Utah Service Reliability Performance Baselines

Pursuant to Utah Public Service Commission Rule R746-313

January 4, 2013

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Executive Summary

Utah Public Service Commission Rule R746-313-4(2), requires that an electric company whose governing authority is the commission must file for commission approval of reliability performance baselines for SAIDI (System Average Interruption Duration Index) and SAIFI (System Average Interruption Frequency Index) reliability indices. Further, the filing must include:

(a) the basis for the proposed SAIDI and SAIFI values; and

(b) identification of systems and description of internal processes to collect, monitor and analyze interruption data and events including:

(i) definitions of all parameters used to calculate the proposed standards and major event days, and the time-period upon which the proposed standards are based (e.g. 12-month rolling average, 365-day rolling average, annual average);

(ii) identification of all proposed deviations from IEEE 1366 used in the calculation of reliability indices and determination of major event days; and

(iii) a description of all data estimation methods used for the collection and calculation of SAIDI, SAIFI, CAIDI, and MAIFI.

1.0 SAIDI and SAIFI Performance Baselines

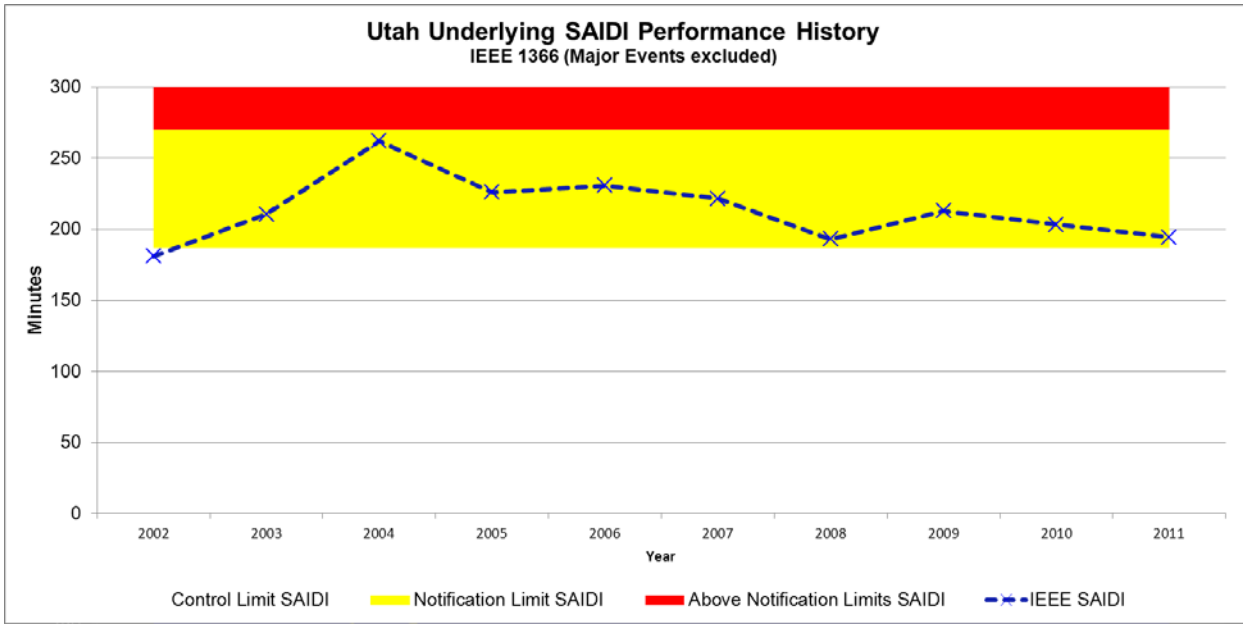
PacifiCorp, dba Rocky Mountain Power, continues to monitor and evaluate system reliability in Utah. In the future, performance baselines may require modification to recognize changes in the system. The Company proposes a control limit of underlying SAIDI of 187 minutes and SAIFI of 1.8 events with a notification limit of 270 minutes for SAIDI and 2.5 events for SAIFI.

The performance baselines were based on underlying distribution interruptions which are exclusive of major events as identified in IEEE 1366-2003/2012. These interruptions moderately align to the normal day to day performance of the system and provide a consistent view for evaluation of trends across time. Further, underlying metrics excludes prearranged and customer requested interruptions, which do not correlate to inconvenience to customers.

