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# UTAH DEPARTMENT OF COMMERCE

## Division of Public Utilities

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## Action Request Response

**To:** Public Service Commission of Utah

**From:** Utah Division of Public Utilities

Chris Parker, Director  
Brenda Salter, Assistant Director  
Doug Wheelwright, Utility Technical Consultant Supervisor  
Bob Davis, Utility Technical Consultant

**Date:** March 16, 2023

**Re:** **Docket No. 23-035-05**, Rocky Mountain Power's Power Quality Report for the Period of January through December 2022

## Recommendation (Acknowledge)

The Division of Public Utilities (Division) recommends the Public Service Commission (Commission) acknowledge Rocky Mountain Power's (RMP) Power Quality Report (Report). The Commission does not need to take any further action at this time. This report and future reports will be used to establish a baseline.

## Issue

On February 14, 2023, RMP filed its Power Quality Report for 2022. On the same day, the Commission issued an action request to the Division asking it to review RMP's Report for compliance and make recommendations. The Commission asked the Division to report back by March 16, 2023. On February 17, 2023, the Commission issued its Notice of Filing and Comment Period asking any interested person to submit comments before March 16, 2023, and reply comments by March 31, 2023.

Division of Public Utilities

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## Background

On May 1, 2020, RMP filed its January 1 through December 31, 2019, Service Quality Review Report (2019 Report)<sup>1</sup> pursuant to the Commission's orders in Docket Nos. 08-035-55, 13-035-01, and 15-035-72 as well as the requirements of Utah Administrative Code R746-313, Electrical Service Reliability (Reporting Requirements). On June 1, 2020, the Division filed its comments and recommended the Commission establish a work group to review RMP's reliability baseline standards and make recommendations.<sup>2</sup> On June 16, 2020, RMP filed reply comments in which it supported the Division's recommendation.<sup>3</sup> On June 23, 2020, the Commission issued an Order directing the Division and RMP to establish a work group led by the Division with the purpose of examining RMP's reliability baseline standards and make recommendations.<sup>4</sup>

In compliance with the Commission's Order, the Division and RMP convened the work group (Work Group) on August 4, 2020. In addition to the Division and RMP, the Office of Consumer Services, Utah Association of Energy Users, Utah Petroleum Association, Utah Mining Association, and Clean Harbors Aragonite Inc. participated in the Work Group. On December 21, 2020, the Division filed a memorandum containing the Work Group's recommended changes to the control limits and the baseline notification levels.<sup>5</sup>

The Work Group met several times through June 2022. The Work Group addressed baselines for the reliability indices and power quality issues raised by representatives of the large industrial customers.

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<sup>1</sup> *Rocky Mountain Power's Service Quality Review Report*, Docket No. 20-035-22, Report filed May 1, 2020, <https://pscdocs.utah.gov/electric/20docs/2003522/313499RMPServQuaRevRepPeriodJanDec20195-1-2020.pdf>.

<sup>2</sup> Docket No. 20-035-22, Comments from the Division of Public Utilities filed June 1, 2020, <https://pscdocs.utah.gov/electric/20docs/2003522/314067DPUCmnts6-1-2020.pdf>.

<sup>3</sup> See Docket No. 20-035-22, Rocky Mountain Power's Reply Comments filed June 16, 2020, <https://pscdocs.utah.gov/electric/20docs/2003522/314292RMPRplyCmnts6-16-2020.pdf>.

<sup>4</sup> Docket No. 20-035-22, Order issued June 23, 2020, at 2, <https://pscdocs.utah.gov/electric/20docs/2003522/3143552003522o6-23-2020.pdf>.

<sup>5</sup> See Docket No. 20-035-22, Division of Public Utilities Memorandum filed December 21, 2020, <https://pscdocs.utah.gov/electric/20docs/2003522/316802DPUMemWrkGrp12-21-2020.pdf>.

On June 28, 2022, RMP filed its proposed Power Quality Reporting template.<sup>6</sup> The parties each filed comments and reply comments containing suggestions for RMP's proposed reporting template. On November 1, 2022, the Commission approved RMP's proposed reporting template and February filing deadline.<sup>7</sup> The Commission noted in its correspondence that the report template is a work in progress and subject to change as more data becomes available. Parties are encouraged to re-evaluate the reporting template and recommend further action if necessary.<sup>8</sup>

## Discussion

RMP's service quality, measured by System Average Interruption Duration Index (SAIDI), System Average Interruption Frequency Index (SAIFI), Customer Average Interruption Duration Index (CAIDI), and Momentary Average Interruption Event Frequency Index (MAIFI<sub>E</sub>), are evaluated annually.<sup>9</sup> While the service quality report generally refers to system related outages measured by SAIDI and SAIFI, the Power Quality Report refers to system faults that result in system voltage sags<sup>10</sup> from various causes.

