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Product Warning !!!

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Display operators need to be aware of the potential for some tiger tail comets to produce extremely dangerous fallout. The problem was discovered only recently and was then investigated by the authors on a visit to the display company's facility. The shells in question are 4- and 5-inch (100- and 125-mm) White and Red Tiger Tail comets as shown overall in Figure 1. While all of the shells have the same basic labels, there were slight differences as noted in Table 1. However, in trying to determine whether any particular tiger tail comets have the problems found in the ones being discussed in this article, it is probably wise to consider that Chinese manufacturers frequently subcontract work and otherwise share production. Thus, it is possible that not all of the items labeled and appearing as shown in this article may have a problem, and it is also possible that items labeled and appearing differently may have the same problem described in this article.

Figure 1. Photos of the 5-inch (125-mm) Tiger Tail comets in question. (The 4-inch (100-mm) comets are virtually identical in appearance.)

Table 1. Identifying Label Information Appearing on the Tiger Tail Comets in Question.

Comet Type[a]	Product Code[a]	EX Number[a]	Product Number[b]	Brand Identification[c]
4-inch (100-mm) Red	560	9612098	None	(d)
4-inch (100-mm) White	564	9612099	None	(d)
5-inch (125-mm) Red	560	9612098	K8051	(e)
5-inch (125-mm) White	564	9612099	K8051	Flower Basket

a) As it appears on the small white label as shown in Figure 2.

b) As it appears on the label around the lift cup as shown in Figure 3.

c) As it appears on the label around the lift cup just above the product number.

d) There is no brand indication; however, at the point where the Flower Basket brand marking appears on the 5-inch White Tiger Tail comets, there is a blue spot, slightly darker than the background label color, which obscures the point where the Flower Basket brand marking might otherwise have appeared.

e) There is no brand indication; however, at the point where the Flower Basket brand marking appears on the 5-inch White Tiger Tail comets, there is a reddish pink spot similar in size and color to the background spot behind the Flower Basket brand marking seen on the 5-inch (125-mm) Red Tiger Tail comets. (See Figure 3.)

Figure 2. Close-up image of the product identification label of the comets in question.

Figure 3. Close-up images of the points on the lift cup label where the product number and brand marking appears on some of the comets. The upper image is of the 5-inch Red Tiger Tail comet label; and lower image is of the 5-inch (125-mm) White Tiger Tail comet label. The 4-inch (100-mm) comet labels are not shown.

Traditional tiger tail comet shells are made by completely covering a normally functioning aerial shell with a thick layer of comet composition. (Thus, after the comet composition burns off, the aerial shell explodes, and there is relatively little potential for dangerous fallout.) The items described in this article are being referred to as only tiger tail *comets* (rather than tiger tail *comet shells*) because they do not have a functioning aerial shell at their center. The manner of internal construction of the comets in question is illustrated in Figure 4, shown without their outer paper wrap, lift cup, lift charge and leader fuse. The outer-most layer is comet composition; next is a paper casing comprised of a thin layer of pasted kraft paper and a pair of standard chipboard hemispheres; the center of most of the items is filled with what appears to be reddish-orange clay. (However, the centers of the 4-inch (100-mm) Red Tiger Tail comets are empty.) Table 2 presents approximate average dimensions and masses of the various comets in question, and it indicates the type of filler contained within them.

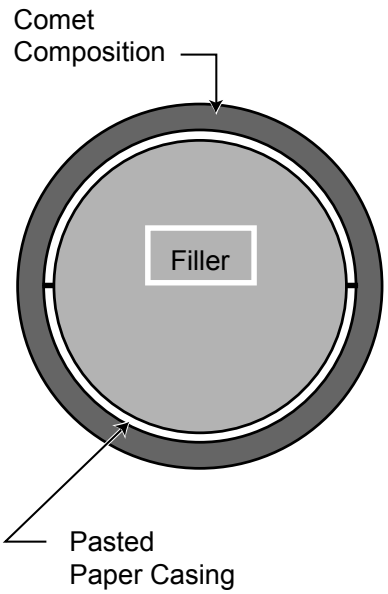

Figure 4. Sketch of the internal construction of the tiger tail comets in question.

The problem with these tiger tail comets is that, after functioning, the inner fully intact sphere falls to the ground with the potential to strike a member of the crew, a spectator, or property. For the 4-inch (100-mm) red comets, with their minimal mass, the consequences of being struck should generally be relatively minor. However, the consequences of being struck by one of the clay-filled spheres could be catastrophic. To help quantify the situation a computer model was used to predict the velocity of the various spheres when

Table 2. Dimensions, Masses and Construction Details for the Comets in Question.

	Unfired Comet				Inner Sphere				
	Mass [a]		Diameter[b]		Diameter [b]		Mass [a]		Filler
Comet Type	(oz)	(g)	(in.)	(mm)	(in.)	(mm)	(oz)	(g)	Type
4-inch Red	10.2	290	3.75	(95)	3.35	85	2.3	65	Empty
4-inch White	16.6	470	3.75	(95)	3.35	85	9.2	260	Clay [d]
5-inch Red	27.5	780	4.35	(110)[c]	3.75	95	13.4	380	Clay [d]
5-inch White	30.0	850	4.35	(110)	3.75	95	14.1	400	Clay [d]

a) Masses are rounded to the nearest 0.1 ounce and nearest 10 grams.

b) Diameters are rounded to the 0.05 inch and nearest 5 millimeters.

c) Not specifically measured, but visibly the same as the 5-inch (125-mm) white comets (i.e., 110 mm).

d) This appears to be common, uncompacted clay, loaded into two hemispherical tissue paper bags.

they impact the ground at the end of their flight. Table 3 presents the velocity results and the corresponding shell energies. As a point of comparison, note that the energy of a fast-ball thrown by a professional baseball pitcher is approximately 80 foot-pounds (110 J). Thus the clay-filled spheres, with impact energies ranging from 150 to 270 foot-pounds (205 to 370 J), have the potential to produce extremely serious (or even fatal) injury as a result of a person being struck with one the spent tiger tail comets.

Table 3. Calculated Impact Velocity and Energy for the Shells in Question.

	Impact [a]			
Comet	Velocity		Energy	
Type	(ft/s)	(m/s)	(ft-lbs)	(J)
4-in. (100-mm) Red	70	20	10	15
4-in. (100-mm) White	130	40	150	210
5-in. (125-mm) Red	140	40	260	360
5-in. (125-mm) White	140	40	270	375

a) Impact values are rounded to the nearest 10 feet per second (5 m/s) or nearest 10 foot-pounds (15 J).

Another point needs to be contemplated; there may be a greater potential for these inner spheres to strike spectators than might be expected. If the comets are fired vertically, experience the same drift as determined for spherical shells of the same size, are among the largest items to be fired in the display, and the display site is only minimally large enough to accommodate the shells being fired, then 5 to 10 percent of the spent comet spheres may fall outside the secured area of the site (i.e., potentially into spectator areas). Further, in some limited testing, the comets fired from angled mortars seem to travel farther than normal dud shells would travel if fired from mortars with the same tilt angle. This too increases the potential for the spent comet spheres to fall into spectator areas. Compounding this potential problem, since comets are not normally expected to produce dangerous fallout, they are often fired from mortars with tilt angles significantly greater than normal shells. Were that to be done with these tiger tail comets, there would be an even greater potential for the spent comet spheres to fall into spectator areas.

If you think you may have some of these troubling tiger tail comets, please test them, under conditions that will safely allow a determination of whether they produce the dangerous fallout reported in this article, prior to using them in displays.

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