2015 Legislative Proposal:  
Stray Voltage Standards

**Issue Background**

- Rural electric cooperatives serve a majority of the dairies in our state
- History of good relationships between the co-op and producers
- Dairies are an important part of the co-op’s electric load
- Dairies are *our Members*
- Co-ops are proactive when working with Producers on stray voltage
- SD electric co-ops support Gov. Daugaard’s dairy initiative
What is Stray Voltage?

“Stray voltage is a small voltage (less than 10V) that can be measured between two possible contact points.”

*Sources of Stray Voltage/Current*, David Ludington

Extensive research has established scientific standards to measure and, if necessary, mitigate stray voltage.
What is Stray Voltage?

When the utility and member side of the meter is properly installed and maintained, stray voltage can be mitigated.
Can we find it and fix it?

- Voltages are developed on both off and on the farm.
- Both must be assessed
- Investigative techniques are well developed
- Vast majority of problems solved by applying accepted codes
Neutral-to-earth or stray voltage can be effectively mitigated in several fundamental ways:

- Reduce animal contact voltage by bonding (Equipotential Planes)
- Reduce Neutral-to-Earth Voltage by
- Reduce Neutral current
- Reduce Neutral resistance
- Improve the Grounding of Neutrals
- These are already part of code requirements and good engineering practice
Cow – Contact is where its at! For measurement
Co-ops work *Proactively* with Member Dairies to Resolve Stray Voltage Questions

**Stray Voltage Testing Trailer**

South Dakota rural electric cooperatives invested in this equipment to investigate stray voltage concerns. The trailer assists producers in measuring stray voltage and locating the source if levels are deemed too high.
However, lawsuits are increasing and scientific standards are being ignored.

Minnesota:
  - Wright-Hennepin (2012): $750,000 for Negligence, Trespass, Nuisance
  - Crow Wing (October 2014): $6.3 million
South Dakota:
  - Codington-Clark (2013)

• All consumers and cooperative members, including dairies, pay for these lawsuits.
• The threat of litigation discourages amicable solutions.

We want to resolve these issues at the dairy barn, not in the courtroom.

Legislation is Needed NOW...
The Goals of the Legislation

✓ Put a process in place where the dairies and utilities work together to address concerns

✓ Enact standards for testing and mitigation

✓ Require that people holding themselves out as experts actually be experts

✓ If dairy and utility can’t agree, then bring in the PUC as a neutral, third-party
Farmer Notifies Electric Utility

Utility has **14 days** to respond

If stray voltage exists due to the utility system (above set standards), utility has **7 days** to start mitigation process

**SD PUC** sets rules and reviews unresolved cases *Prior* to Civil Action

Accurate and consistent *science-based* standards for measuring stray voltage are *critical.*
Stray Voltage Standards
Based on Science

- USDA Red Book (1991)
- Vermont (1994)
- Connecticut (1995)
- Idaho Legislature & PSC (2005)
- Michigan PSC (2007)
- Iowa Stray Voltage Guide¹ (2014)

¹Sponsoring Organizations: Alliant Energy, Iowa Association of Electric Cooperatives, Iowa Cattlemen’s Association, Iowa Energy Center, Iowa Farm Bureau Federation, Iowa Institute of Cooperatives, Iowa State Dairy Association
Does it work?

• The soundness and repeatability of scientific research and the success of its practical application has been validated over the past 25 years on over 9000 stray voltage investigations on farms in Wisconsin.
Common Cow Reactions to Stray Voltage

• 1 to 3 mA (0.5 to 1.5 V)
  – Basic Perception/Awareness

• 4 to 6 mA (2 to 3 V)
  – Behavioral responses
    • Typically some type of avoidance, delay to drinking

• Over 6 mA (> 6 V)
  – Production loss
    • Water and feed intake reduced
    • Lower milk production

  – Source (Wisconsin PUC, Answers to Your Stray Voltage Questions, 2011)
Preventive Action Level: 1.0 Volt across 500 ohm resistor
Remedial Level: Above 0.5 Volt

Figure 7-2. Behavioral and milk production responses to increasing current levels. Voltages, on the right, were estimated using a worst case circuit impedance and a more realistic impedance.
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Check out the “South Dakota Legislative Roster” App for iPhone, iPad and iPod Touch and Droid devices brought to you by South Dakota’s electric cooperatives.

