

4 August, 2009

Mr. Andrew Trice  
Synergymc2(Glowmark).

Dear Andy;

As you know Tactical Imaging has created an internal building navigation system for first responder's which integrates incident command with a simple to follow standard involving physical "tags" placed at strategic locations within a structure. As we have been developing this process we have been looking at various reflective materials that will be visible to the fire fighter or police officer who must enter a darkened building. As part of that research we have evaluated the performance of the Glowmark materials under various conditions and I thought you would like to have a brief synopsis of our findings.

We tested the Glowmark arrows for their ability to remain visible in complete darkness for long periods of time. We also tested their visibility from distances at various points in time, and we tested the ability of the material to retain its glow even after the plastic material surrounding it had melted.

### **Duration Test**

In order to test the visibility of the material over a long duration in complete darkness several arrows were exposed to different light sources and kept in total darkness for up to 29 hours. We found that in general the arrows were still glowing, although seriously degraded up until about the 22 hour point. This test evaluated the performance of the material when exposed to several different light sources. Each was exposed to the light source for up to 20 minutes prior to being put into the darkened test box. At each point the box was opened in a totally darkened interior room in order to ensure that the material was not exposed to light from another source. Our results are as follows:

- We tested materials exposed to:
  - Direct Sunlight – the best performance overall
  - High candle power halogen spot light – next best performance
  - Standard light bulb – slightly less performance than the halogen light
  - Fluorescent light - about on a par with the light bulb
- In general each of the test arrows remained visible for up to 20 hours with various levels of "fading" depending upon the light source used.
- The final observation showed that at some point between 22 hours and 29 hours the glow faded completely from all test materials.

## **Distance Test**

At each point in the testing we measured the distance at which the material was “distinctly visible”. The term distinctly visible means that we could not only see the glow, but that the shape and configuration of the arrow was clearly seen. As you can imagine for our purposes it is not enough to just see that “something is glowing” we must see it distinctly.

For the first 9 hours we could clearly make out the arrows from distances of about 12 meters ranging down to 3 meters. After about 9 ½ hours we did notice that the distance at which the material was *distinctly visible* dropped to about 1 ½ meters where it remained until our last test at about 22 hours.

## **Temperature Test**

Due to the use that we are anticipating for the material, we wanted to test the point at which the plastic lens would melt and how the material would perform under those conditions. We found that the plastic material began to melt at about 140 degrees Fahrenheit with a complete degradation of the material (melted to the point that you could not detect a distinct shape) at about 170 degrees Fahrenheit. However; to our surprise the material underneath kept glowing for up to 14 hours even with the plastic lens having been destroyed. Now of course the ability to detect the material from distance was severely degraded but it did continue to glow.

## **Flashlight Test**

Considering the particular usage that we anticipate for the materials we wanted to also test how an arrow that had gone completely dark would react to a brief exposure to a flashlight. In order to test this we took one of the arrows that had completely “discharged” its glow after 29 hours and shined a tactical flashlight on it for approximately 6 seconds from a distance of 3 meters or greater. We found that even that brief exposure to light was able to “recharge” the glow so that it was sufficiently distinct in its glow from that 3 – 6 meter distance.

## **Conclusions**

All in all we have been very impressed with the performance of the material and are continuing to evaluate how it can be used as part of our standard allowing first responders to navigate in low or no light situations within a structure.



Thank you for working with us as we continue to formulate our standard and determine the best approach for achieving our goal of saving lives by being able to locate a first responder inside a structure with a single radio call.

Sincerely;

Garry Kolb  
President and CEO  
Tactical Imaging, LLC