

This Isn't Your Father's Stray
Voltage Anymore
(suggested terminology to better
define today's problems)

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- **“stray voltage” was generally accepted as referring to the low neutral-to-earth voltages found on customer equipment**
- **Today, “stray voltage” is being used to refer to any situation where the public is receiving shocks, no matter the cause or voltage level.**
- **This usage has led to an escalation of unfounded fear by the public.**
- **It is suggested that different, more descriptive terms be used to clarify the various manifestations of elevated voltages appearing in unexpected places.**

- **It is obvious to all who have studied electricity that voltage does not “stray.” Voltage appearing at a location that is remote from a source is caused by electrical current flowing through an impedance. Voltage always appears just where it should be.**

O.C. Seevers, “Ground Currents and the Myth of Stray Voltage,” PennWell, 1994

- **The earth is a conductor of electricity, so, a portion of the return current also flows in the earth. This current in the earth causes a voltage to be on all equipment and materials associated with the electrical delivery system, and on many things not associated with the delivery of electricity.**
- **Voltage is always present; it is just at too low a level to be a "perceived touch potential."**

- **Perceived touch voltage levels for people range from 3 volts for children, to greater than 8 volts for some adult males.**
- **Voltage levels in the perceived range can be a significant deterrent to the use of devices and facilities, and can be interpreted by the public as an indication of a hazardous condition.**

- **Inspections of facilities in the public way in the Northeast have found voltages as high as 190 volts rms on equipment.**
- **While it is obvious to those that understand electricity that this level of voltage is not caused by an excessive neutral return current, newspaper articles and utility press releases still utilize the term “stray voltage” to describe the problem.**

- The sales brochure goes on to say, **“Stray voltage is a potentially lethal hazard. It is caused by electricity leaking from the electrical distribution grid into exposed objects.”**
- The use of the term “stray voltage” to identify both low voltage, non-hazardous conditions caused by high earth return neutral currents, and, hazardous short-circuits only leads to confusion and an unnecessary level of fear in the public.

“Hazardous Voltage”

- Any A.C. rms voltage difference, between two possible human contact points, that equals or exceeds 50 volts, as noted in OSHA, National Electrical Code (NEC) and National Electrical Safety Code (NESC) rules.

“Neutral-to-Earth Voltage”

- An A.C. rms voltage difference between an electric delivery system neutral, either the high voltage utility system or the utilization system within customers' facilities, and a remote point that is grounded to earth, caused by the neutral-to-earth currents that normally occur in grounded neutral systems.

“Perceived Touch Voltage”

- The level of A.C. rms non-hazardous voltage that could be felt by a human or animal, under normally expected conditions. This voltage level may be as low as 0.5 volts for certain contact points on some domesticated animals, to as high as 8 volts for humans with thick skin.
- The voltage range for perceived touch voltage would be 0.5 to 8 volts rms for animal related conditions, and 3 to 8 volts rms for human related conditions.

“Elevated Equipment Voltage”

- An A.C. rms voltage difference between utility equipment and the earth, or to nearby grounded facilities, that exceeds the highest perceptible voltage level for humans, generally accepted as 8 volts.
- Insulation failures, with the attendant fault currents, cause "elevated equipment voltage," and the fault currents can be far greater than required to cause grave physical harm to animals and people.

Conclusion

- We need to start to clarify what we are talking about, and hope that it is not too late.