Voltage sags or spikes and the duration of the events can create problems for all customers but primarily industrial customers due to the ride-through<sup>11</sup> capabilities of their equipment. Many equipment manufacturers follow standards established by the Underwriters Laboratories (UL), International Electrotechnical Commission (IEC), Institute of Electrical

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<sup>6</sup> See *Rocky Mountain Power's Proposed Reporting for Power Quality*, Docket No. 22-035-34, Rocky Mountain Power's Proposed Reporting for Power Quality filed June 28, 2022, <https://pscdocs.utah.gov/electric/22docs/2203534/324661PrpsdRprtngPwrQlty6-28-2022.pdf>.

<sup>7</sup> Docket No. 22-035-34, Correspondence from Gary L. Widerburg filed November 1, 2022, <https://pscdocs.utah.gov/electric/22docs/2203534/326013CorresWiderburg11-1-2022.pdf>.

<sup>8</sup> *Id.* at 2.

<sup>9</sup> *Rocky Mountain Power's Service Quality Review Report*, Docket No. 22-035-14, Utah Service Quality Review Report filed April 29, 2022, <https://pscdocs.utah.gov/electric/22docs/2203514/323803RMP2021SrvqQltyRvwRprt4-29-2022.pdf>.

<sup>10</sup> A voltage sag is defined as a decrease in voltage magnitude below 90% of nominal, but not a complete interruption. Pacific Gas and Electric Company, Voltage Sag Immunity Standards – SEMI F47 and F42, Power Quality Bulletin No. 3, [https://www.pge.com/includes/docs/pdfs/about/news/outagestatus/powerquality/power\\_quality\\_bulletin-issue\\_no.3-volt\\_saglmm\\_std-8-10-07.pdf](https://www.pge.com/includes/docs/pdfs/about/news/outagestatus/powerquality/power_quality_bulletin-issue_no.3-volt_saglmm_std-8-10-07.pdf).

<sup>11</sup> *Id.* Ride-through is generally defined as the ability for equipment to withstand voltage or frequency disturbances for some duration of time without creating a fault.

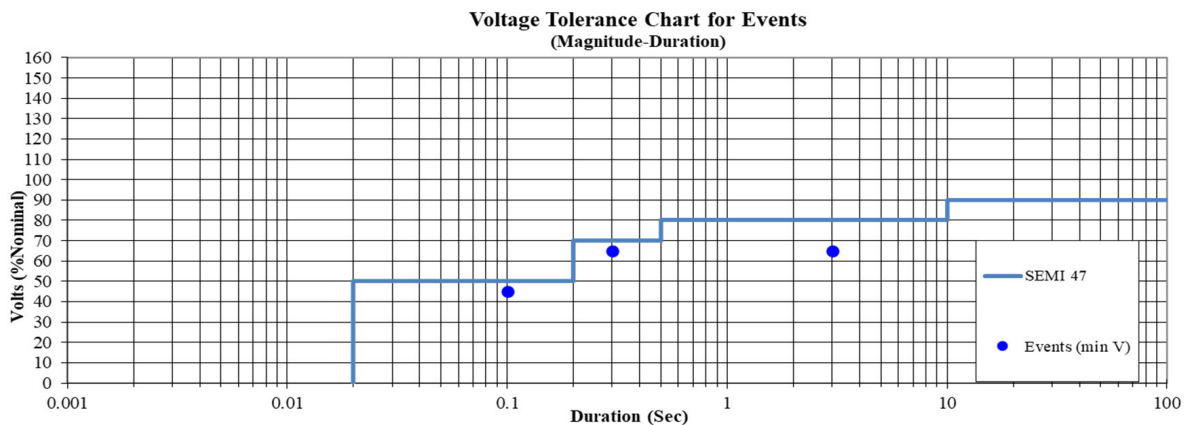
and Electronics Engineers (IEEE), and Conformité Européene (CE).<sup>12</sup> Most manufacturers follow the SEMI-F47 Curve developed by the semiconductor industry to ensure that control and manufacturing equipment would not require operator intervention in the event of a voltage sag or spike. The SEMI-F47 Curve is based on a table of metrics that establishes maximum durations in seconds of sags or spikes at percentages of the nominal voltage.<sup>13</sup>

Table 1<sup>14</sup> illustrates the metrics and Illustration 1 is an example of the SEMI-F47 Curve showing sample voltage sags and duration.<sup>15</sup>

