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April 7, 2016

Ms. Patricia Van Gerpen
SD Public Utilities Commission
500 East Capitol
Pierre, SD 57501

Re: Stray Electrical Current and Voltage Remediation Rules
RM16-001

Dear Ms. Van Gerpen:

On behalf of the South Dakota Rural Electric Association ("SDREA"), we appreciate the opportunity to provide input and comments in this stray voltage rule-making docket (RM16-001). In follow-up to the formal rules hearing on Monday, March 28, 2016, wherein we provided testimony in support of the rules, we hereby submit the following written comments.

Comments on A.R.S.D. § 20:10:39:10[1]

As noted in our testimony at the rules hearing, SDREA supports this Section of the rules as proposed by the Commission. Xcel Energy continues to have concerns about the accuracy of measurement of current. SDREA does not support the additional language proposed by Xcel Energy at the rules hearing because it in essence eliminates the option to use current measurements by also requiring voltage testing if a person who does the testing chooses to take current measurements. That is inconsistent with the stray voltage statutes. SDCL § 49-47-3 requires utilities, upon receipt of notice by a dairy producer, to "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" (emphasis added). Therefore, SDREA does not support the language proposed by Xcel Energy at the hearing.

SDREA noted at the rules hearing that while we support Section 10 in its original form and that we do not support Xcel Energy's proposed amendment, if the Commission is inclined to modify the language of Section 10, we have alternative language for the Commission's consideration.

(1) The accuracy and resolution of any instrument used to measure or record cow contact voltage or current shall limit the error to five percent or less at one volt or two milliampere If conditions exist that could affect the accuracy of current measurements, voltage measurements should also be taken to verify the existence of stray voltage.

[1] Hereinafter, SDREA will refer to rules by section (§) number.

Comments Concerning the Formulas in § 20:10:39:57 and § 20:10:39:58

SDREA was asked during the hearing if we had any changes to the formulas contained in these two sections of the rules. We noted that Xcel Energy had questioned these formulas during the pre-formal rules hearing process, and we had reserved our right to respond to any proposals they made to changes in the formulas. None were presented at the rules hearing.

Subsequent to the March 28th hearing, SDREA engaged in further research on these rules. SDREA and Xcel Energy also discussed these Sections of the rules. As a result of these discussions, SDREA proposes the following revisions to these Sections of the rules:

20:10:39:57. Determination of any contributions to stray current or voltage for single phase dairies.[2]

The utility contribution to cow contact voltage or cow contact current is determined using the following: ~~formulas:~~

Cow contact voltage or cow contact current is measured with the load box set at FULL LOAD (18-24 kW) and recorded with the farm disconnected from power. This measurement represents the utility contribution to stray voltage or current.

~~(1) Utility contribution to cow contact voltage = ((Vp48 – V-Half) / (Vp Full – Vp Half)) x (Vcc Full – Vcc Half) + Vcc HALF; or~~

~~(2)~~(1) ~~Utility contribution to cow contact current = ((Vp48 – Vp HALF) / (Vp FULL – Vp HALF)) x (Icc FULL – Icc Half) + Icc HALF.~~

The values determined are compared to the preventive action level.

20:10:39:58. Determination of any contributions to stray current or voltage for three-phase dairies.

The utility contribution to cow contact voltage or cow contact current is determined by using the following:

Cow contact voltage or cow contact current is measured with the farm disconnected from power. This measurement represents the utility contribution to stray voltage or current.

The values determined are compared to the preventive action level.

[2] Text of these Sections of the rules are the original draft, not LRC's draft.

~~for dairies with three phase balanced load service is determined by directly using the results of the load box test results for step 1 and step 2 as specified in § 20:10:39:49.~~

~~The cow contact voltage measured during step 1 of the load box with the load box "off" and the dairy "on" shall be the total cow contact voltage. The cow contact voltage measured during step 2 of the load box test with the load box "off" and the dairy "off" is the contribution to cow contact voltage from the utility or Vccutility. The contribution to cow contact voltage by the dairy is the difference between cow contact voltage and cow contact voltage from the utility. The formula is: Vccdairy = Vcc – Vccutility.~~

The reason SDREA is recommending these revisions is because as currently written, § 20:10:39:57 and § 20:10:39:58 fail to account for other sources of electricity on the farm, which affects the accuracy of the testing. The revisions proposed above clarify that cow contact current or cow contact voltage measurements are taken with the farm completely disconnected from power, for both single phase and three phase dairies. It is SDREA's understanding that Xcel Energy is supportive of this change.

