

## Incident Summary (#5612302)

SUPPORTING INFORMATION	Incident Date		Feb 21, 2017	
	Location		Mission	
	Regulated industry sector		Low voltage electrical system (30V to 750V)	
	Impact	Injury	Qty injuries	0
			Injury description	n/a
			Injury rating	None
	Damage	Damage	Damage description	Electrical arcing damage to a meter base and electrical meter. Minor damage to the siding of the house.
			Damage rating	Major
	Incident rating		Major	
	Incident overview		<p>The occupant of the house was getting ready for work in the morning when she heard a humming noise and noticed the lights flickering off and then on again. A neighbor pounded on the door and alerted the home owner that their electrical meter was on fire.</p> <p>The fire was out when they exited the house to see what had happened.</p> <p>The utility was contacted and disconnected the power to the house.</p>	
INVESTIGATION CONCLUSIONS	Site, system and components		<p>Utility metering equipment is typically installed at every house that is connected to the utilities system.</p> <p>The metering in this case consisted of a meter base with a meter that was plugged into the base.</p> <p>The meter base enclosure is where the utility and the house electrical service conductors terminate onto the meter base socket that the utility meter plugs into. The enclosure is intended to contain the energized parts of the meter base and service conductor terminations to protect them from weather, accidental contact, and to contain thermal energy in the event that there is an electrical failure or fault within the meter base.</p> <p>Foreign objects including tools used during installation must be removed from the electrical equipment prior to it being closed and energized.</p>	
	Failure scenario(s)		<p>During installation and connection of a 100A 120/240V service to a house a 5/16" hex socket was left inside the meter base in a conductor termination lug.</p> <p>The meter base cover was re-installed.</p> <p>The socket was in close proximity to the cover but it did not initially make contact with it when the service was energized.</p> <p>Eventually over time the socket made electrical contact with the grounded cover and a fault occurred between the energized terminal of the meter base and the grounded cover and enclosure.</p> <p>The fault current traveled from the 120V energized terminal, through the socket, through the cover/enclosure, to the grounded circuit conductor, and back to the utility transformer that supplied power to the house.</p>	

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	<p>The fault current was of a magnitude large enough to cause the socket to become welded to the cover and to damage the cover and the enclosure at points where they made contact.</p> <p>Extensive electrical arcing continued until the circuit between the cover and the meter base burned opened.</p> <p>The service remained energized throughout and after the incident occurred until the utility arrived to disconnect the power.</p>
Facts and evidence	<p>Interview with contractor:</p> <ul style="list-style-type: none"> <li>- Was hired by the owner to repair the damaged meter base.</li> <li>- Reported the incident to BCSA.</li> </ul> <p>Interview with the owner:</p> <ul style="list-style-type: none"> <li>- Heard a low humming sound.</li> <li>- Lights were flickered off and then on again.</li> <li>- A neighbor pounded on the door and alerted the owner that the meter was on fire.</li> <li>- The owner went to observe the meter - the fire was out but still smoking.</li> <li>- The owner observed damage to the meter and the house siding.</li> </ul> <p>Observations of the site and damaged equipment:</p> <ul style="list-style-type: none"> <li>- Meter base on the west side of the house was repaired and a new meter installed after the incident. See figure 2.</li> <li>- Some minor damage from arcing molten metal on the vinyl siding.</li> <li>- House was serviced from the utility's 25 KVA pole mounted transformer located to the west and across the road. The service dips from overhead to underground where it crosses under the road to terminate at the house meter base (approx. 100M).</li> <li>- Equipment examined showed extensive electrical arcing at contact points between the socket, meter base cover and enclosure. See figure 3 – 14.</li> <li>- The socket was welded to the cover. See figure 7 &amp; 9.</li> </ul> <p>Interview with Utility line foreman</p> <ul style="list-style-type: none"> <li>- The Utility was called after the incident occurred and attended to disconnect the power.</li> <li>- The lineman that attended observed a hex socket left in one of the conductor termination lugs inside the meter base.</li> <li>- The socket was welded to the meter base cover.</li> <li>- The service was originally connected by the utility in December of 2001.</li> <li>- The smart meter was installed in July of 2014.</li> <li>- It's likely that the socket was left in the lug at the time the service was originally connected by a utility employee or contractor.</li> <li>- The fuse on the line side of the transformer (3 – 6A??) did not trip and open the circuit.</li> <li>- The ground fault arced itself open and the service remained energized until the utility lineman arrived to disconnect it.</li> </ul>

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Causes and contributing factors	The cause of this incident is very likely a hex socket that was left in an energized conductor termination lug inside of the meter base. The socket was very likely left in the lug by a utility installer after it was used to tighten the termination prior to the service being energized.
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Figure 1

This is the front of the house where the incident occurred.



