Electric Safety Issues Related to Utility Vehicle Grounding Practice

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Introduction
Utility trucks working in the proximity of the power lines may accidentally contact the energized lines, and the truck also get energized to the same voltage as power line. Consequently, it can be unsafe for the workers to touch or approach the truck due to the risks of touch and step voltages.

Utility companies practice is some kind of truck-grounding schemes to minimize the hazards to their workers. Typical schemes are:
(a) Ungrounded the truck;
(b) Grounded the truck to a temporary grounding rod;
(c) Grounded the truck to a permanent grounding rod;
(d) Grounded the truck to the system neutral.

While none of the practices can guarantee complete safety, there is no consensus among utility companies on which scheme can lead to the most suitable practice.

Table 1 Barricading area for each grounding scheme to avoid risky step voltage

<table>
<thead>
<tr>
<th>System voltage $V_{pu}$</th>
<th>Ungrounded</th>
<th>Grounding to temporary rod</th>
<th>Grounding to system rod</th>
<th>Grounding to neutral</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.8 kV</td>
<td>2m from truck</td>
<td>3m from temp. rod</td>
<td>1m from syst. rod</td>
<td>1m from the closest exit: rod</td>
</tr>
</tbody>
</table>

Aim
The purpose of this project is to investigate these truck grounding schemes to clarify the issues associated with these schemes. The investigation includes,

1) Options to increase worker safety;
2) Quantitative assessment of the other concerns associated with different grounding schemes;
3) Comparing different grounding schemes.

Options to Increase Worker Safety
If a truck is energized accidentally, several practical methods can be used to reduce the risk to a utility worker. These options can be classified as follows:
1) Reduce the voltage level and duration of the energized truck by using different grounding schemes;
2) Prevent workers from contacting the truck. Barricading the truck is the most commonly used solution;
3) Approach the truck in a safe manner if a worker must (or may accidentally) contact it. Various utilities have considered three solutions: the use of an Equipotential zone or an isolation zone or insulated boots and gloves.

The following figures and table will show the results from above three perspectives.