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Handout for the 2016 Midwest Rural Energy Council’s Annual Rural Energy Conference, March 2-4, La Crosse, WI.

The following handout, “South Dakota Stray Voltage Law”, was shared as part of the presentation called South Dakota Stray Voltage Law.

Presentation given by Ed Anderson of the South Dakota Rural Energy Association.
AN ACT

ENTITLED, An Act to establish certain provisions regarding stray electrical current and voltage remediation.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF SOUTH DAKOTA:

Section 1. Terms used in this Act mean:

(1) "Adequate remediation," corrective action by an electric utility that results in, and is reasonably likely to sustain, a reduction of stray current or voltage attributable to the electric utility's distribution system of fifty percent or less of the preventive action level;

(2) "Commission," the Public Utilities Commission;

(3) "Cow contact points," any two electrically conductive points that a dairy cow may, in its normal environment, unavoidably and simultaneously contact;

(4) "Electric utility" or "utility," an electric utility as defined in § 49-34A-1;

(5) "Preventive action level," stray current or voltage that is either:

(a) A steady-state, root mean square (rms), alternating current (AC) of 2.0 milliamp (mA) or more through a 500 ohm resistor connected between cow contact points, as measured by a true rms meter; or

(b) A steady-state, rms, AC voltage of 1.0 volts or more, across (in parallel with) a 500 ohm resistor connected between cow contact points, as measured by a true rms meter;

(6) "Steady-state," the value of a current or voltage after an amount of time where all transients have decayed to a negligible value;

(7) "Stray current or voltage,:"

(a) Any steady-state, 60 hertz (Hz) (including harmonics thereof), root mean square (rms), alternating current (AC) of less than 20 milliamp (mA) through a 500 ohm
resistor connected between cow contact points, as measured by a true rms meter; or

(b) Any steady-state, 60 Hz (including harmonics thereof), rms, AC voltage of less than 10 volts, across (in parallel with) a 500 ohm resistor connected between cow contact points, as measured by a true rms meter.

Section 2. Within twelve months of the effective date of this Act, the commission shall promulgate rules, pursuant to chapter 1-26, concerning:

(1) Acceptable standards for measurements of stray voltage;

(2) Procedures and requirements for testing used to measure stray voltage;

(3) Responsibilities of dairy producers, including notice requirements and cooperation with measuring and testing procedures conducted by electric utilities;

(4) Responsibilities of electric utilities, including response to notices from dairy producers;

(5) Tests used to detect and measure stray voltage;

(6) Qualifications of persons performing and analyzing results of stray voltage tests;

(7) Requirements for stray voltage measuring and recording equipment;

(8) Protocols for persons performing stray voltage tests; and

(9) Remediation guidelines.