Figure 2

This is the west side of the house where the electrical meter base and meter are located. This photo shows the new meter base and meter after repairs were made by an electrical contractor.

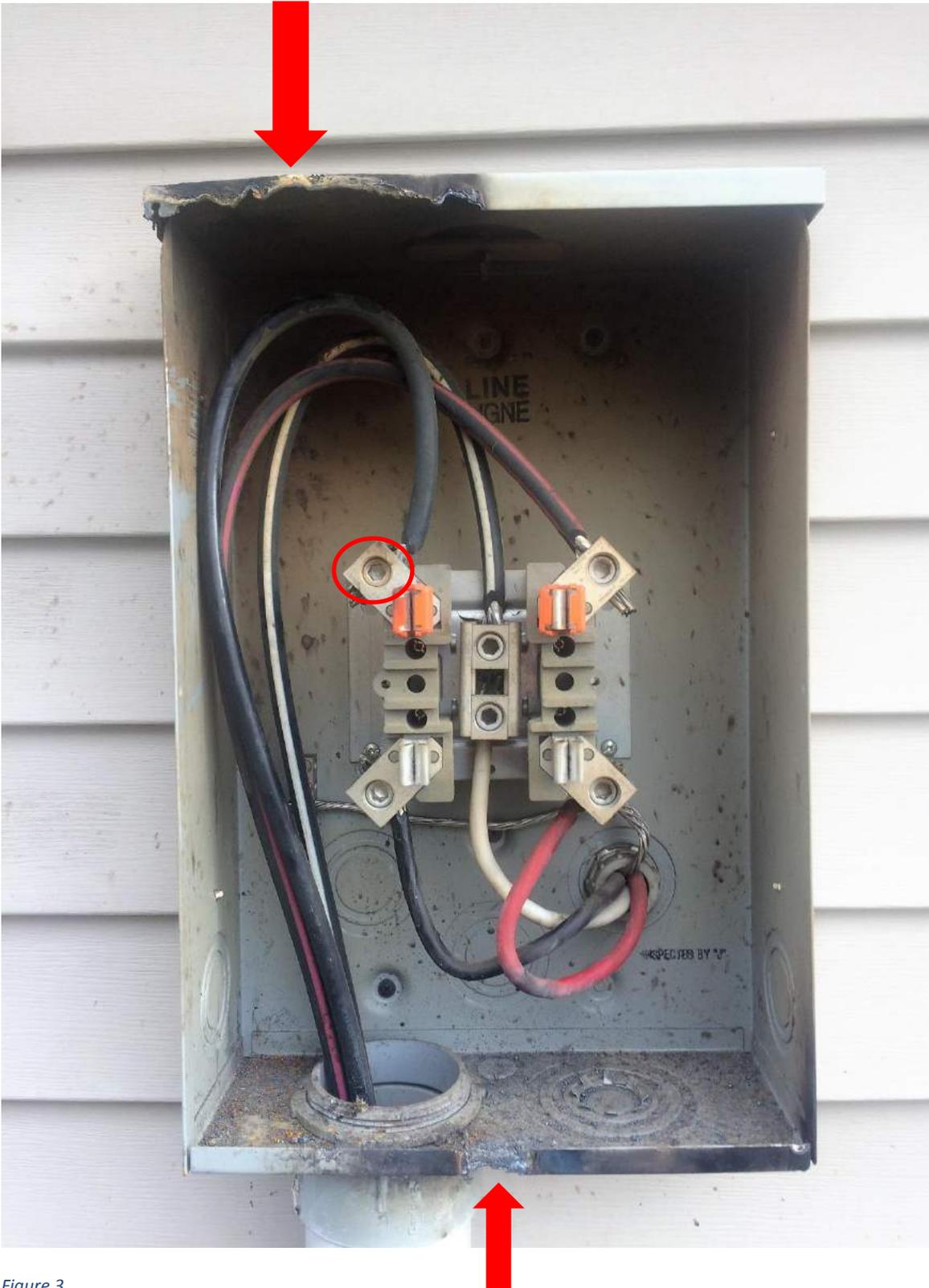


Figure 3

Photo of the meter base taken by the contractor prior to replacing it. The red outline shows the termination lug that the hex socket was left in. The red arrows show the locations where the enclosure was damaged by the fault current.



Figure 4

This photo shows the front of the meter base cover. The red arrows show where the electrical fault caused damage to the cover. The hex socket was located inside the meter base behind the center arrow.



