B376CRM146-A is superseded by this bulletin and is no longer in effect.</u>	2
3		3
4	This new bulletin (#B376CRM146-B) was released after this accident from the manufacturer,	4
5	with guidance from CPSC.	5
6	This new bulletin requires the addition of a gauge plate secured to the cylinder rod with cap	6
7	screws, hardened washers, and safety wire. The addition of the gauge plate allows the	7
8	attraction maintenance personnel to perform the inspection of the lock nut and lock washer	8
9	assembly by inserting a 1/4" gauge between the gauge plate and the top of the lock nut. If the	9
10	gauge is rejected for any reason, the Owner/Operator is supposed to contact Chance for	10
11	additional inspection and repair procedures. The new bulletin does not require a physical	11
12	inspection of the bearings, gauge plate and gauge plate hardware, and safety wire.	12
13		13
14		14
15	Throughout the course of the investigation, the Division had numerous conversations with Mr.	15
16	Laycock regarding the YO-YO attraction, with particular emphasis on the re-building of the	16
17	hydraulic cylinder and spider assembly. During these conversations, the Division learned that	17
18	most cylinders sent into chance for the 5 year re-build also have the spider assembly re-built at	18
19	the same time.	19
20		20
21		21
22	According to statements made by Mr. Laycock, the Division learned that a typical re-build uses	22
23	the following process:	23
24		24
25	1. Chance is contacted by the Owner/Operator inquiring about a lift cylinder and spider	25
26		26

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1	assembly re-build.	1
2		2
3	2. Chance generates a work order and requests an up-front payment.	3
4		4
5	3. The cylinder and spider assembly is received at Chance.	5
6	4. Chance shop personnel match the received cylinder and spider assembly to a work	6
7	order.	7
8		8
9		9
10	5. Chance personnel re-build the cylinder and spider assembly.	10
11		11
12	6. Finalized paperwork is submitted to the office by the shop personnel, and the owner is	12
13	contacted to arrange payment and shipping.	13
14		14
15		15
16	<u>Hydraulic Cylinder Re-build Information</u>	16
17		17
18	Throughout this investigation, there have been unresolved questions regarding the last time	18
19	the hydraulic cylinder and spider assembly in this attraction was re-built. Chance's records	19
20	show that the hydraulic cylinder in this attraction was last re-built in 1997. However, Mr. Blash,	20
21	who previously operated YO-YO C# 3041, maintains that he sent YO-YO C# 3041's cylinder	21
22	into Chance in 2005. He also claims that Chance sent back the certification identifying his	22
23	other YO-YO C# 3838 as having had its cylinder re-built, that he never noticed that the	23
24	paperwork identified the rebuild as pertaining to C#3838, and that he operated YO-YO C#	24
25	3041 during the 2006 operating season with the wrong tag attached to the cylinder. Mr. Blash	25
26		26

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1	contends that, during some fair in 2006, an independent inspector noticed that the wrong tag	1
2	was attached to the cylinder and questioned the discrepancy, but nothing was followed up to	2
3	correct the situation.	3
4		4
5	On Wednesday, January 7, 2009, SE Medeiros and AE King met with Mr. Blash, owner of	5
6	North American Amusements, d.b.a. Shamrock Shows. The purpose for this meeting was to	6
7	understand the history of this attraction, and the past maintenance and repairs performed on	7
8	this attraction. Mr. Blash provided the following information:	8
9		9
10		10
11	• Mr. Blash provided maintenance documentation, service bulletins, daily inspection	11
12	sheets, invoices, check registers, and ticket tallies for the YO-YO C#3041 attraction	12
13	involved in this accident. The same documentation was made available for his other	13
14	YO-YO C# 3838 attraction that is still owned and operated by North American	14
15	Amusements.	15
16		16
17		17
18	• Mr. Blash told the Division that the YO-YO involved in this accident was owned by MLM,	18
19	and that in 2005, Shamrock Shows took possession of the YO-YO attraction through an	19
20	arrangement with MLM. After taking possession, Mr. Blash determined that the	20
21	attraction needed to have repairs made prior to operating it. One of the repairs that it	21
22	needed was the mandatory 5-year cylinder re-build.	22
23		23
24	• Mr. Blash made arrangements with Chance to have the cylinder re-built. On March 9,	24
25	2005, a check was written to Con-Way Freight for the shipping of the cylinder to	25
26		26

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1	Chance. The cylinder was shipped to Chance the next day. The cylinder repairs were	1
2	completed by Chance, and the cylinder was sent back to North American Amusements	2
3	on March 25, 2005.	3
4		4
5	The Division was able to determine the following through an analysis of the paperwork	5
6	provided by Mr. Blash:	6
7		7
8		8
9	• Shamrock Shows sent two hydraulic cylinder and spider assemblies to Chance for re-	9
10	build between 2002 and 2005. Chance's records indicate that the same cylinder, C	10
11	#3838, serial #74-3317 was re-built during those dates.	11
12		12
13	• Shamrock Shows operated two YO-YO attractions during 2005: C# 3838 and C# 3041.	13
14		14
15	• Shamrock Shows took possession of YO-YO C# 3041 in 2005.	15
16		16
17	• YO-YO C# 3041 had not had an operating permit since 2001 and did not receive a	17
18	current operating permit until May 22, 2005.	18
19		19
20		20
21	• Shamrock Shows removed a lift cylinder from C# 3041 in March of 2005 and did not	21
22	have it re-built and ready to operate until May 22, 2005.	22
23		23
24	• As evidenced by the daily operating and maintenance documentation provided to the	24
25	Division, it appears that YO-YO C# 3838 was operating at the same time that Mr. Blash	25
26	removed and shipped a hydraulic cylinder and spider assembly to Chance, where it was	26