**Table 1**

<b>VOLTAGE SAG DURATION</b>				<b>VOLTAGE SAG</b>
Second (s)	Milliseconds (ms)	Cycles at 60 hz	Cycles at 50 hz	Percent (%) of Equipment Nominal Voltage
<0.05 s	<50 ms	<3 cycles	<2.5 cycles	Not specified
0.05 to 0.2 s	50 to 200 ms	3 to 12 cycles	2.5 to 10 cycles	50%
0.2 to 0.5 s	200 to 500 ms	12 to 30 cycles	10 to 25 cycles	70%
0.5 to 1.0 s	500 to 1000 ms	30 to 60 cycles	25 to 50 cycles	80%
>1.0 s	>1000 ms	>60 cycles	>50 cycles	Not specified

**Illustration 1**  
**(SEMI-F47 Curve Example)**



<sup>12</sup> See Rocky Mountain Power's Power Quality Report for 2022, Docket No. 23-035-05, 2022 Utah Power Quality Report filed Feb. 14, 2023, Glossary, at 2, <https://pscdocs.utah.gov/electric/23docs/2303505/3269992022UtPwrQltyRprt2-14-2023.pdf>.

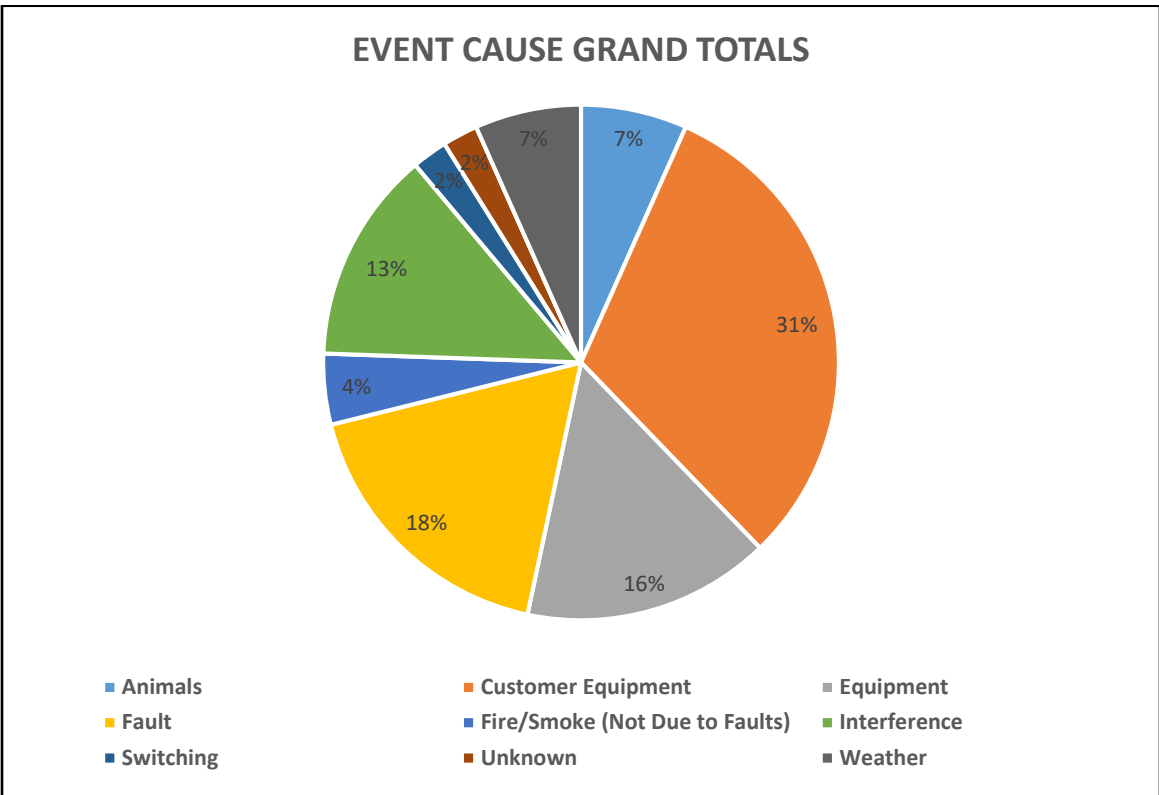
<sup>13</sup> *Supra* note 10.

<sup>14</sup> *Id.*

<sup>15</sup> *Supra* note 12, at 2.

The Division concludes that RMP’s Report adheres to the Commission’s approved template. The Division notes that the SEMI-F47 curve on page 6 of the Report may be mis-labeled as 2023 instead of 2022 and assumes the supporting data is for year 2022. RMP reports 49 “Meter Events Grand Total” which is defined as fault conditions that can trigger a voltage event at more than one meter location. RMP also reports 37 voltage sag events under “Event Caused Grand Total,” which consolidates meter events that report the same sag event.<sup>16</sup> Illustration II shows each event cause as a percentages of the total.