The commission shall review the rules from time to time, or upon petition to the commission, to ensure that the rules adopted by the commission to establish uniform procedures and protocols continue to be the most scientifically and technologically accurate and reliable means of detecting stray current or voltage. Any measurements of stray current or voltage not made in compliance with commission rules shall be inadmissible before the commission or in any civil action. The commission rules shall be applicable to dairy producers, electric utilities, and all persons or entities involved in any way in the measurement or remediation of stray current or voltage in this state.
Section 3. Any dairy producer in this state who claims that the producer's dairy cows are being affected by any form or type of electrical energy allegedly attributable to an electric utility including, without limitation, stray current or voltage, shall, as a condition precedent to commencing any civil action against the utility, provide written notice of the affect to the utility. The notice shall specify why the dairy producer believes the producer's dairy cows are being affected by electrical energy attributable to the utility. Within fourteen business days of receipt of the notice, the utility shall take measurements at cow contact points at the dairy producer's dairy to identify the existence and magnitude of stray current or voltage, if any. If the utility finds a level of stray current or voltage at cow contact points in excess of the preventive action level, the utility shall promptly identify that portion, if any, of the stray current or voltage that is attributable to the utility's distribution system. If that portion of the stray current or voltage at cow contact points attributable to the utility's distribution system exceeds fifty percent of the preventive action level, the utility shall, within seven business days, commence and diligently pursue to completion, remedial procedures which shall reduce, and are reasonably likely to sustain, that portion of the stray current or voltage at cow contact points attributable to the utility's distribution system to fifty percent or less of the preventive action level, unless extraordinary circumstances prevent the utility from commencing remedial action within seven business days. In such case, the utility has an additional seven business days to commence and pursue to completion remedial procedures.

Section 4. A dairy producer or utility may file a complaint with the commission claiming that there has been a failure to comply with this Act. The commission has exclusive, initial jurisdiction to determine:

(1) Whether the dairy producer has provided the requisite notice to the electric utility;

(2) Whether the dairy producer has cooperated with the electric utility to allow the utility to complete measuring and testing;
Whether a utility has complied with the commission rules regarding measurement of stray current or voltage;

Whether the utility's measurements demonstrated stray current or voltage at or above the preventive action level;

Whether the utility has properly identified that portion of the stray current or voltage at cow contact points attributable to the utility's distribution system; and

Whether the utility has complied with its remediation obligation under this Act.

After opportunity for hearing, the commission shall issue a decision finding whether this Act has been complied with or not. If one or more provisions of this Act have not been complied with, the commission shall order compliance within a period of time prescribed by the commission. The commission shall assess its costs associated with the complaint equally between the dairy producer and the utility.

Section 5. If, after hearing, the commission determines that a dairy producer made or pursued a claim in bad faith or for purposes of harassment of the utility, the commission shall require the dairy producer to pay the utility's actual costs of investigation. If, after hearing, the commission determines that an electric utility acted in bad faith or for purposes of harassment or delay, the commission shall require the utility to pay the dairy producer's actual costs of investigation, if any.

Section 6. No civil action may be commenced by a dairy producer against an electric utility seeking damages or other relief allegedly due to injury caused by stray current or voltage unless the dairy producer has complied with the provisions of section 3 of this Act, and the commission has issued an order pursuant to section 4 or 5 of this Act. In any civil action against a utility for damages or other relief, after the dairy producer has complied with the provisions of section 3 of this Act, and the commission has issued an order pursuant to section 4 or 5 of this Act, the commission's order is admissible in evidence in such civil actions. The dairy producer may commence the civil action not
later than one year following the issuance of the commission's final order or one year following the
completion of any appeals of the commission's final order, whichever occurs later.

Section 7. In any civil action against an electric utility for damages pursuant to this Act, a dairy
producer is limited to those damages which were incurred by the dairy producer during that period
of time commencing twelve months prior to the dairy producer's provision of notice to the utility and
ending on the date of completion of adequate remediation, and were caused by that portion of the
stray current or voltage attributable to the utility's distribution system.

Section 8. Any claim against an electric utility for damages due to stray current or voltage is
limited to a claim of negligence, including in the case of a prior determination of the commission
pursuant to section 4 or 5 of this Act, negligence per se. In determining whether the utility was
negligent, the utility's conduct shall be judged using the commission rules.
An Act to establish certain provisions regarding stray electrical current and voltage remediation.

I certify that the attached Act originated in the SESNATE as Bill No. 131

Secretary of the Senate

President of the Senate

Attest:

Secretary of the Senate

Attest:

Secretary of the Senate

Attest:

Chief Clerk

Senate Bill No. 131
File No. _____
Chapter No. _____