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ACCIDENT INVESTIGATION REPORT NARRATIVE

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1	re-built in March of 2005.	1
2		2
3	<ul style="list-style-type: none">The cylinder for YO-YO C# 3041 had "GB 28" stamped into the barrel of the cylinder.	3
4	Only after this accident, and after several layers of paint were removed, could these	4
5	numbers be seen.	5
6		6
7		7
8	Mr. Blash has stated that he is sure that the hydraulic cylinder in C# 3041 was sent to Chance	8
9	in 2005 for a re-build, and that the cylinder and spider assembly was re-installed in YOYO C	9
10	#3041 after it was received back from Chance.	10
11	At the time it was installed, nobody determined whether the data tag from the factory was	11
12	installed or the serial numbers on the documentation and components were correct.	12
13		13
14	Mr. Blash believes that when Chance generated the work order for the cylinder re-build,	14
15	Chance assumed that the cylinder belonged to Blash's YO-YO C# 3838 and did not check the	15
16	cylinder tank numbers. Likewise, Mr. Blash failed to inform Chance that he was operating two	16
17	YO-YO attractions, and Chance generated the work order, assuming that the cylinder was for	17
18	Shamrock Shows, and listed the YO-YO attraction that it had on file.	18
19		19
20		20
21	If Mr. Blash's account of having C#3041 rebuilt instead of C#3838 in 2005, then C# 3838 had	21
22	not been re-built since 2002 and was being operated up to the time of the C#3041 accident	22
23	with a cylinder that expired in 2007. When asked how he could be certain that he sent C#	23
24	3041 back to Chance, and yet operating YO-YO C# 3838 with a cylinder that had expired in	24
25	2007, Mr. Blash stated that he lost track, and pointed to the paperwork he contends	25
26		26

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ACCIDENT INVESTIGATION REPORT NARRATIVE

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1	erroneously reflects a rebuild of the cylinder of YO-YO C# 3838 in 2005.	1
2		2
3	According to Chance, the hydraulic cylinder received in 2005 was not painted by the factory	3
4	during the re-build, and it would not have been standard procedure to paint the cylinder.	4
5		5
6	The Division has not been able to determine when cylinder GB 28 received its many layers of	6
7	paint. It is possible that if this was the cylinder that was returned to Chance in 2005, that it had	7
8	been heavily painted before arriving at Chance's facilities, and that the cylinder numbers were	8
9	never checked. Chance states that it is their procedure to always check the cylinder tanks for	9
10	numbers, and that the same employee has been re-building the cylinders for years.	10
11		11
12		12
13	<u>Midway of Fun Documentation</u>	13
14		14
15	The Division requires training and authorization for all employees who supervise or perform	15
16	work on an amusement ride attraction. The Division also requires that the Owner/Operator	16
17	document all operations and maintenance work performed on an attraction, and make all the	17
18	training and documentation available to the Division for review upon request.	18
19		19
20	Typical documentation contains information that answers:	20
21		21
22	• who performed the tasks,	22
23	• what the tasks were,	23
24	• why the tasks were performed,	24
25		25
26		26

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1	<ul style="list-style-type: none">• where the tasks were performed,	1
2	<ul style="list-style-type: none">• when the tasks were performed,	2
3	<ul style="list-style-type: none">• how the tasks were performed, and	3
4	<ul style="list-style-type: none">• what methods and procedures were used to complete the tasks.	4
5		5
6		6
7	The Division also requires that the Owner/Operator maintain all of the manufacturer's manuals	7
8	and bulletins with the ride, and make them available to all employees that operate and	8
9	maintain the attraction.	9
10		10
11	Midway of Fun produced very few documents for the Division to review regarding employee	11
12	training and past maintenance. The documents that were received contained a minimal	12
13	amount of information, or were not completely filled out. At the time of the accident, the	13
14	Division received the following documentation:	14
15		15
16	Erector/Dismantler Training:	16
17		17
18		18
19	<ul style="list-style-type: none">• A single page, generic document with 15 items	19
20		20
21	<ul style="list-style-type: none">• Training documents for Gerald Black and Greg Henshaw were provided	21
22		22
23	Erector/Dismantler Assistant Training Checklist:	23
24		24
25	<ul style="list-style-type: none">• A single page, generic document with 15 items	25
26		26

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Temporary

1	<ul style="list-style-type: none">• Training documents for Gerald Black and Greg Henshaw were provided	1
2		2
3	Training Checklist:	3
4		4
5	<ul style="list-style-type: none">• A single page, generic document with 7 items	5
6	<ul style="list-style-type: none">• The document is reproduced with the supervisor's initials on all items	6
7		7
8	<ul style="list-style-type: none">• #2 - Specific duties, assigned positions selection not chosen	8
9	<ul style="list-style-type: none">• #7 - "Do you have any questions" selection not chosen	9
10	<ul style="list-style-type: none">• #7 - The "Yes" initial line appears to have been omitted	10
11	<ul style="list-style-type: none">• Missing operator's initials on all training items	11
12	<ul style="list-style-type: none">• Supervisor's signature date missing	12
13	<ul style="list-style-type: none">• Operator's printed name not written	13
14		14
15	YO-YO Maintenance Log:	15
16		16
17	<ul style="list-style-type: none">• A single page, generic document with 16 rows and 3 columns	17
18	<ul style="list-style-type: none">• The first entry is 4/3/08. It states: "set up 1st time our ownership"	18
19	<ul style="list-style-type: none">• There are only 7 maintenance entries logged	19
20		20
21	Operator's Daily Log:	21
22	<ul style="list-style-type: none">• A single page, generic document with many areas that require the operators to enter	22
23	the applicable information	23
24	<ul style="list-style-type: none">• The 3 days of operation in Angels Camp were supplied	24
25	<ul style="list-style-type: none">• The "Team Leader Signature" is missing from all 3 documents	25
26		26

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1	YO-YO Daily Inspection:	1
2	• An attraction-specific document for the YO-YO attraction, with 13 items to inspect and a	2
3	place for comments and signatures	3
4	• The 3 days of operation in Angels Camp were supplied	4
5	• 6 chairs are listed as "out of service" on May 14 th	5
6	• 7 chairs are listed as "out of service" on May 15 th and 16 th	6
7	• All items were addressed, and all required signatures were obtained	7
8		8
9		9
10	YO-YO Post (set up check sheet):	10
11	• A handwritten inspection sheet containing 25 items that need to be inspected after the	11
12	attraction is set up, and prior to operation	12
13	• This document is dated 5/14/08	13
14	• The words "OK to run" and an illegible signature are written at the bottom of the page	14
15		15
16		16
17	On May 27, 2008, the Division drafted and delivered a letter to Mr. Mason, the owner of	17
18	Midway of Fun, Inc., requesting critical background and historical documentation about the	18
19	attraction maintenance, and the employees associated with the maintenance, erection,	19
20	dismantling, and operation of this YO-YO attraction. The Division requested the following	20
21	information:	21
22		22
23	• Provide an organizational chart that shows the line of authority, for the past three	23
24	years, from Mr. Mason to the attraction operator. This should include Managers,	24
25	Supervisors, Leads, Maintenance personnel, etc.	25
26		26