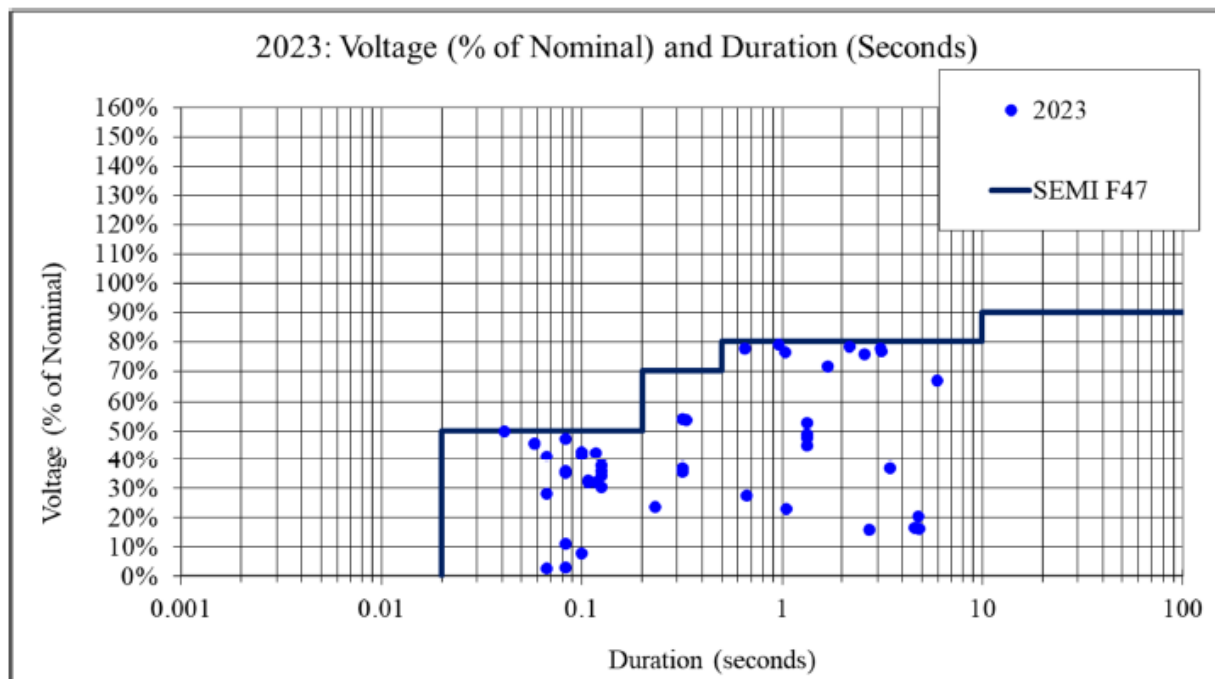
**Illustration II**



<sup>16</sup> *Id.* at 7, Voltage Sag Event Site Index, Table 2. Note that the Grand Total from the Index sums to 45.

RMP does not report voltage spikes that would appear above the SEMI-F47 line. Illustration III, RMP SEMI-F47 2022 Curve, shows RMP's voltage sag events for 2022.<sup>17</sup>

**Illustration III**  
**RMP SEMI-F47 2022 Curve**



The Division has concerns with the number of events occurring below the SEMI-F47 line, especially events lasting between 1 and 10 seconds. RMP reports the main event causes are: 14 Customer Equipment, 7 Utility Equipment, 8 Fault, and 6 Interference.<sup>18</sup> The Division understands that voltage sags are inevitable given the many factors that are generally out of RMP's control, however, customer and utility equipment failures constitute the leading cause of power quality issues. The Division's comments in Docket No. 22-035-14 note that the largest contributor to RMP's SAIDI and SAIFI numbers are equipment

<sup>17</sup> *Id.* at 6.  
<sup>18</sup> *Id.* at 11.

related.<sup>19</sup> However, this is RMP's first power quality report, and the Division has no baseline on which to evaluate its initial concerns based on the current power quality metrics. The Division intends to monitor RMP's SEMI-F47 curves and the event causes in future years to develop a baseline before offering any recommendations.

## **Conclusion**

The Division reviewed RMP's Power Quality Report for 2022 and determined that it reflects the Commission's approved template. Therefore, the Division recommends the Commission acknowledge RMP's Report.

cc: Jana Saba, RMP  
Michele Beck, OCS  
Service List

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<sup>19</sup> See *Rocky Mountain Power's Service Quality Review Report*, Docket No. 22-035-14, Comments from the Division of Public Utilities filed December 1, 2022, at 2, <https://pscdocs.utah.gov/electric/22docs/2203514/326288DPUCmnts12-1-2022.pdf>.