The rules specifically require the development of a lower and higher threshold of performance. At the control limit level, the Company and Commission are expected to be closely monitoring performance using the Service Quality Reports and under the direction of the Service Quality Review Group. If however, the notification level was reached, the rules require that within 60 days the Commission is apprised of that level being exceeded.

Another important aspect to developing baselines is determining the historically normal ratio of outage causes that result in month to month performance history. Therefore the Company has

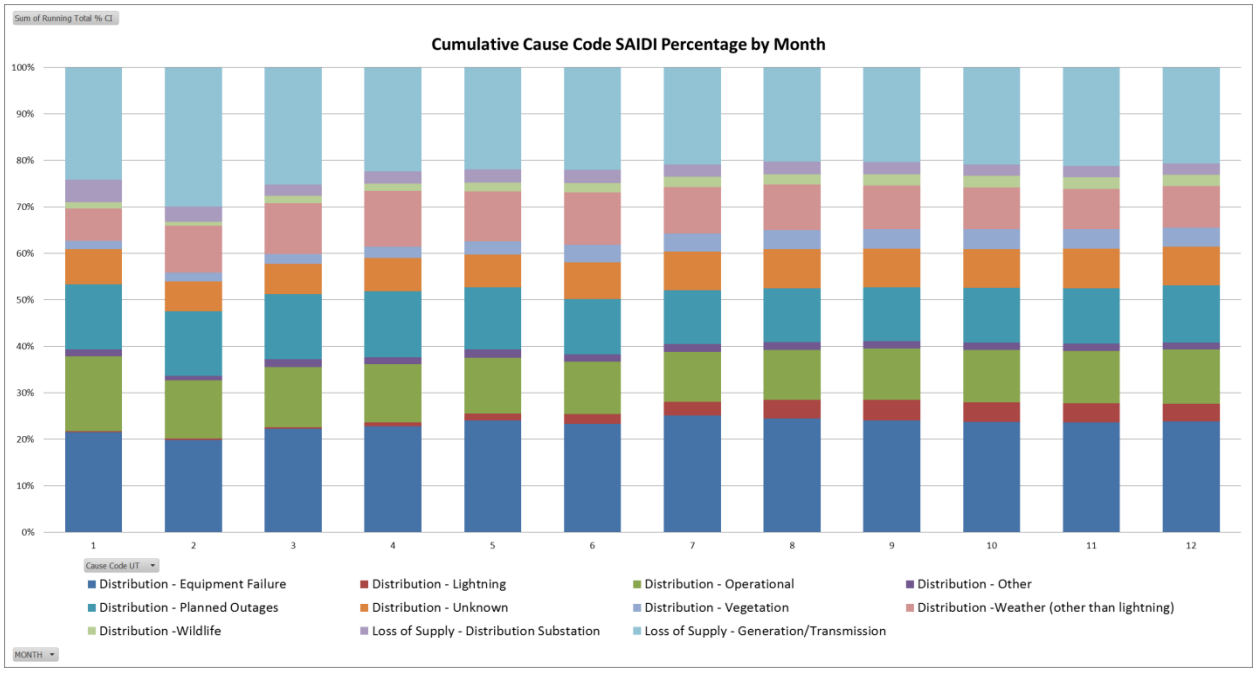
prepared its cause code weighted history against which any underlying performance variances would be compared shown in Table 1 and 2.