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ACCIDENT INVESTIGATION REPORT NARRATIVE

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- | | | |
|----|---|----|
| 1 | • Provide a copy of all Employees who have, or may have worked on or operated this | 1 |
| 2 | attraction for the past two years. This list should include their permanent home | 2 |
| 3 | address, Phone Numbers, California Drivers License Number, and Date of Birth. | 3 |
| 4 | | 4 |
| 5 | • Provide a copy of all the Operator Training certifications for all employees who have | 5 |
| 6 | worked with this attraction for the past two years. | 6 |
| 7 | | 7 |
| 8 | | 8 |
| 9 | • Provide a copy of all the Maintenance Training certifications for all employees who | 9 |
| 10 | have worked with this ride for the past two years. | 10 |
| 11 | | 11 |
| 12 | • Provide a copy of all the Evacuation Training certifications for all employees who have | 12 |
| 13 | worked with this ride for the past two years. | 13 |
| 14 | | 14 |
| 15 | • Provide a copy of all the Set Up and Tear Down certifications for all employees who | 15 |
| 16 | have worked with this ride for the past two years. | 16 |
| 17 | | 17 |
| 18 | | 18 |
| 19 | • Provide a copy of all the Operator Training Procedure for all employees who have | 19 |
| 20 | worked with this ride for the past two years. | 20 |
| 21 | | 21 |
| 22 | • Provide a copy of all the Maintenance Training Procedure for all employees who have | 22 |
| 23 | worked with this ride for the past two years. | 23 |
| 24 | | 24 |
| 25 | | 25 |
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- Provide a copy of all the Evacuation Training Procedure for all employees who have worked with this ride for the past two years.
- Provide a copy of all the Set Up and Tear Down Procedure for all employees who have worked with this ride for the past two years.
- Provide a copy of the ride manual that travels with this ride and that the employees have access to at all times.
- Provide a copy of all materials used and/or ordered for the repair and maintenance of this ride for the past three years.
- Provide a copy of all work performed by persons other than persons employed by Midway of Fun for the past three years.
- Provide a copy of all ride bulletins and notifications regarding maintenance or operational issues with this ride for the past three years.
- Provide a copy of all daily operational check lists, NDT reports and maintenance and repair logs associated with this ride for the past three years.

On May 29, 2008, AE King made an attempt in Antioch to interview Midway of Fun employees that were involved with the YO-YO attraction. AE King was informed that none of the

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ACCIDENT INVESTIGATION REPORT NARRATIVE

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1	employees were available in Antioch.	1
2		2
3	On June 17, 2008, Mr. Mason responded to an additional request for information by AE King	3
4	with an email stating that all of the documents that Mr. Mason had are now with his attorney,	4
5	Mr. Michael Amaro.	5
6		6
7	On June 25, 2008, Mr. James Clark, an attorney for the Division, sent Mr. Amaro an email	7
8	requesting any and all documents that were in his possession, or reasonably obtainable,	8
9	relating to the YO-YO attraction be provided to the Division.	9
10		10
11		11
12	On July 3, 2008, the Division served a subpoena to Mr. Mason formally requesting the	12
13	documentation that had been previously requested by letter on May 27, 2008.	13
14		14
15	On July 17, 2008, Mr. Amaro sent an email to Mr. Clark stating that he was still in the process	15
16	of gathering the requested information, and that he hoped to have the information and	16
17	documentation together by the following week. Mr. Amaro also said that he would deliver the	17
18	responsive documents the following week, as well.	18
19		19
20		20
21	On August 6, 2008, while Midway of Fun was operating in Napa, AE King asked to interview	21
22	Midway of Fun employees involved in the YO-YO accident. Again, they were not available.	22
23		23
24	On December 17, 2008, Mr. James Clark sent Mr. Amaro an email again, requesting the	24
25	documents that Mr. Amaro stated that he was gathering for the Division on July 17, 2008.	25
26		26

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1 On January 14, 2009, the Division contacted Mr. Mason to request the documents that had 1
2 previously been requested. Mr. Mason stated that he believed that Mr. Amaro had previously 2
3 complied with the request for documentation, and was surprised that the Division had not 3
4 received them. He also stated that he believed that the Division had received all of the 4
5 documents at the time of the accident. Mr. Mason said that he only owned the YO-YO 5
6 attraction since April of 2008, and that there would not be much documentation available. 6
7

8
9 When Mr. Mason was asked about the documents from the 2007 operating season, he said 8
10 that all documentation for the 2007 operating season had been boxed up and delivered to his 9
11 ex-wife, the previous owner of the attraction. Mr. Mason only possessed documents from April 10
12 of 2008 (the time he has owned the attraction). 11
12

13
14 At the writing of this report, the only documents made available to the Division were those 13
15 obtained at the time of the accident. With the exception of Mr. Mason and Mr. Malone, 14
16 attempts to interview Midway of Fun employees associated with this accident have been 15
17 unsuccessful. 16
17

18
19
20
21 Witness and Rider Statements 21

22 While there were many witnesses to the accident that occurred on the YO-YO attraction at the 22
23 Calaveras Fairgrounds on May 16, 2008, only a few of them have been willing to give 23
24 additional statements other than those they gave to the first responders shortly after the 24
25 accident occurred. 25
26

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1	The following are summarized statements of interviews that were conducted during the course	1
2	of this investigation. These statements were taken either in person or over the telephone, and	2
3	were conducted during the course of this investigation by the Division and first responders.	3
4		4
5		5
6	<u>Tanner Smith</u>	6
7		7
8		8
9	Tanner, a 15-year-old male, was riding the YO-YO attraction at the time of the accident. During	9
10	the ride, and just before the accident, Tanner heard what he thought sounded like a hydraulic	10
11	line hissing. The YO-YO attraction then turned to one side and started dragging passengers	11
12	across the ground. Tanner said that the attraction made one complete revolution and then	12
13	stopped. After the attraction stopped, it was total chaos, with people yelling, screaming, and	13
14	crying everywhere.	14
15		15
16		16
17	<u>Kaylin Milligan</u>	17
18		18
19		19
20	Kaylin, a 14-year-old female, was riding the YO-YO attraction at the time of the accident.	20
21	Kaylin's injuries were potentially serious in nature and required immediate medical attention.	21
22	Kaylin had bleeding from the ears and scalp, and was airlifted to Memorial Hospital in	22
23	Stockton. Kaylin was released the following day.	23
24		24
25		25
26		26

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1 Sara Simmons

2

3 Sara, a 12-year-old female, was riding the YO-YO attraction at the time of the accident. Sara's
4 father, Jason Simmons, provided the following account of his daughters' experience: Sara said
5 that when she was riding the attraction, it dropped twice. The first time, it dropped two inches,
6 then it dropped towards the ground some more, and then back up. Then, it collapsed. Sara
7 was having difficulty breathing and when she was given water, she threw up. Sara was airlifted
8 to UC Davis, admitted into the Trauma Unit, and released the next day. Sara said that on the
9 day of the accident, the YO-YO attraction and another attraction did not open with the other
10 rides. Sara heard someone yell to another, "go buy a bolt."
11

12

13

14 Kyle Nichols

15

16 Kyle, a 14-year-old male, was riding the YO-YO attraction at the time of the accident. Kyle was
17 riding the YO-YO attraction for the first time. Kyle said that the attraction felt normal to begin
18 with. He said that the attraction was at its highest point and going its fastest when it went out of
19 control. Kyle heard a big boom, and the attraction fell and hit the ground. Kyle had bruises on
20 his chest, back, and elbows. Kyle did not seek medical attention.
21

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Courtney Couch

Courtney, a juvenile female, was riding the YO-YO attraction at the time of the accident.