*Figure 5*

This photo shows the damage to the meter base cover. The location of the hex socket was behind the area shown outlined in red. The red arrow shows the top of the cover where the cover was in contact with the enclosure and created a path for current to flow.



*Figure 6*

A closer look at the damage to the top front side of the meter base cover.



*Figure 7*

This photo shows the back of the cover and the 5/16" hex socket that was left in the conductor termination lug inside the meter base. The socket was welded to the inside of the meter base cover.



*Figure 8*

This photo shows the bottom of the meter base cover. The red arrow shows the melted latching tab that holds the cover in place after installation. The bottom of the cover was melted away.



*Figure 9*

This photo shows the front of the cover with the socket still welded in place.



*Figure 10*

This photo shows the damage from arcing on the cover done to the external plastic cover on the meter.

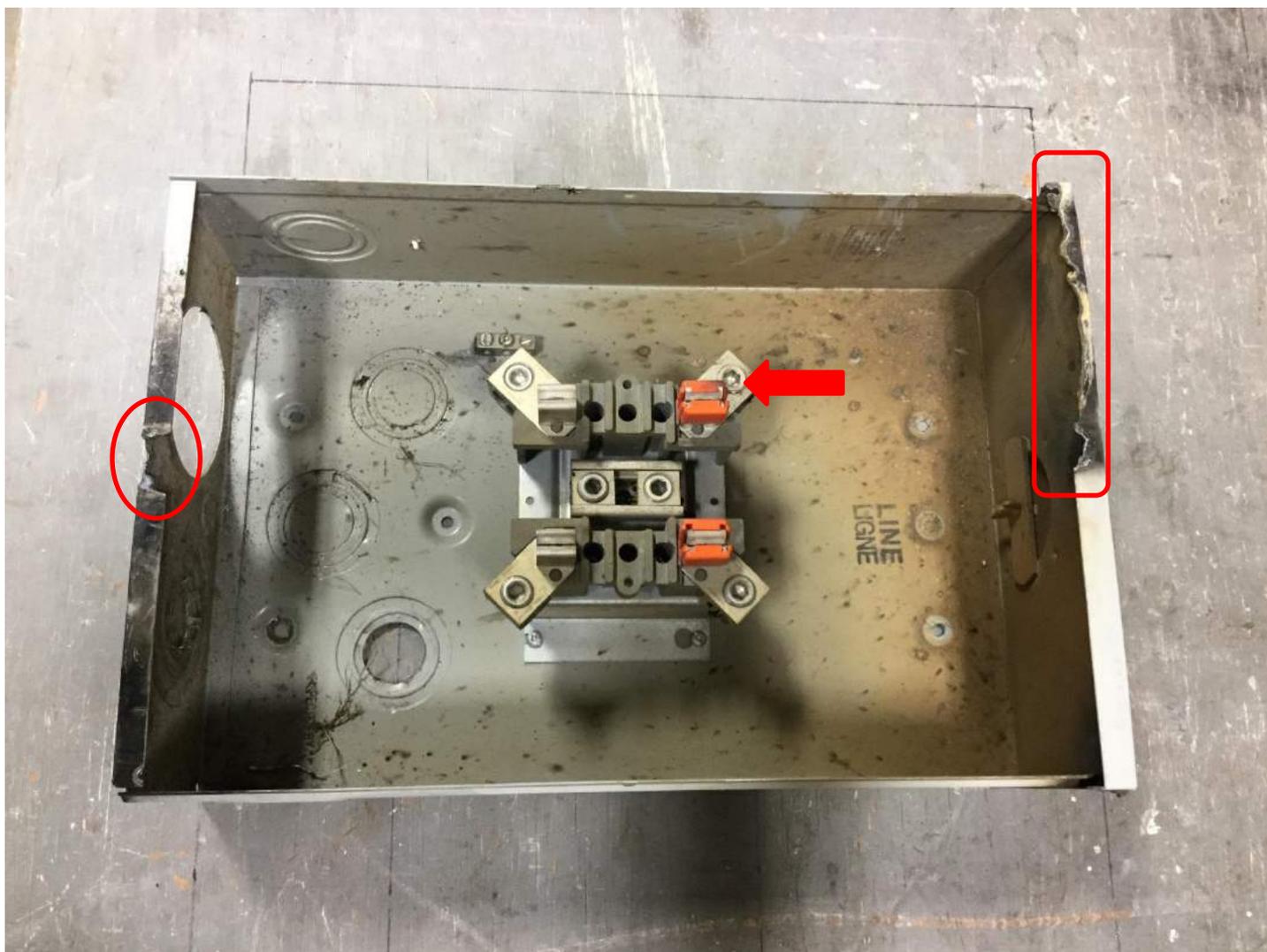