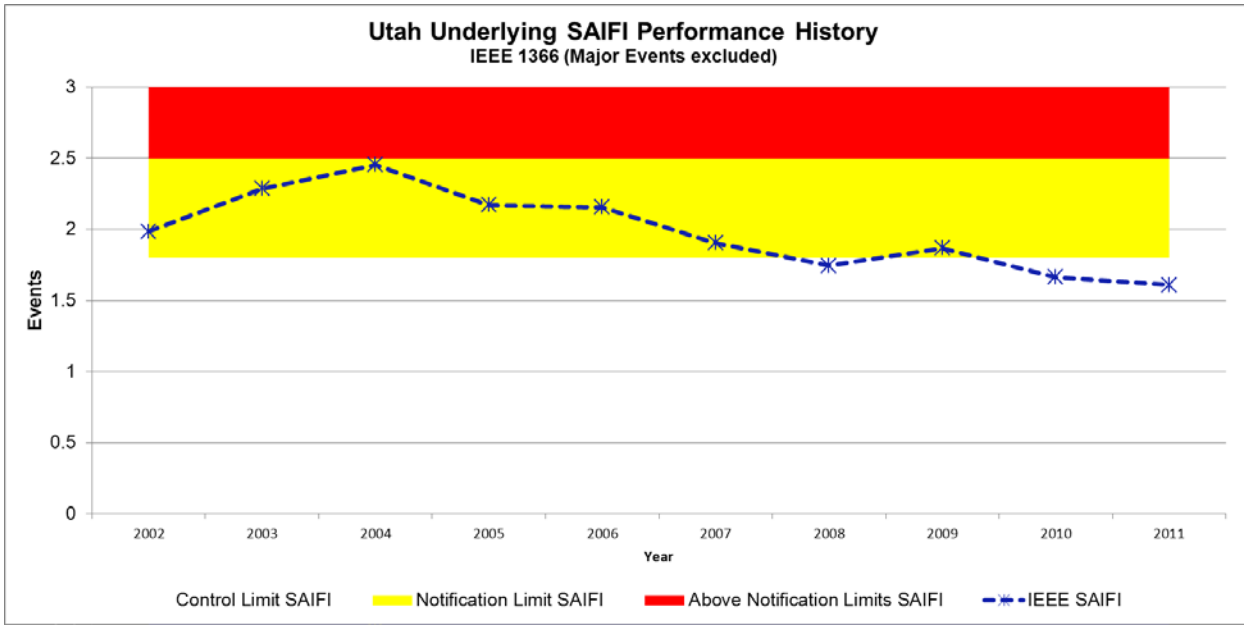


Since 2005, the Company has applied IEEE 1366-2003 major event definitions, however, prior to that it applied the previous definition form IEEE 1366-1998, which results in historical performance different than that which has been reported in prior Service Quality Reports. Above the Company provides historic SAIDI performance consistently applying the current definition for a major event. Using this history, the Company calculates as a control limit a 95% confidence level on the past four years of history and 2012 forecast results, resulting in 187 minutes. To establish a notification level for SAIDI it applied the highest SAIDI across the comparable history.

Table 1. SAIDI ratio by Cause Code

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Distribution - Equipment Failure	22%	20%	22%	23%	24%	23%	25%	24%	24%	24%	24%	24%
Distribution - Lightning	0%	0%	0%	1%	1%	2%	3%	4%	4%	4%	4%	4%
Distribution - Operational	16%	13%	13%	12%	12%	11%	11%	11%	11%	11%	11%	12%
Distribution - Other	2%	1%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Distribution - Planned Outages	14%	14%	14%	14%	13%	12%	12%	12%	12%	12%	12%	12%
Distribution - Unknown	8%	6%	7%	7%	7%	8%	8%	8%	8%	8%	8%	8%
Distribution - Vegetation	2%	2%	2%	2%	3%	4%	4%	4%	4%	4%	4%	4%
Distribution -Weather (other than lightning)	7%	10%	11%	12%	11%	11%	10%	10%	9%	9%	9%	9%
Distribution -Wildlife	1%	1%	2%	2%	2%	2%	2%	2%	2%	3%	3%	2%
Loss of Supply - Distribution Substation	5%	3%	2%	3%	3%	3%	3%	3%	3%	2%	2%	2%
Loss of Supply - Generation/Transmission	24%	30%	25%	22%	22%	22%	21%	20%	20%	21%	21%	21%