Courtney's mother, Debbie, gave the following account of the accident: Courtney called her

mother, Debbie, and told her that the attraction crashed. Courtney had ridden the attraction

two times earlier in the day. The accident happened while she was riding it for the third time.

Each time Courtney rode the attraction, she heard a noise coming from it. The third time she

rode it, the attraction was higher up on one side, and there was a grinding noise right before it

hit the ground. After the attraction hit the ground, it continued to spin one time around.

Courtney could hear something that sounded like wood ripping."

Jolene Blankenship (Key)

Jolene, an 11-year-old female that also uses the last name "Key", was riding the YO-YO

attraction at the time of the accident. Jolene's mother, Angel, was present during a phone

interview. Jolene said that she had ridden the attraction twice before the day of the accident.

During her third ride, she felt the chains drop a couple of inches. Then the attraction started to

tilt, she heard a crackling noise, and then she fell about 6 or 7 feet to the ground, where she

was dragged around the attraction once or twice before she flipped over in her chair. Jolene

had scrapes on her body and legs, and a bump on her head that required medical attention.

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ACCIDENT INVESTIGATION REPORT NARRATIVE

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1 Connor Fredrick

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3 Connor, a 14-year-old male, said he was standing at the end of the wine-tasting building, when
4 he heard a loud "screeching" noise similar to gears grinding. He turned and saw the YO-YO tilt
5 to one side. After it tilted, half of the passengers were slammed into the ground. Connor said
6 the attraction kept spinning for a few seconds, with all the passengers hitting the ground and
7 the wall of the attraction.

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11 Katlyn Brenner

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13 Katlyn, an 11-year-old female, said she was standing in line for the YO-YO attraction, and she
14 saw that there was an open door at the bottom of the attraction. She said that she saw a
15 female rider strike the open door at the bottom of the attraction after the attraction went out of
16 control. Katlyn said that all of the other teenagers that were riding the attraction started hitting
17 the ground and hitting the attraction. She said that the attraction stopped after a few rounds,
18 and everyone was crying and screaming.

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22 Laura Allen

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24 Laura, a 10-year-old female, was waiting in line with Katlyn Brenner, when she heard a loud
25 "bang". Laura said that she turned to the attraction and saw it spinning and throwing

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ACCIDENT INVESTIGATION REPORT NARRATIVE

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Temporary

1 passengers into the ground and the side of the attraction.

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4 Sean Ranney

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Sean, a 15-year-old male, said he had just ridden the Ferris Wheel, and as he was getting off, he heard a loud "clanking" from the YO-YO attraction. When Sean looked at the YO-YO attraction, he saw people slamming into each other, the top of the attraction platform, and into the ground. Sean said that the seats were hitting the ground and causing rocks to be thrown. He said that everyone in the area started screaming and yelling for help. Sean said that the attraction was spinning for a few seconds with passengers hitting the ground before it came to a complete stop.

Colby Klein

Colby, a 15-year-old male, was standing between the Ferris Wheel and the funnel cake booth, looking at the YO-YO attraction. He said that he heard a loud "clinking" noise, and one side of the attraction fell and started to drag the passengers across the ground. Colby said the passengers were being slammed into the side of the attraction and the ground.

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ACCIDENT INVESTIGATION REPORT NARRATIVE

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1	<u>Carson Klein</u>	1
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3	Carson, a 16-year-old male, was standing at the ticket booth for the attractions, when he heard	3
4	a noise that sounded like a car trying to start. He turned towards the YO-YO attraction and saw	4
5	one side of the attraction fall. Carson said the attraction went around 2 or 3 times, slamming all	5
6	the passengers into the ground and wall of the attraction. He saw one little girl's head slam into	6
7	the side of the wall, and she appeared to be unconscious. Carson said that people started to	7
8	jump the fenced-off area to help the injured people.	8
9		9
10		10
11	<u>Robert Brooks</u>	11
12		12
13		13
14	Robert, a 15-year-old male, said that he was standing near the ticket booth for the attractions,	14
15	when he heard a "clinking" sound. He turned towards the YO-YO attraction and saw the	15
16	passengers of the attraction being bounced off the ground and slammed into the wall of the	16
17	attraction. Robert said the attraction continued to spin for about five revolutions before	17
18	stopping.	18
19		19
20		20
21	<u>Steven Thomas</u>	21
22		22
23		23
24	Steven, an adult male, was standing at the funnel cake building, when he heard a loud	24
25	"hissing" sound come from the YO-YO attraction. He saw the arms drop a little bit, and then	25
26	come back up. Thomas said that the arms then dropped completely, and all the passengers	26

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1 started to be dragged across the ground. Steven saw the operator try to push the "stop"
2 button, but the attraction did not stop. He said that the operator then ran over and hit the
3 emergency stop button, and the attraction finally stopped. Steven said that he saw the
4 attraction being assembled that morning, and that the person working on it raised it up and
5 started to turn it slowly. Steven said that while the operator was turning and raising the
6 attraction, it started to make a hissing noise, and the operator working on the attraction
7 lowered it and started to walk away. Steven said that the hissing noise that it made just prior to
8 the accident was the same one he heard that the morning. Steven told the worker, "That's not
9 going to be safe to ride on," and the worker ignored him. Steven said that the worker looked
10 "high on crank" to him.
11

