Greetings and welcome to Focus on Forensics. This is the first of many brief articles for future editions of the NSPII newsletter. The purpose of the series is to detail simple informal tests that serve to educate NSPII members who may have a professional interest.

This edition describes burn testing conducted to document the burn rate for a standard 10" taper candle. Since this type of candle has been used as a time-delay mechanism by arsonists, knowing just how long it takes for such a candle to burn is important when considering its potential use in setting a fire.

This test used a “Home” brand taper candle purchased at a Target store. It was set up in a single-held candle holder, lit and allowed to burn freely. The testing lab room used was climate controlled but no air-movement was present to affect the burn test. The burn rate was measured at one-hour intervals, which were all photo-documented and recorded. The table below lists the time and rate of burn measurements recorded.

<table>
<thead>
<tr>
<th>TIME LINE (Hours):</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL INCHES BURNED:</td>
<td>N/A</td>
<td>1.5</td>
<td>2.5</td>
<td>3.5</td>
<td>4.25</td>
<td>5.0</td>
<td>6.0</td>
<td>6.5</td>
<td>7.0</td>
<td>8.0</td>
</tr>
</tbody>
</table>

The burn rate averaged slightly less than one inch per hour. In the end the candle burned down eight inches in nine hours. The burn rate did slow some towards the bottom, likely due to the diameter being greater towards the base of the candle.

Theorizing that a person employing the use of a similar candle as a timing device, an envelope was leaned against the candle as it burned towards its base. Expecting that as the candle burned further down, the envelope would slowly lean closer to the flame and would ignite, providing a first material ignited to spread to other staged combustibles. The testing proved that the envelope ignited from the radiant heat generated by the candle before the envelope actually touched the flame. Once ignited, the envelope burned with a sizable flame. Had other combustible materials, such crumpled newspaper, been staged around the candle, it would have also ignited and the planned fire would have occurred, all with a nine hour delay.

As the candle burned down, there was no melted wax accumulations and had a large fire resulted, all of the remaining wax and wick would have likely been consumed leaving no trace whatsoever that a candle had been present. It should be noted also that the use of a candle holder would not be necessary as a nail anchored in a small piece of cardboard could have been used to keep the candle erect, leaving only the nail in the fire debris, amongst many other construction nails.

Volume 2012-01 (Published in the Winter 2012 NSPII newsletter)
At the eight hour mark, the candle had burned down approximately seven inches.

Radiant heat ignited a mailing envelop that had been leaned against the candle. As the candle burned down, the envelope fell closer to the flame.

The envelope, once ignited burned with a sizable flame.

Volume 2012-01