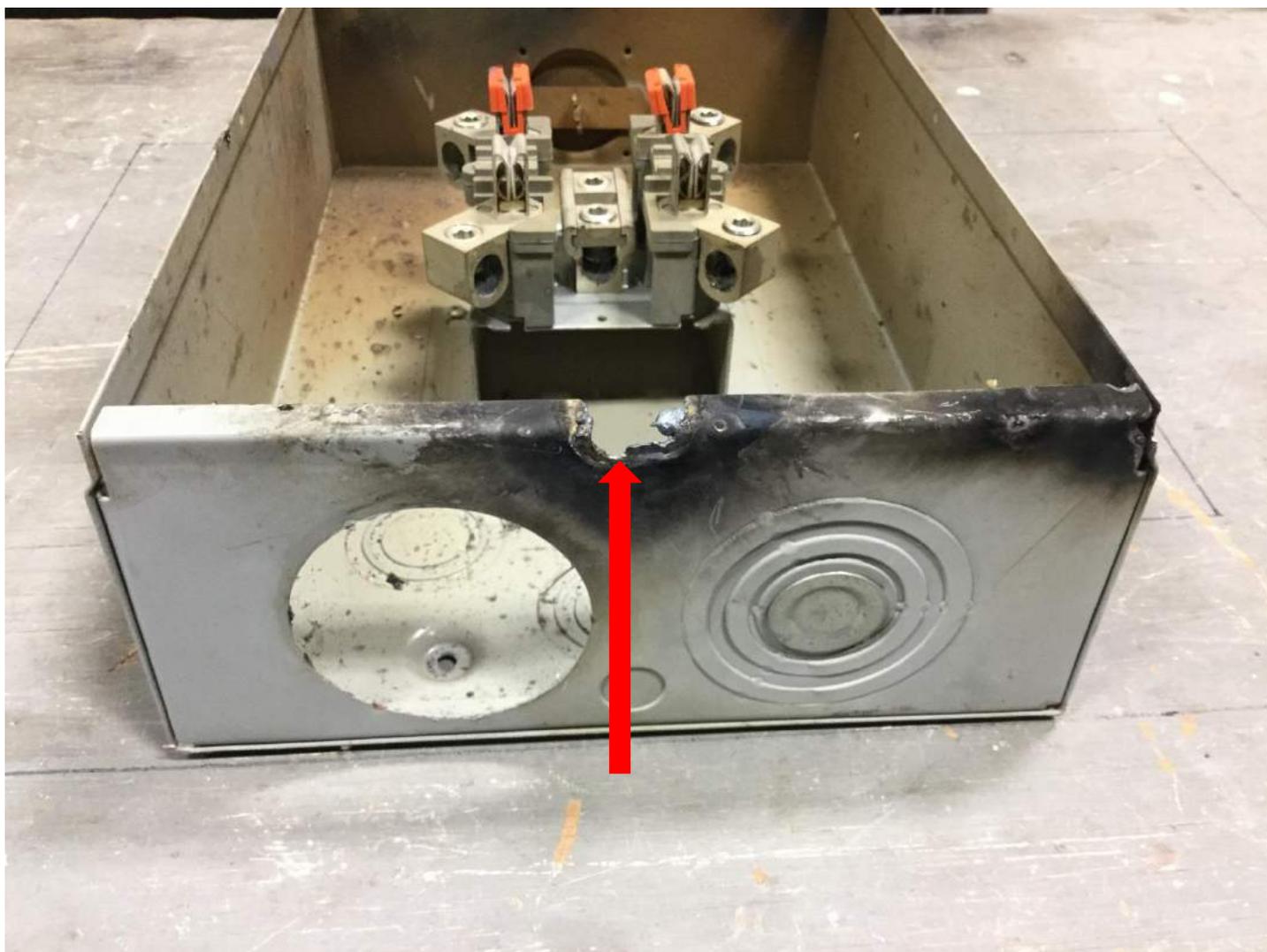


Figure 11

This photo shows the meter base enclosure and the internal components that the service conductors were connected to. The red arrow shows the termination lug that the socket was in at the time of the incident. The red outlines show the top and bottom of the meter base where the enclosure made electrical contact with the cover during the fault and the ground fault current damaged the equipment.



*Figure 12*

This photo shows the bottom of the meter base enclosure and the damage caused by the fault current. The center area shown by the red arrow is where the cover latch secures the cover to the meter base enclosure. The material was melted away in this location.



*Figure 13*

This photo shows the top of the meter base that was damaged by the fault current.



*Figure 14*

This photo shows the ring that secures the meter to the meter base. The red arrow shows where the ring was located in relation to the hex socket that was left in the termination lug.