14 Dean Dix

16 Dean, an adult male, was standing close to the Picture Palace when he heard a "crash" sound
17 similar to a car crash. He turned towards the YO-YO attraction and saw the arms lower part-
18 way. Dean said that the attraction made another revolution, and then the arms dropped
19 completely. After the arms dropped completely, there was a cloud of dust that was large
20 enough to obstruct his view of the area. Dean ran over to the attraction and helped un-tangle a
21 female rider whose legs were tangled in the chains.
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1	<u>Shianna White</u>	1
2		2
3	Shianna, a 12-year-old female, was walking towards the attraction when the accident	3
4	happened. She saw the seats come crashing down.	4
5		5
6		6
7		7
8	<u>Taylor Robinson</u>	8
9		9
10	Taylor, an 11-year-old female, came to the attraction and saw the yellow arms moving up and	10
11	down. She saw the little girl way up in the air come crashing down. Taylor saw the other riders	11
12	hit the purple part of the attraction.	12
13		13
14		14
15	<u>Kayla Suzanne Welsh</u>	15
16		16
17	Kayla, a 13-year-old female, was standing by the Airbrush Tattoo stand, when she heard a	17
18	loud sound as if something broke on the YO-YO attraction. She then heard a crashing sound	18
19	and saw the swings on the ground with the attraction still spinning. Kayla was able to identify	19
20	the attraction operators as Gary and Mauricio.	20
21		21
22		22
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1 Tori Rae Welsh

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3 Tori, a juvenile female, was riding the Ferris Wheel at the time of the YO-YO accident. Tori
4 was watching her friend that was on the YO-YO, who was acting crazy and waving his hands
5 at her. She said that the YO-YO sounded "funny", the arms started to go up and down, and the
6 swings were hitting the center and sides of the attraction and deck. Tori said that the attraction
7 then collapsed and finally stopped.
8

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11 Conclusion

12

13 The Division has completed its investigation of the YO-YO attraction, which included evidence
14 as described in this report and information from the following sources:

15

16

- California Department of Forestry and Fire Protection

17

- Calaveras County Sherriff's Department

18

- Calaveras County Fair/Frogtown

19

- Midway of Fun, Inc.

20

- Rider statements/interviews

21

- Witness statements/interviews

22

- Chance Manufacturing, Inc.

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- Anamet, Inc.

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- Herguth Laboratories, Inc.

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1	• Division files and archives	1
2	• Maintenance, operation manuals, and Bulletins (YO-YO)	2
3	• Photographic documentation	3
4	• On-site inspections of the YO-YO	4
5	• Any other information that has been compiled and documented in the body of this	5
6	report.	6
7		7
8		8
9	As a result of its investigation, the Division has drawn the following conclusions:	9
10		10
11	1. On May 16, 2008, at the Calaveras County Fairgrounds in Angels Camp, 21 patrons	11
12	were on an amusement ride known as the YO-YO, having State ID C# 3041, when	12
13	the sweeps collapsed and the chairs and riders fell to the ground. At the time of the	13
14	collapse, all the patrons were in seats rotating around the center tower with the	14
15	sweeps in the raised position. Most of the patrons on the attraction sustained	15
16	serious injuries.	16
17		17
18		18
19	2. There was no evidence that operator error contributed to the accident or its severity.	19
20		20
21	3. The sweeps of YO-YO C# 3041 "collapsed" because the spider bearing assembly	21
22	slipped off of the cylinder rod, thus losing the power to pull down the sweep's top	22
23	ends. This happened because the two lock nuts that were holding down the spider	23
24	bearing assembly rotated off and disengaged from the threaded end of the cylinder	24
25	rod.	25
26		26

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4. Failure analysis performed by Anamet concluded, as did the Division, that at the time of the accident, the lock nuts had disengaged from the threaded end of the cylinder rod of the spider assembly. Further results of the Anamet study have lead the Division to make the following conclusions:

- The lock nuts loosened and rotated off because of the failure of a lock washer designed to hold the lock nuts in place and keep them from rotating. The lock washer had 19 outer tabs and one inner tab. As designed, one of the outer tabs was bent 90 degrees upward and fitted into a slot in the upper lock nut. The inner tab of the lock washer was bent 90 degrees downward and fitted into a keyway in the cylinder rod. The lock washer failed because the inner tab fractured and broke off of it.
- The accident occurred on YO-YO C# 3041 because it was operating with a lock washer that had lost its ability to prevent a loosening rotation of the lock nut when the inner tab broke away from the lock washer. Examination of the fractured tab under magnification indicated that it failed suddenly in a manner that could only have occurred during service on the spider assembly when the lock washer was rotated clockwise with the upper lock nut while the lock nut was being tightened. The inner tab that was fixed in the cylinder rod keyway broke away from the lock washer inner face as it followed the movement of upper lock nut during the tightening of the lock nut. Thread imprints on the fracture face

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1	indicate that the lock washer rotated clockwise about 1/2-inch while the inner tab	1
2	was kept captive in the keyway of the shaft onto which the nut was being	2
3	tightened.	3
4		4
5		5
6	• The fracture faces on the tab consisted of elongated dimples, which occur in	6
7	overload fractures of ductile materials, and no evidence of fatigue cracking was	7
8	found. This fracture pattern could only have been produced during a single-	8
9	episode tightening of the lock nuts following completion of service on the spider	9
10	assembly. This means that the ride had been operated with a defective lock	10
11	washer and without having had further service involving the lock nuts, until the	11
12	accident occurred.	12
13	• The most likely explanation for the failure of the lock washer is failure to notice	13
14	rotation of the lock washer while the top lock nut was being tightened. It is	14
15	possible that abnormal tightening of the lock nut is what caused the lock washer	15
16	to rotate. The low hardness of the lock washer that failed may have contributed	16
17	to the inner tab failure when the last tightening of the upper lock nut occurred.	17
18		18
19		19
20	• Since the inner tab is hidden by the lock nuts, damage to it would not have been	20
21	visible on inspection without removing the lock nut. The only way to assure the	21
22	inner tab's integrity after tightening of the lock nut is to observe the lock washer	22
23	while tightening the lock nut to make sure that it stays in place and does not	23
24	follow the rotation of with the lock nut while the lock nut is being tightened.	24
25	Observing the lock washer while tightening the lock nut is a procedure that	25
26		26

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1	should always be followed. Periodic inspection to determine whether the lock nut	1
2	has loosened is an additional necessary means of assuring that the function of	2
3	the lock washer has not been compromised.	3
4		4
5	5. As noted above, analysis of the tab fracture reveals that the fracture was the result	5
6	of a single incident that occurred while the lock nut was being installed and	6
7	tightened. The question remains as to when and how this event occurred. The only	7
8	documentation available describing the service record of the C#3041 cylinder and	8
9	spider assembly has come from Chance. This documentation indicates that the last	9
10	service performed was in 1997 by Chance.	10
11		11
12		12
13	The documentation of service is incompetent and offers no help in elucidating the	13
14	service and maintenance history of the ride. Neither Mr. Mason, the current owner	14
15	of this ride, nor Mr. Blash, the former owner of this ride, has any documentation	15
16	showing that the ride has ever received service on the cylinder or spider assembly	16
17	since 1997. As described above in the body of this report, Mr. Blash contended in	17
18	interviews with the Division that he sent the cylinder and spider assembly for YO-YO	18
19	C#3041 to Chance for service in 2005, even though documentation provided by	19
20	Chance indicated that the only YO-YO Mr. Blash sent to Chance that year was for	20
21	YO-YO C#3838.	21
22		22
23		23
24	It is possible, as Mr. Blash contended, that Chance mistakenly issued paperwork	24
25	indicating that it had serviced C#3838, when in fact Chance had actually serviced	25
26		26

