



Interagency Aviation Accident Prevention Bulletin



No. IAAPB 16-02

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Subject: Plastic Sphere Dispensers (PSD)

Area of Concern: PSD Jamming

Distribution: All Aviation and Fire Activities

Discussion: The following events occurred while conducting Plastic Sphere Dispenser (PSD) aerial ignition operations with approved sphere types. Potential jamming by debris or malformed spheres often result in mission degradation or cancellation. Here's what happened:

Panther Wildlife Refuge, Florida prescribed burn.

After approximately 1000 plastic spheres, the prescribed burn machine operator went to fill the machine with more spheres. As she was pouring the spheres into the hopper, she saw a piece of orange plastic fall in with the spheres and subsequently removed it from the hopper (Figures 1, 2). If the plastic piece had remained in the hopper and entered the machine, it could have jammed it or worse - caused a fire. The bags of spheres had been loaded the day prior to the burn and the spheres were stored in the original bags for an undetermined amount of time. The remaining bags were inspected for similar anomalies but none were discovered.

Figure 1. Aerial Ignition Plastic Spheres

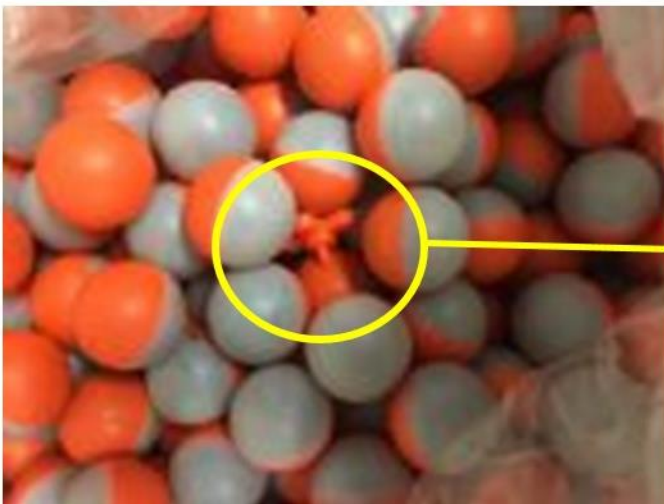
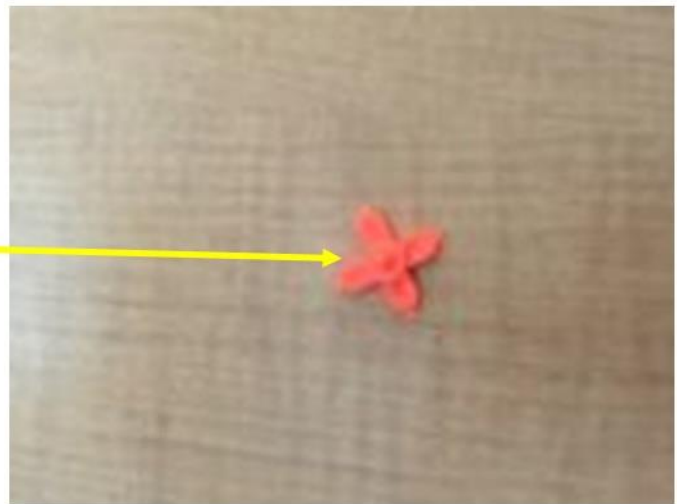


Figure 2. Plastic debris found among spheres



Oklahoma Range prescribed burn near Delta Junction, Alaska.

While conducting PSD operations, the aircrew encountered several episodes of PSD spheres cracking during the injection stage. After cracking, the PSD spheres became lodged in the slipper block of the PSD machine and blocked the hopper chute. After landing, the aircrew inspected the machine and discovered a large amount of potassium permanganate residue in and around the injection stage, caked on the needles, and in the exit chute. The needles were cleaned and sharpened but the aircrew continued to experience similar issues.

During a separate inspection of the plastic spheres, the crew discovered a raised seam around the middle that cracked when the needles punctured near that area, were darker in color, and contained residual powder clinging to the inner wall of the sphere. The crew compared these attributes with other successful operations where they used a different batch of plastic spheres that contained smooth seams, appeared light in color, and lacked any residual powder adhering to its inner walls. According to the aircrew, "it would increase safety on burn operations and decrease wear and tear on the machine if quality spheres were available." [SAFECOM 16-0292](#)



Stuart Creek prescribed burn near Chena Hot Springs area, Alaska.

An aerial ignition mission using a PSD machine was aborted after the crew discovered the plastic spheres failed to ignite. A visual inspection revealed that the spheres appeared darker in color, had raised ridges along the seam, and potassium permanganate was adhering to the inner wall. The spheres cracked in the chutes of the Premo Mark III machine and blocked the chutes. Additionally, the spheres cracked during the injection phase and potassium permanganate coated the sliders, the inside of the chute, and continued all the way down onto the skids and side of the helicopter. None of the spheres that cracked in the machine ignited, but they also failed to ignite on the ground. The machine's interior was heavily coated with potassium permanganate all the way up to the hopper chutes. This required a thorough cleaning prior to every ball bag reload in order to prevent additional malfunctions. [SAFECOM 16-0306](#)

Pleasant Gap prescribed burn, Georgia

Issue: Using older Premo needles with the new pink/white PSD balls. 10,000 balls were successfully dropped using a refurbished Premo Machine. The machine was then removed and serviced with a Premo machine tool kit that contained a box of four (of what was thought to be) replacement/spare needles. The needles that were originally installed are rocket shaped and flared at the base, making them much stronger than the "replacement" straight needles. After replacing the original needles with the "replacement" straight needles, they were unable to properly calibrate the glycol dispense rate to the 20 second ignition delay. The firing boss contacted the manufacturer and explained the problem to which the manufacturer explained that the new balls {pink/white} have a thicker seam and would bend the older, straight needles. It was also discovered that the new pink/white balls leave a much heavier residue of Potassium Permanganate in the holes and center shaft of the needles. This problem necessitates their removal and thorough cleaning with a paperclip and carb/brake cleaner after each mission. The next morning, all four of the needles were removed and replaced resulting in mission success with 11,200 balls dropped without incident. [SAFECOM 16-0154](#)

[SAFECOM 16-0275](#) describes an instance where the emergency water supply line was plugged and the importance of the pre-use checklist.

[SAFECOM 16-0242](#) is another instance of irregular shaped plastic spheres.

[SAFECOM 16-97](#) Discovered half of a sphere without the other half attached - appeared as if it arrived from the factory in that condition.

Operators should be aware that using a metal screwdriver or other ferrous object to clean/scrape the potassium permanganate buildup can ignite in to a small flash fire.

Kudos to the PSD crewmembers for identifying and reporting the problems associated with their PSD operations. Pre-inspecting the spheres, actively monitoring the equipment, and contingency planning for an unexpected occurrence may be your best mitigations. Additionally, Contracting Officers should be notified of these issues so that they can be addressed with their respective manufacturers.

We have experienced numerous issues over the years with PSD machines and the balls. Please review the previous Alerts and Bulletins below.

[IATB 2015-03 Plastic Aerial Ignition Spheres](#)

[IAIB 13-05: Aerial Ignitions Spheres](#)

[IAAPB 11-01 Aerial Ignition Operations](#)

[IASA 10-01 Defective Spheres](#)

[IALL 10-03 Foreign Object Debris in Plastic Sphere Dispenser \(PSD\)](#)

[IALL 07-03 Plastic Sphere Dispensing](#)

[FSSA 06-01 Plastic Sphere Dispenser Operations](#)

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