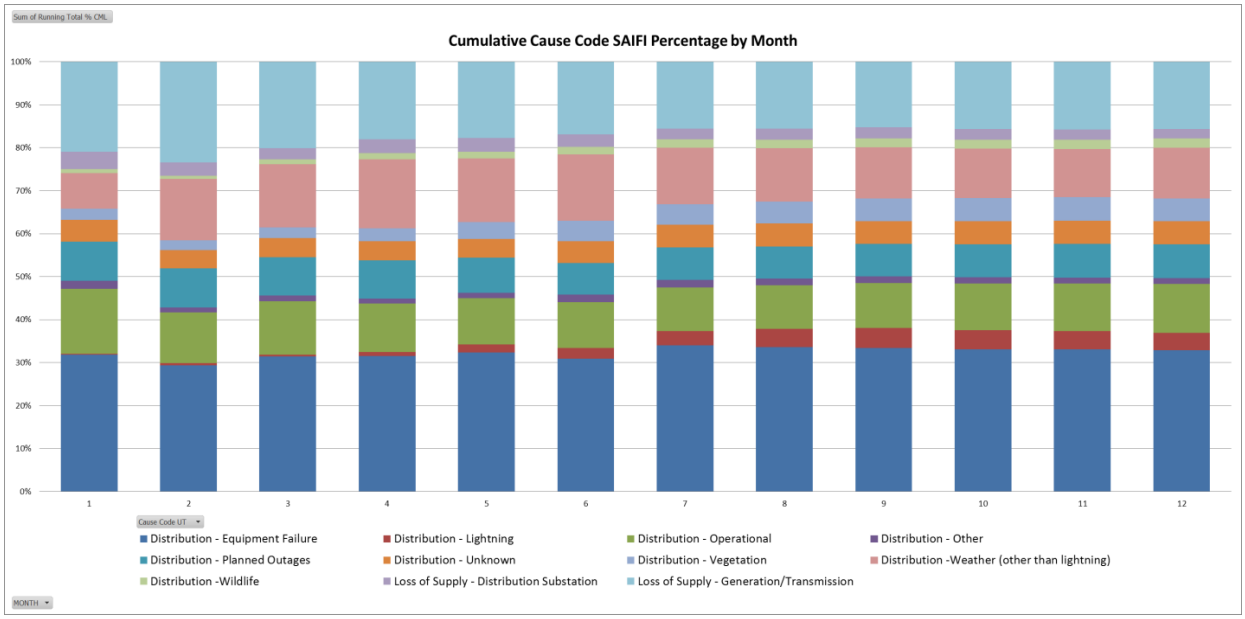




Similarly, using this history, the Company calculates as a control limit a 95% confidence level on the past four years of history and 2012 forecast results, resulting in 1.8 events. To establish a notification level for SAIFI it applied the highest SAIFI across the comparable history.

Table 2. SAIFI ratio by Cause Code

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Distribution - Equipment Failure	32%	29%	31%	32%	32%	31%	34%	34%	33%	33%	33%	33%
Distribution - Lightning	0%	0%	0%	1%	2%	2%	3%	4%	5%	4%	4%	4%
Distribution - Operational	15%	12%	12%	11%	11%	11%	10%	10%	10%	11%	11%	11%
Distribution - Other	2%	1%	1%	1%	1%	2%	2%	2%	2%	1%	1%	1%
Distribution - Planned Outages	9%	9%	9%	9%	8%	7%	8%	7%	8%	8%	8%	8%
Distribution - Unknown	5%	4%	4%	4%	4%	5%	5%	5%	5%	5%	5%	5%
Distribution - Vegetation	3%	2%	2%	3%	4%	5%	5%	5%	5%	5%	5%	5%
Distribution -Weather (other than lightning)	8%	14%	15%	16%	15%	15%	13%	12%	12%	11%	11%	12%
Distribution -Wildlife	1%	1%	1%	1%	2%	2%	2%	2%	2%	2%	2%	2%
Loss of Supply - Distribution Substation	4%	3%	3%	3%	3%	3%	3%	3%	3%	2%	2%	2%
Loss of Supply - Generation/Transmission	21%	23%	20%	18%	18%	17%	16%	16%	15%	16%	16%	16%