Comments With Regard to LRC Style and Form Revisions

As noted by the Commission at the hearing, LRC made substantial style and form comments on the proposed rules. This portion of SDREA's comments addresses the questions raised by the Commission at the hearing on some of LRC's suggested revisions. We will also address LRC's comments to the other Sections of the rules not questioned by the Commission at the hearing.

1. General Comments

A. At the hearing it was noted that LRC deleted the words "cow contact" throughout the rules. SDREA believes those words should be reinserted, throughout the rules.

B. SDREA disagrees with LRC's change of references from "utility" to "service provider." The references to utility should be left as originally proposed, throughout the rules. We will provide some specific examples below.

C. SDREA disagrees with LRC's suggestion of abbreviating the voltage and current terms, such as Icc and Vcc. Maintaining full reference to these terms eliminates confusion and the need to continually refer back to definitions.

2. 20:10:39:01(13) (page 6): In the definition of "Resistance", it is SDREA's position that the Commission should reject LRC's change of the word "quantity" to "quality". The correct word is "quantity".

3. 20:10:39:04 (page 8): SDREA believes this section should read as follows:

20:10:39:04. Notice to utility. A dairy producer who believes the producer's cattle are being affected by stray electricity, ~~may~~shall provide notice to the utility ~~pursuant to SDCL 49-47-3~~ regardless if the dairy producer ~~with or without first having~~ conducted tests or measurements of stray current or stray voltage.

4. § 20:10:39:10(3) (page 10): At the hearing, the Commission questioned LRC's deletion of the words "is used to measure current between two points". SDREA agrees with LRC's recommendation.

5. §§ 20:10:39:17 and 18 (page 13): SDREA agrees with the comments of the Dairy Producers that the words "subject to the provisions of" should be retained in Section 17, and "as defined in SDCL 49-47-1(5) should be retained in Section 18.

6. § 20:10:39:19 (page 13): This is one example that illustrates SDREA's position that "utility" should not be changed to "service provider". LRC questioned whether the word "utility" in the second sentence of this rule should be changed to "service provider", and the Commission questioned this revision at the hearing. The word "utility" in sentence two should be retained. Another example that supports SDREA's general comment that the word "utility" should be retained throughout these rules is in 20:10:39:23 (pages 15 and 16). Upon notification by a dairy producer of a possible stray voltage issue, it is the utility that has the obligation to conduct testing. Regardless of whether the utility conducts the tests or contracts with a service provider to do so, the utility must ensure that pre-testing procedures are followed as well. This rule should read as follows:

20:10:39:19. Preventive action level exceeded. If stray current or stray voltage exceeds the preventive action level ~~is exceeded~~after completion of the 48 hour test, the utility shall perform the ~~remaining~~ four remaining tests, unless testing is suspended or limited pursuant to ~~except as provided in~~ § 20:10:39:21. The utility shall also perform an analysis to determine ~~whether~~if a portion of the stray current or stray voltage attributable to an off-farm source exceeds 50 percent of the preventive action level.

If the preventive action level is exceeded and the portion of the stray current or stray voltage attributable to an off-farm source does not exceed 50 percent of the

preventive action level, the utility has no further ~~testing or remediation~~ obligations under these rules during the test cycle.

If the preventive action level is exceeded, and the portion of the stray current or stray voltage attributable to an off-farm source exceeds 50 percent of the preventive action level, the utility shall conduct remediation pursuant to SDCL 49-47-3. ~~Under this condition~~and the 48 hour recording period of the 48 hour test may be reduced but to no fewer than 24 hours.

7. § 20:10:39:22 (page 14): In response to the LRC's comment and the Commission's question of how many ground rods must be installed, SDREA suggests the following language:

20:10:39:22. Use of remote reference ~~grounding~~ electrode~~s~~. ~~Remote reference electrodes are established by installing ground rods.~~ In preparation for testing, a remote reference electrode ~~each ground rod~~ must be installed and penetrate the soil to a depth of approximately 30 inches. When practicable, the ~~each~~ remote reference electrode ~~is~~shall be installed at least 25 feet away from the nearest underground conductive electrical equipment, of any type, or at a distance equal to three to four times the buried depth of any metallic structure connected to the service entrance neutral. When practicable, ~~each~~the remote reference electrode must be located no closer than 25 feet from the centerline of a primary electrical conductor right-of-way and no closer than 100 feet from the edge of a transmission line right-of-way.

