Guidelines for Proper Emergency Flare Usage

- How do I use emergency flares?
- What are mistakes to avoid when using flares?
- How do I properly store and handle my emergency flares?
- Highway Flares and Atmospheric Conditions.

Orion Emergency flares are easy and safe to use.

First, remove plastic lid to expose scratch surface on cap. Next, twist and remove cap, exposing the black flare igniter button. Last, gently strike the scratch surface of cap against the black button of the flare (similar to striking a match), while pointing away from face and body. Once flare is ignited, carefully place on the ground (do not drop). Do not hold flare in upright position as molten residue from the combustion process will burn if dripped on hand. We recommend carefully reading all instructions first.

Mistakes to avoid when using flares

Striking the igniter button with the scratch surface too hard. This is unnecessary and can cause the prime to "pop," much like a match-head.

Improper positioning of flare during ignition process (i.e., near stomach and below face). The flare should be held in front of and away from body. Then, even if prime is struck too hard and pops, the ignited prime will not touch the operator.

Carrying lighted flares with the burning end straight up so that the molten residue drips on hand of operator. If the flare must be carried, be sure to keep the burning end down towards the ground.

Not "placing" the flare on ground after ignition, but dropping it. This practice can cause the
burning portion of the flare to break off, extinguishing the flare.

Trying to extinguish the flare by smothering the flame. The flare is designed to produce oxygen independent of the outside air. Flares should be allowed to burn completely, thereby consuming all chemicals within the flare.

**Emergency Flare Safe Storage and Handling Procedures**

Flares are a safe and stable item to store. The U.S. Departments of Transportation classifies flares as a flammable solid, but they are not particularly sensitive to initiation. There is no threat of mass explosion, nor is there any threat of an individual flare exploding.

Flares should be stored in sealed bag, away from flame and heat. Failure to store in sealed bag will diminish flare performance.

While flares have no expiration date when properly stored, storage above 120 degrees F for a long period of time (more than 1 week) should be avoided. The normal recommended storage temperatures are 40 degrees to 90 degrees F.

**Highway Flares and Atmospheric Conditions**

**A. How Flares Operate and Are Tested.** Highway flare composition is a mixture of oxidizers, fuels and burn rate modifiers. The highway flare formulation is designed to burn at not less than 70 candela (brightness measure) for a specified amount of time (Orion sells 30, 20, 15, 10 and 5 minute flares). To the extent a flare is only as good as its ability to be seen; burn time and brightness are two of the critical variables being exhaustively checked at various points in the production process. All such testing is conducted at ambient temperature at the elevation of the production facility.

Another significant test involves underwater burning. A lit flare is placed vertically in a bucket of water for a sufficient length of time to allow the ignition compound to burn and transfer the combustion process to the flare composition. The flare must vigorously pass through the "transfer" as this indicates proper formulation and processing. The flare will extinguish when placed horizontally in water (which is why puddles will extinguish flares) but vertical burning underwater shows that sufficient gas is being generated (as a byproduct of combustion) to displace the water away from the flame front.

**B. Effects of Atmospheric Conditions.** As a pyrotechnic composition designed to produce intense light, highway flares are susceptible to atmospheric conditions and especially moisture.
Other factors that affect the burn include elevation, wind and temperature. Flares are robust enough to burn in cold temperatures, at high elevations, in high wind and in rain so long as the flare itself is not laying in water. When these variables are working against the combustion process, this can diminish light output (which typically also lengthens the burn time) or, if the conditions become sufficiently extreme, extinguish the flare altogether.

Combinations of cold temperatures, high winds and rain can conspire to fight the ability of the flare to burn normally. Water is a "heat sink" when it evaporates and if there are enough rain drops, particularly in cold weather, this can lead to a cooling of the burning material until it eventually extinguishes. This is especially true if the flare is laying on the ground as opposed to propped up with a wire stand. Cold ground will pull heat away from the flame front as will wind. When this situation is combined with rain, it creates the most challenging environment for burning and the greatest likelihood for extinguishing the flare.

C. Flare Placement When No Stand. While wire stands are highly recommended (see Section D below), if flares are to be placed on the ground the following guidelines are recommended:

- The flare should be placed away from any puddles and not within the primary drainage path for water flowing off the roadway (i.e., not in a ditch or gutter)
- The lighted end of the flare should be positioned downwind (you do not want the wind blowing directly into the flame front)
- The lighted end of the flare should be placed downhill (if possible) so that water flowing off the roadway is not being channeled into the tip of the flare
- In a particularly hard rain, one flare can be propped under another to raise the flare body and the tip of the burning flare off the wet road surface

D. Wire Stands. To increase the visibility of flares and minimize the effects of moisture on the burning process, Orion manufactures and sells flares with affixed wire stands. By elevating the flare above ground level, this greatly increases the sighting distance for the flare. By elevating the flare above any water laying on the road surface, the greatly improves the ability of the flare to burn vigorously through extreme conditions while maximizing light output.