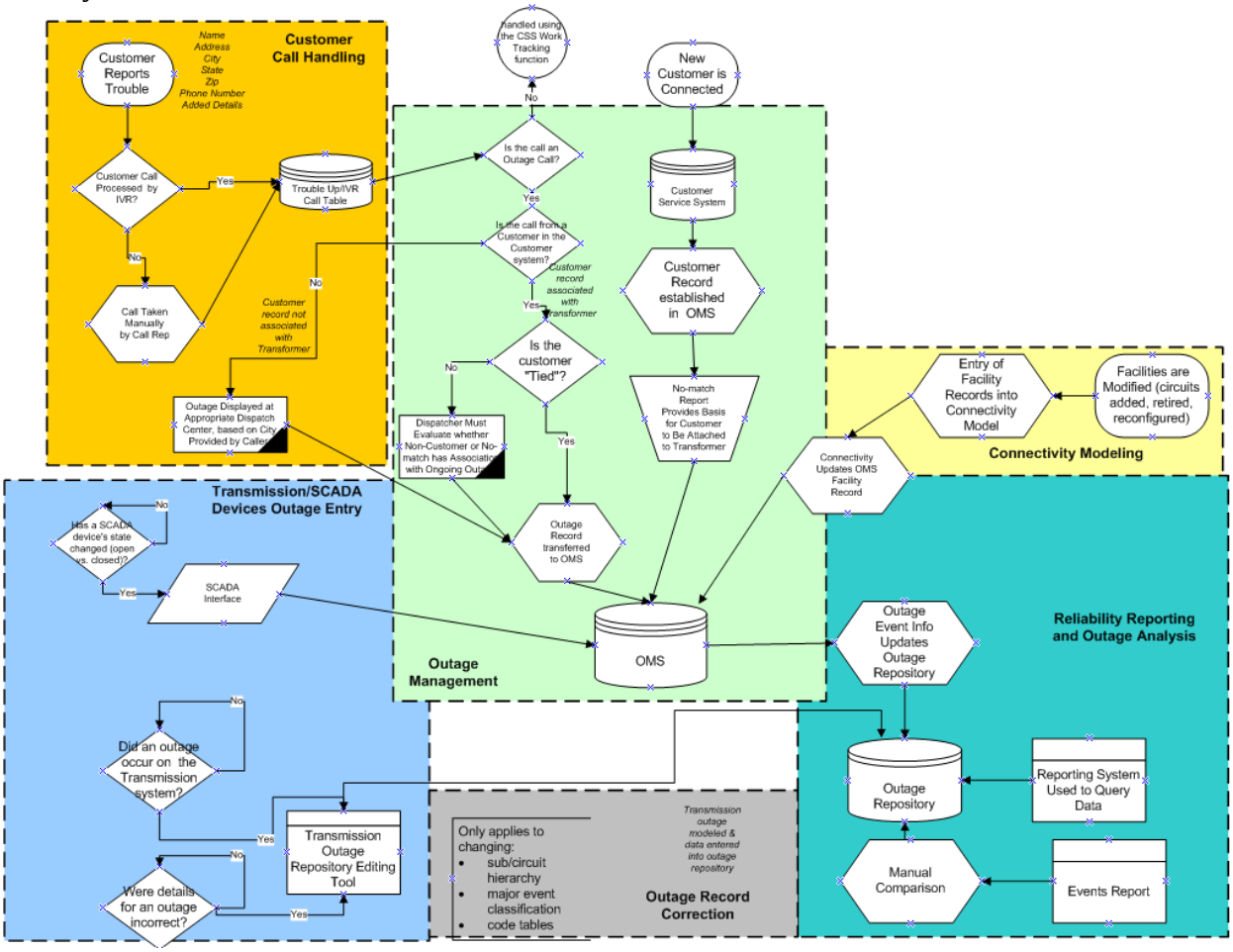
The intent of the plan is to evaluate and communicate reliability results delivered. The Company, however, cautions that while general trends may be detectable, underlying causes for these trends are not always obvious. For instance, substantial variation in weather may lead to significantly differing results. While the Company believes such attention to system and subsystem reliability is critical to effective operations, comparisons should recognize influences that may impact such comparisons. For example, as reporting systems evolve they can influence system metrics, but actual customer experience may remain the same as or be similar to prior periods. Further, comparisons among companies reporting similar metrics may not yield accurate or useful conclusions due to differences in data collection methods, customer demographics, system age or physical environments.