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ACCIDENT INVESTIGATION REPORT NARRATIVE

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C#3041, because Chance had records of providing prior service to C#3838 for Mr. Blash and Mr. Blash had only recently acquired C#3041 when he allegedly sent it to Chance. Chance might not have known that Mr. Blash had another YO-YO and might have assumed that the YO-YO assembly Mr. Blash sent was the same one that had been sent in the past. Mr. Blash's shipping documentation for the YO-YO he sent in 2005 does not indicate its identification. For this to have occurred, Chance would have had to ignore the fact that identification number on #C3041's cylinder was completely obscured by paint.

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Chance contends that the same technician has been installing the spider bearing assemblies on the cylinder rods for many years, and that it is not possible that this type of mistake could have been made. Chance further states that it is not highly unusual for the same cylinder to be returned to the manufacturer before the 5 year due date, as would have been the case if Mr. Blash had sent the assembly from C#3838, and therefore, receiving the assembly from C#3838 in 2005 would not have caused the manufacturer to question why the assembly was being sent earlier than its due date of 2007.

In addition, this means that Mr. Blash and his staff either did notice that the identification tag indicating updated service pertained to C#3838 and not C#3041, or deliberately decided to ignore the mistake in the documentation. It also means that Mr. Blash chose to operate C#3838 for the 2008 season without having had it serviced by 2007 as required to meet the 5-year service interval requirement by

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Chance.

There are several factors pointing to a service date of 2006 or later for the spider assembly, when it appears that new bearings may have been installed. Neither Mr. Blash nor Mr. Mason admit to knowing of any service performed on C#3041 other than the alleged service provided by Chance as part of a cylinder rebuild in 2005. However, examination of the spider bearing assembly indicated that the condition of the bearings was such that they appeared to be recently installed, with little wear visible upon inspection even though the lubrication in the bearing assembly was grossly insufficient. In addition, what grease was present indicated that there were two different types, as indicated by their two different colors, which had not significantly mixed.

The last service performed, if it was performed within the last few years, was incompetent. Whoever performed the bearing installation packed the bearings with a grossly inadequate amount of grease that failed to meet specifications located in the YO-YO's -Operation and Maintenance Manual. A thoroughly packed bearing installation would have remained packed while continuing to add lubrication. While there is no indication that the failure to provide adequate lubrication had a role in causing the accident, it suggests that the person performing the service either did not know how to do it properly or was in too much of a hurry to do it properly. This is consistent with what appears to have been improper installation of the locknuts and lockwasher that failed. In addition, there was no documentation indicating that

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1	service of any type was performed, and as noted above, that any service was	1
2	performed at all after 2005 is denied by the only two people in a position to have	2
3	authorized it. There is only a remote possibility that these service problems were the	3
4	result of work performed by Chance in 2005, even if it is assumed that Chance	4
5	worked on it at all that year.	5
6		6
7		7
8	6. Chance accepts hydraulic cylinders for rebuild without the accompanying spider	8
9	bearing assembly, and allows entities other than the factory to re-install their spider	9
10	bearing assemblies onto their cylinders. A torque-down should always occur when	10
11	the spider bearing assembly is re-installed, but prior to the accident, specifications	11
12	did not exist in documents Chance made available to users describing details on	12
13	how to install a spider bearing assembly. The only other relevant service instructions	13
14	are contained in Chance's service bulletins #146-A and #146-B which state: "All	14
15	work must be performed by qualified personnel, capable of understanding the	15
16	function of the parts and their proper installation". Since this accident, Chance has	16
17	released detailed instructions on installing a spider bearing assembly. In these	17
18	instructions released by Chance in May of 2008 for a Sweep Lift Cylinder Bearing	18
19	Installation, Chance does not specify a torque value for the tightening of the lock	19
20	nuts. The new 'Installation Procedure' calls for the use of a spanner wrench or an	20
21	appropriate socket to tighten the lower lock nut, installing the lock washer as shown	21
22	in a diagram with the locking teeth up, applying LocTite 272 to the threads of the	22
23	upper lock nut, and installing and tightening the upper lock nut against the lock	23
24	washer. The instructions do not contain any specifications for insuring, visually, that	24
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1	the lock washer does not move with the lock nut during a final torque down	1
2	procedure. According to Anamet's findings this would be an essential step in order	2
3	to do a fail safe final torque down procedure in order to ensure that the lock washer	3
4	tab remains attached to the washer and therefore accomplishes its purpose.	4
5		5
6	7. According to Chance, there are no serial numbers on the spider assemblies. Some	6
7	customers return the spider with the cylinder when the cylinder is returned for the	7
8	five year rebuild and some customers do not return the spider. If the spider is	8
9	returned with the cylinder, Chance inspects the spider and changes the bearings.	9
10	Customers are encouraged to buy and change the bearings if they do not return the	10
11	spider with the cylinder. Some may buy the bearings from Chance and some may	11
12	not. The lock washer installed by Chance is a standard lock washer it purchases	12
13	from a supplier that may be equally available to those who prefer to buy them	13
14	directly from the supplier.	14
15		15
16		16
17	8. It is evident through statements and documentation provided by Mr. Mason and Mr.	17
18	Malone, and by observation of the physical state of disrepair the ride was in at the	18
19	time of the accident, that this attraction had not been properly maintained by Mr.	19
20	Mason and Mr. Malone prior to the accident. Furthermore, Mr. Mason, as a ride	20
21	owner, failed to become familiar enough with the YO-YO attraction to establish,	21
22	implement, and document a comprehensive safety program of inspection and repair	22
23	in accordance with Chance specifications and applicable Title 8 regulations, in order	23
24	to safely operate the YO-YO.	24
25		25
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1	Although there is no documentation indicating that Mr. Mason and Mr. Malone	1
2	performed or caused to be performed a bearing replacement after Mr. Mason	2
3	acquired the YO-YO, and they deny they did or that such a procedure was	3
4	performed after Mr. Mason acquired the ride, it is highly probable that such a	4
5	procedure was performed after Mr. Mason acquired it.	5
6		6
7		7
8	Mr. Mason was able to provide almost no maintenance documentation for the YO-	8
9	YO. Mr. Mason was adamant that during the time he operated the YO-YO that his	9
10	maintenance crew never removed the bearing cap. The documentation that was	10
11	available for review and provided by Midway of Fun for maintenance, repair, and	11
12	inspections was grossly inadequate, did not contain all of the repair items	12
13	performed, was lacking maintenance items that should have been performed, and	13
14	was missing inspection items identified by the manufacturer as necessary in order to	14
15	maintain the YO-YO to manufacturer specifications. Lubrication was performed	15
16	every week according to Mr. Malone, yet not documented. The claim that lubrication	16
17	was applied in any significant amount ever while the ride was operated by Midway of	17
18	Fun is wholly inconsistent with what was observed on inspection.	18
19		19
20		20
21	Per Herguth Laboratories's report the analysis of the lubrication taken from the	21
22	upper bearing in the spider assembly was rated abnormal due to the amount of wear	22
23	particles and indicated "lubricant starvation."	23
24		24
25	When asked why certain items were not documented, Mr. Malone, who was the	25
26		26

