



Stray and Induced Voltage Facts

What is stray voltage?

The term stray voltage describes a special case of voltage developed on the grounded neutral of the electrical wiring system of a farm and/or the utility's electric power delivery system. If this voltage reaches sufficient levels, animals coming into contact with grounded devices may receive a mild electric shock that can cause a behavioral response. The term stray voltage is often applied incorrectly to other electrical phenomena such as electric fields, magnetic fields and electric current flowing in the earth or on grounding systems. Stray voltage is not caused by proximity to or problems on high voltage transmission lines.

What causes stray voltage?

Electrical current flowing between the neutral wire and ground is a normal part of electrical systems. Stray voltage problems are most often the result of the system not operating properly. This abnormal condition leading to stray voltage can be caused by:

- ▶ Poor grounding conditions
- ▶ Inadequate connections
- ▶ Undersized neutral conductors

Why isn't stray voltage applicable to this project?

Distribution systems and electrical service lines use the neutral wire as a path for current flow, and based on local service loading, may have unbalanced flows on these wires. This, along with the abnormal conditions listed above, can create stray voltage issues.

In transmission systems, the neutral or shield wire normally does not have any current flowing through it. The neutral or shield wire is only there in the event of a fault condition, such as lightning striking the transmission line. Plus, transmission lines by nature of their design will always have balanced current flow conditions. Both of these conditions mean that stray voltage does not come from transmission lines.

What is induced voltage?

Induced voltage is an electrical condition through which very low levels of voltage could be seen in objects in the near vicinity of a high voltage transmission line. Near objects could be buildings, fences, or other equipment in very close proximity to the transmission line. Much like stray voltage, induced voltage normally is not a problem. Where it is, the problem can be taken care of with proper grounding of the affected objects.

How will induced voltage be eliminated?

As part of the design and engineering process, the transmission line will be designed to eliminate any induced voltages in objects in close proximity to the line. National Electric Safety Code (NESC) clearances will be met, and the transmission line engineered in such a way as to ensure that induced voltages are not present. For objects that may be in close proximity to the transmission line, such as fences, simple precautions such as ensuring the fence is properly grounded are more than adequate to eliminate any induced voltages.

Resources

- ▶ Midwest Rural Energy Council
<http://www.mrec.org/sv-info.html>
- ▶ National Electrical Safety Code
<http://standards.ieee.org/nesc/>
- ▶ Public Service Commission of Wisconsin
<http://psc.wi.gov/utilityinfo/electric/strayvoltage.htm>
- ▶ Wisconsin Public Service Corporation
<http://www.wisconsinpublicservice.com/farm/research.aspx>