2.0 Data Collection

2.1 Monitoring, Recording and Reporting Reliability

How PacifiCorp Monitors Reliability

PacifiCorp operates automated outage management and reporting systems; a diagram of the data flow process is shown below. Customer trouble calls and SCADA events are interfaced with the Company's real-time network connectivity model, its CADOPS system (Computer Aided Distribution Operations System). By overlaying these events onto the network model, the program infers outages at the appropriate devices (such as a transformer, fuse or other interrupting device) for all customers down line of the interrupting device. The outage is then routed to appropriate field operations staff for restoration and the outage event is recorded in the Company's Prosper/US outage repository. In addition to this real-time model of the system's electrical flow, the Company relies heavily upon the SCADA system it has in place. This includes the Dispatch Log System (an Access database application) which serves to collect all events on SCADA-operable circuits. That data is then analyzed for momentary interruptions to establish state-level and circuit-level momentary interruption indices consistent with industry and statutory definitions.



2.2 Reliability Definitions

This section will define the various terms[1] used when referring to interruption types, performance metrics and the internal measures developed to meet the performance plans. These definitions are not materially different than as defined in IEEE-2003/2012. In addition, the Company is not proposing any deviations for the calculation of reliability indices from IEEE 1366-2003/2012.

Interruption Types

Sustained Outage
A sustained outage is defined as an outage of greater than 5 minutes in duration.

Momentary Outage Event
A momentary outage is defined as an outage equal to or less than 5 minutes in duration. Rocky Mountain Power has historically captured this data using substation breaker fault counts, but where SCADA (Supervisory Control and Data Acquisition Systems) exist, uses this data to calculate consistent with IEEE 1366-2012.

Reliability Indices

SAIDI = Σ sustained customer minutes interrupted/Σ system customers served
SAIDI (system average interruption duration index) is an industry-defined term to define the average duration summed for all sustained outages a customer experiences in a given period. It is calculated by summing all customer minutes lost for sustained outages (those exceeding 5 minutes) and dividing by all customers served within the study area. When not explicitly stated otherwise, this value can be assumed to be for a one-year period.

Daily SAIDI = Σ sustained customer minutes interrupted (for the day)/Σ system customers served
In order to evaluate trends during a year and to establish Major Event Thresholds, a daily SAIDI value is often used as a measure. This concept was introduced in IEEE Standard 1366-2012. This is the day's total customer minutes out of service divided by the static customer count for the year. It is the total average outage duration customers experienced for that given day. When these daily values are accumulated through the year, it yields the year's SAIDI results.

SAIFI = Σ sustained customers interrupted / Σ system customers served
SAIFI (system average interruption frequency index) is an industry-defined term that attempts to identify the frequency of all sustained outages that the average customer experiences during a given time-frame. It is calculated by summing all customer interruptions for sustained outages (those exceeding 5 minutes in duration) and dividing by all customers served within the study area.

[1]IEEE 1366-2012 was adopted by the Institute of Electrical and Electronics Engineers (IEEE) Commissioners on May 31, 2012, which provides the basis for the definitions of the terms used in this document.

CAIDI = sustained average interruption duration index / sustained average interruption frequency index

CAIDI (customer average interruption duration index) is an industry-defined term that is the result of dividing the duration of the average customer's sustained outages by the frequency of outages for that average customer. While the Company did not originally specify this metric under the umbrella of the Performance Standards Program within the context of the Service Standards Commitments, it has since been determined to be valuable for reporting purposes. It is derived by dividing PS1 (SAIDI) by PS2 (SAIFI).

$MAIFI_E$

$MAIFI_E$ (momentary average interruption event frequency index) is an industry-defined term that attempts to identify the frequency of all momentary interruption events that the average customer experiences during a given time-frame. It is calculated by counting all momentary interruptions which occur within a 5 minute time period, as long as the interruption event did not result in a device experiencing a sustained interruptions. This sequence of events typically occurs when the system is trying to re-establish energy flow after a faulted condition, and is associated with circuit breakers or other automatic reclosing devices.

Lockout

Lockout is the state of device when it attempts to re-establish energy flow after a faulted condition but is unable to do so; it systematically opens to de-energize the facilities downstream of the device then recloses until a lockout operation occurs. The device then requires manual intervention to re-energize downstream facilities. This is generally associated with substation circuit breakers and is one of the variables used in the company's calculation of blended metrics.

CEMI = for each customer/Σ interruptions during period

CEMI is an acronym for Customers Experiencing Multiple (Momentary Event and Sustained) Interruptions. This index depicts repetition of outages across the period being reported and can be an indicator of recent portions of the system that have experienced reliability challenges.