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1	employee responsible for the maintenance of YO-YO C# 3041, stated that he is "not	1
2	good at paperwork." The Division believes the lack of paper work indicates that the	2
3	maintenance was not being performed.	3
4		4
5	Additionally, the Division did not receive any documentation indicating that the	5
6	employees working with this attraction were able to review the attraction manual and	6
7	all manufacturer bulletins prior to erecting, maintaining, or operating this attraction.	7
8	Additionally, upon receipt of this attraction in 2007, Mr. Mason failed to take the	8
9	proper steps to gather and review all necessary information in order to inform him	9
10	self of the status of the ride prior to operating the attraction to the public.	10
11		11
12		12
13	9. Since this accident Chance has worked with the U.S. Consumer Product Safety	13
14	Commission (CPSC) on a repair kit and on new inspection and maintenance	14
15	guidelines for the YO-YO attraction. On October 7, 2008 the new program was	15
16	announced by Chance in cooperation with CPSC. The revised design allows for a	16
17	plate to be installed on top of the cylinder rod for the purpose of giving the owner an	17
18	inspection distance to the plate in order to determine if the lock nuts are backing off	18
19	of the cylinder rod.	19
20		20
21		21
22	10. Mr. Blash states that while he possessed YO-YO C# 3041, the spider bearing	22
23	assembly and cylinder for the YO-YO was shipped to Chance in March of 2005. He	23
24	has a shipping receipt from a trucking company dated 3-23-05- with a YO-YO	24
25	identified, not any particular YO-YO. Another document which is an invoice	25
26		26

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1	addressed to J. A. Blash, JR Enterprises DBA Shamrock Shows, for \$7,284.50, from	1
2	Chance, dated 3-25-05, and that invoice identifies C# 3838 as receiving a Sweep	2
3	Lift Rebuilt.	3
4		4
5	Inspection records supplied to the Division by Mr. Blash indicate that his company	5
6	was inspecting a non-specific YO-YO in March of 2005 while he claims C# 3041 was	6
7	shipped to Chance. Later, during the operating season, documentation of daily	7
8	inspections identify YO-YO I and YO-YO II as being repaired and inspected. One	8
9	maintenance document signed on 3-31-05 identifies a YO-YO M (indicating YO-YO	9
10	C# 3041 who was actually owned by MLM Amusements) as having its cylinder	10
11	removed and replaced after Chance did a repair. However all the paperwork	11
12	supplied to Mr. Blash from Chance, and to Mr. Mason from Mr. Blash, all reflect that	12
13	only C# 3838 was re-built in 2005, not C# 3041.	13
14		14
15		15
16	If C# 3041's cylinder went back for a rebuild in 2005, then Mr. Blash failed to review	16
17	his documentation when he received the cylinder back from Chance, and then failed	17
18	to inspect the cylinder tag attached by Chance to the hydraulic cylinder, or he didn't	18
19	send that particular cylinder to Chance. He also continued operating YO-YO C#	19
20	3838 well past its 5 year due date, presented the ride to the Division for its annual	20
21	permit inspection in 2008 and was operating the attraction when the accident in May	21
22	of 2008 occurred, most likely because he was using the 2005 hydraulic lift cylinder	22
23	tag identifying his YO-YO C# 3838 supplied by the rebuild he claims was for C#	23
24	3041. During this accident investigation the hydraulic cylinder tag attached to the	24
25		25
26		26

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1	hydraulic cylinder that Chance rebuilt in March of 2005 has never been found on	1
2	either YO-YO attraction. Furthermore he failed to notify the manufacturer that he	2
3	even owned another YO-YO.	3
4		4
5	These factors make it impossible to eliminate the possibility that Mr. Blash changed	5
6	out the bearing assembly and conducted the service resulting in the tab failure prior	6
7	to the ride being transferred to Mr. Mason in 2006.	7
8		8
9		9
10	11. While conducting the accident investigation, the Division observed significant	10
11	maintenance deficiencies on YO-YO C# 3041.	11
12		12
13	• More than 14 electrical deficiencies were found, involving loose and exposed	13
14	electrical conductors. Most of these electrical wiring problems could be observed	14
15	without the removal of scenery panels.	15
16		16
17	• The hydraulic system had leaks, and several pressure gauges were missing on	17
18	the main hydraulic unit. A separate and temporary hydraulic unit was being used	18
19	during the assembly process.	19
20		20
21		21
22	• A large amount of oily residue was found throughout the attraction.	22
23		23
24	• Seven of the chairs were out of service, and many of the recent welds still	24
25	contained slag that prevented employees from performing proper inspections.	25
26		26