~~Each~~The remote reference electrode ~~must~~shall be checked for remoteness ~~prior to its use~~before being used for tests or measurements, and, if found to be insufficiently remote, a new location for ~~that~~the remote reference electrode ~~must~~shall be found and retested for remoteness. Remoteness of the remote reference electrode is determined by measuring the voltage from the transformer grounding electrode to the remote reference electrode. The ground electrode resistance and current at the transformer are also measured.

Remoteness is ~~considered~~ adequate if the measured voltage between the transformer grounding electrode and the remote reference electrode is within 20

percent of the voltage calculated by multiplying the transformer grounding electrode current by the transformer grounding electrode resistance.

If the transformer grounding electrode is within 25 feet of other primary or secondary ground electrodes, ~~this~~the remoteness test ~~is~~shall be conducted at the first primary system ground electrode upstream of the transformer that is greater than 25 feet from the other primary or secondary system grounding electrodes.

8. § 20:10:39:26 (page 17): In response to LRC's question/comment at the end of this rule about where the location of electric fences and other electrified cow control devices are to be noted, SDREA suggests leaving the language as is, because it gives flexibility to the analyst to note these separately in the report, to have them shown in the drawing of the dairy, or both.

9. § 20:10:39:27 (page 17): LRC proposes deleting the words "at which" in the last line of the rule. SDREA proposes substituting the word "where" for the words "at which", so the rule should read as follows:

20:10:39:27. ~~Purpose of t~~The cow contact test. The ~~purpose of the~~ cow contact test ~~is to~~ determines the locations, if any, where stray current or stray voltage exceeds the preventive action level and ~~to~~ identifies~~y~~ the locations ~~at which~~ where the cow contact voltage will be recorded in the 48 hour test.

10. § 20:10:39:32 (page 19): This rule is an example of SDREA's general comment that retaining the voltage and current terms, instead of abbreviating them, makes the rules clearer. We would suggest leaving in the words "an open circuit voltage", rather than "Voc". SDREA concurs with the balance of LRC's suggested revisions in this rule.

11. § 20:10:39:35 (page 20): SDREA would make the same comment with regard to not using abbreviations of voltage and current terms in the rules. If abbreviations are used, it is extremely critical that the upper and lower cases of the initials are correct. For these reasons, SDREA recommends rejection of LRC's use of abbreviations in this rule.

12. § 20:10:39:38 (page 21): SDREA concurs with LRC and the Commission that the provisions in this rule are already covered in 30:10:39:19. Section 38 is thus redundant and can be deleted.

13. § 20:10:39:45 (page 24): LRC and the Commission questioned what is significant, for purposes of this rule. SDREA talked about different percentages, but ultimately concluded the word "significantly" should remain in the rule, as it provides necessary flexibility. SDREA also reiterates its request to not use abbreviations for voltage terms in this Section of the rules.

14. § 20:10:39:50 (page 25): This was originally 20:10:39:49, but LRC has changed the order, so it is now section 50. SDREA concurs with the comment of the Dairy Producers to retain the words "load box current", "voltage at load box", and "primary line to neutral voltage" in subdivision 4.

15. § 20:10:39:49 (pages 25-26): This was originally 20:10:39:50, but LRC has changed the order, so it is now section 49. In response to LRC's comment and the Commission's question with regard to the last sentence of this section, SDREA proposes the following revisions to that sentence:

> **20:10:39:49. Conducting the load box test.** (last sentence only)
>
> For dairies with three-phase balanced primary service, ~~service provider~~qualified testing professional performs only steps one and two.

16. 20:10:39:51 (page 26): SDREA does not agree with all of LRC's revisions to this section of the rules. SDREA believes that the following language would clarify the rule:

> **20:10:39:51. Calculating the K factor for the load box test.** The K factor is a calculated ratio of cow contact voltage~~/~~ divided by secondary neutral to reference voltage (Vcc divided by Vs). The K factor should be less than one. ~~because cow contact voltage should be less than secondary neutral to reference voltage.~~ If the K factor is greater than one, then there is contribution to cow contact voltage from a source~~s~~ other than secondary neutral to reference voltage (Vs).

17. 20:10:39:53 (page 27): SDREA clarified at the hearing that the final sentence of this Section of the rules should be retained.

18. 20:10:39:59 (page 30): SDREA agrees with other interested parties at the hearing that 30 days is a reasonable period of time.

Once again, SDREA applauds the Commission for the process utilized in this docket. Understanding that these comments are lengthy and detailed, we welcome any opportunity to answer questions concerning our comments. Thank you for allowing us to participate and provide input in this rule-making docket.

Sincerely yours,

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