CPI99

CPI99 is an acronym for Circuit Performance Indicator, which uses key reliability metrics of the circuit to identify underperforming circuits. It excludes Major Event and Loss of Supply or Transmission outages. The variables and equation for calculating CPI are:

CPI = Index * ((SAIDI * WF * NF) + (SAIFI * WF * NF) + (MAIFIE * WF * NF) + (Lockouts * WF * NF))

Index: 10.645

SAIDI: Weighting Factor 0.30, Normalizing Factor 0.029

SAIFI: Weighting Factor 0.30, Normalizing Factor 2.439

$MAIFI_E$: Weighting Factor 0.20, Normalizing Factor 0.70

Lockouts: Weighting Factor 0.20, Normalizing Factor 2.00

Therefore, **10.645 * ((3-year SAIDI * 0.30 * 0.029) + (3-year SAIFI * 0.30 * 2.439) + (3-year $MAIFI_E$ * 0.20 * 0.70) + (3-year breaker lockouts * 0.20 * 2.00)) = CPI Score**

CPI05

CPI05 is an acronym for Circuit Performance Indicator, which uses key reliability metrics of the circuit to identify underperforming circuits. Unlike CPI99, it includes Major Event and Loss of Supply or Transmission outages. The calculation of CPI05 uses the same weighting and normalizing factors as CPI99.

Performance Types

Rocky Mountain Power recognizes two categories of performance: underlying performance and major events. Major events represent the atypical, with extraordinary numbers and durations for outages beyond the usual. Ordinary outages are incorporated within underlying performance. These types of events are further defined below.

Major Events

A Major Event is defined as a 24-hour period where SAIDI exceeds a statistically derived threshold value (Reliability Standard IEEE 1366-2012) based on the 2.5 beta methodology.

Underlying Events

Within the industry, there has been a great need to develop methodologies to evaluate year-on-year performance. This has led to the development of methods for segregating outlier days, via the approaches described above. Those days which fall below the statistically derived threshold represent "underlying" performance, and are valid (with some minor considerations for changes in reporting practices) for establishing and evaluating meaningful performance trends over time. Underlying events includes all sustained interruptions, whether of a controllable or non-controllable cause, exclusive of major events, prearranged and customer requested interruptions.

Controllable Events

In 2008, the company identified the benefit of separating its tracking of outage causes into those that can be classified as "controllable" (and thereby reduced through preventive work) from those that are "non-controllable" (and thus cannot be mitigated through engineering programs). For example, outages caused by deteriorated equipment or animal interference are classified as controllable distribution since the company can take preventive measures with a high probability to avoid future recurrences; while vehicle interference or weather events are largely out of the company's control and generally not avoidable through engineering programs. (It should be noted that Controllable Events is a subset of Underlying Events. The Cause Code Analysis section of this report contains two tables for Controllable Distribution and Non-controllable Distribution, which list the company's performance by direct cause under each classification.) At the time that the Company established the determination of controllable and non-controllable distribution it undertook significant root cause analysis of each cause type and its proper categorization (either controllable or non-controllable). Thus, when outages are completed and evaluated, and if the outage cause designation is improperly identified as non-controllable, then it would result in correction to the outage's cause to

preserve the association between controllable and non-controllable based on the outage cause code.

2.3 Performance Types & Commitments

PacifiCorp recognizes two categories of performance: underlying performance and major events. Major events represent the atypical, with extraordinary numbers and durations for outages beyond the usual. Ordinary outages are incorporated within underlying performance. These types of events are further defined below.

SAIDI-Based Major Event

A SAIDI-Based Major Event is defined as a 24-hour period where SAIDI exceeds the annually statistically-derived threshold value, as detailed in IEEE Distribution Reliability Standard P1366-2012.

Underlying Events

Within the industry, there has been a great need to develop methodologies to evaluate year-on-year performance. This has led to the development of methods for segregating outlier days, via the approaches described above. Those days which fall below the statistically-derived threshold represent "underlying" performance, and are valid (with some minor considerations for changes in reporting practices) for establishing and evaluating meaningful performance trends over time. These events will measured against the SAIDI and SAIFI performance baselines on a 12-month rolling period.