ACCIDENT INVESTIGATION REPORT NARRATIVE

Permanent

Temporary

1	<ul style="list-style-type: none">• 5 year re-build as per Chance Service Bulletin #B376R1077-0 (Effective Date:	1
2	May 16, 1990). Records supplied by Mr. Mason did not indicate that this re-build	2
3	had been performed.	3
4		4
5	<ul style="list-style-type: none">• Chance Bulletin #B376CRM146-A (Effective Date: March 21, 2006) was not	5
6	performed.	6
7		7
8		8
9	<ul style="list-style-type: none">• The required tag on the hydraulic cylinder containing all the necessary	9
10	information that is required by Chance was missing at the time of the accident.	10
11		11
12	<ul style="list-style-type: none">• The information that is steel-stamped into the barrel of the cylinder and identifies	12
13	the cylinder and part number was covered and not able to be identified at the	13
14	time of the accident.	14
15		15
16	12. Midway of Fun's maintenance training program in place at the time of the YO-YO	16
17	accident failed to follow the ASTM F770-06 as required by the California Labor Code	17
18	section 7916 (a). ASTM F770-06 section 6.1 requires each Owner/Operator of an	18
19	amusement ride or device to read and become familiar with the contents of the	19
20	manufacturer's recommended maintenance instructions and specifications, when	20
21	received. Based on the manufacturer's recommendations, each Owner/Operator	21
22	shall implement a program of maintenance, testing, and inspection providing for the	22
23	duties and responsibilities necessary in the care of each ride. This program of	23
24	maintenance shall include a checklist to be made available to each person	24
25		25
26		26

Permanent

ACCIDENT INVESTIGATION REPORT NARRATIVE

Temporary

1	performing the regularly-scheduled maintenance on each ride or device. The	1
2	Owner/Operator's checklist shall include, but not be limited to:	2
3		3
4	<ul style="list-style-type: none">• Description of preventive maintenance assignments to be performed	4
5		5
6	<ul style="list-style-type: none">• Description of inspections to be performed	6
7		7
8		8
9	<ul style="list-style-type: none">• Special safety instructions, where applicable	9
10		10
11	<ul style="list-style-type: none">• Any additional recommendations of the Owner/Operator	11
12		12
13	Midway of Fun's Owner/Operator (Mr. Mason) did not read and become familiar with	13
14	all of the YO-YO ride's instructions and specifications when he received the	14
15	attraction and, as a result, failed to implement a program of maintenance based on	15
16	the manufacturer's recommendations. Furthermore, the maintenance program in	16
17	place was not maintained.	17
18		18
19		19
20	13. Had Midway of Fun's maintenance program been sufficient, the YO-YO would have	20
21	been inspected and maintained to conform to all of Chance's specifications. On	21
22	inspection that would have been performed was the inspection called for by CRM	22
23	Bulletin B#376CRM146-A, dated March 21, 2006. That bulletin advised all owners	23
24	immediately and annually thereafter to inspect the sweep lift cylinder bearing	24
25	assembly and its connection to the sweep lift cylinder rod to ensure that the parts	25
26		26

ACCIDENT INVESTIGATION REPORT NARRATIVE

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1 are functioning properly and that the lock nut connection is secure. According to Mr. 1
2 Mason, this inspection was never performed while Midway of Fun operated YO-YO 2
3 C#3041. If the inspection had been performed as called for by the bulletin, it is 3
4 possible that the loosening of the lock nut would have been detected before it led to 4
5 the lock nut spinning completely off the assembly. 5
6

7 14. Mr. Mason had previously worked with and operated another YO-YO attraction (C# 7
8 17371) for Midway of Fun in 2001 at the Sacramento County Fair, and was familiar 8
9 with YO-YOs enough to have known that a 5-year re-build was required. In 2001, 9
10 while inspecting YO-YO C# 17371, the Division discovered that the YO-YO's 10
11 hydraulic cylinder 5-year certification had expired. Mr. Mason was instructed to 11
12 correct the situation and was instrumental in calling Chance to receive a one time 12
13 extension, for a short number of days, to operate before sending the cylinder back 13
14 for its re-build. The manufacturer of this attraction does not have a record of any 14
15 inquiries or requests from Midway of Fun for updated operating manuals, attraction 15
16 bulletins, or maintenance records. 16
17
18
19
20

21 Corrective Action Specifications 21

22 Based on these accident investigation findings, the following requirements were issued to the 22
23 Owner/Operator: 23
24

25 R1) The Owner/Operator, Harry Mason of Midway of Fun, failed to ensure that his YO-YO 25
26

ACCIDENT INVESTIGATION REPORT NARRATIVE

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1	attraction was safe to operate when he first received the attraction. As a result, he operated an	1
2	attraction that did not have all of the required inspections, certifications and documentation in	2
3	place to ensure its safe operation. The Owner/Operator shall establish and implement	3
4	procedures for reading and becoming familiar with the contents of the manufacturer's	4
5	maintenance instructions and specifications, and other available information pertinent to the	5
6	ride, when a ride is first received, and periodically, at least once a year thereafter, while	6
7	operating the ride to the public in order to ensure the safe operation of the attraction. L.C. 7916	7
8	(a)	8
9		9
10		10
11	R2) The Owner/Operator shall, in accordance with all of the manufacturer's instructions,	11
12	specifications, and other information, as described in R1 above, create, document, implement,	12
13	and enforce a program of maintenance, testing, and inspection for the care and use of the YO-	13
14	YO attraction. This program shall be in writing and submitted to the Division for review and	14
15	approval prior to operating the YO-YO attraction to the public. T8 3910 and LC 7916(a)	15
16		16
17	R3) The Owner/Operator shall create a checklist for this program of maintenance, testing, and	17
18	inspection that shall be made available to each person performing the regularly-scheduled	18
19	maintenance, testing, and inspections on the YO-YO attraction. The Owner/Operator's	19
20	checklist shall include, but not be limited to:	20
21		21
22		22
23	• Description of preventive maintenance assignments to be preformed.	23
24	• Description of inspections to be preformed.	24
25	• Description of tests to be performed	25
26		26

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ACCIDENT INVESTIGATION REPORT NARRATIVE

Temporary

1 • Special safety instructions, where applicable.

2 • Any additional recommendations of the Owner/Operator

3 L.C. 7916(a)

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R4) The Owner/Operator shall ensure that, an authorized person who is competent, experienced, and trained in the work to be performed supervises all inspections, tests, and preventive maintenance for the YO-YO attraction and is instructed to correct all identified preventative maintenance issues prior to operating the YO-YO to the public. The Owner/Operator shall include, as part of the maintenance program, a procedure to identify and correct all safety hazards, such as exposed electrical wiring, open electrical boxes, leaking/failing hydraulic systems, oil and fluid spills, missing parts, loose and missing fastenings, broken chairs, worn chains, control mechanisms, non-functioning brakes, and all other equipment provided for safety, including the proper installation of safety devices as required by the General Safety Orders of the Division. T8CCR 3910, L.C. 7916 (a)

R5) The Owner/Operator shall maintain all of the records necessary to demonstrate that the requirements of subdivision 7916 (a) have been met, including employee training records and maintenance, repair, and inspection records for each amusement ride, as specified in ASTM F770-06. All records shall be made available to Division upon request. L.C. 7916(b)