Service Quality Standards for High-Technology Customers

Written by the
Industrial Customer Task Force*

February 1, 2007

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Service Quality Standards for High-Technology Customers

Scope

This document summarizes the issues identified through the Service Quality Standards for High-Technology Customers Taskforce and Rocky Mountain Power's response to those issues. Requests for differentiated service to such customers are addressed point-by-point. RMP's processes to evaluate reliability and ensure quality electrical service are examined.

Terms

The following terms in alphabetical order are used in this document with meanings as indicated.

CI. Continuous Improvement
DPU. Division of Public Utilities—Utah
EMC. Electromagnetic Compatibility. This is defined in the *EMC* section.
MEHC. MidAmerican Energy Holdings Company
PQ. Power Quality
RMP. Rocky Mountain Power
TQM. Total Quality Management. This is defined in the H*igher Level Procedures* section.

Introduction

As part of the transaction for MEHC to purchase PacifiCorp, a commitment was made to review the service quality standards for high-tech companies, with participation from the DPU, industrial customer groups, and industrial customers. This commitment reads as follows:

"Within 90 days of the close of the Transaction, MEHC and PacifiCorp will begin working with the Division of Public Utilities and other interested parties, to evaluate and, if mutually agreed to be appropriate, file with the Commission service quality standards related to industrial customers, with a focus on high tech companies. MEHC, PacifiCorp, the Division of Public Utilities and any other interested party, will report back to the Commission on the conclusions and recommendations reached no later than February 1, 2007. MEHC and PacifiCorp acknowledge that modifications to existing customer service guarantees and performance standards may result from this process and nothing in Commitments 1 or 45 will preclude these from being filed if mutually agreed-upon by the Parties."

To proceed in fulfilling this commitment, a meeting was held with the DPU and other parties on May 5, 2006, to review existing service quality standards and RMP's approach to resolving service quality concerns of high-tech companies. Another meeting was held with the DPU, industrial customer group representatives and five interested high-tech customers on June 8, 2006, to discuss needs and concerns for service quality standards. At this meeting four of the five customers indicated that service quality and reliability had improved significantly over the last few years and their primary interest was to ensure that the improved level of service continues. Some customers felt there was still more to be done.

Customers' Recommendations

After these meetings customers provided the following recommendations:

- Conduct an annual review of performance with each of the high-tech customers and *tie compensation* of employees involved in operating the system *to reliability performance*.
- Establish an *incident review* board comprised of high-tech customers and utility officials to review significant customer and utility events and jointly discuss methods of improving reliability.
- Establish *higher level* operational and maintenance *procedures* for facilities which provide service to high-tech customers.
- Conduct national/international *benchmarking* with other utilities to determine best-in-class procedures for providing service to high tech customers.
- RMP should offer a *program* to its high-tech customers that *provides incentives* to implement *solutions to power quality problems* in their plants.

These recommendations were carefully reviewed by RMP and further discussed in a meeting held on November 8, 2006. Some of the discussion from this last meeting provided much of the material covered in the following sections. The RMP/DPU response to these recommendations is provided at the conclusion of each separate section below.

Employee Incentives for Improving Performance

An annual performance review is held at RMP with each non-represented employee. Compensation for these employees is comprised of several items, including power system reliability performance, on at least two levels. At the company level, RMP's performance measured against reliability goals affects the level of annual incentive compensation available to employees. At a lower level (work group and individual), if an employee's role directly impacts power system reliability, this will be reflected in his or her goals. And performance against goals directly impacts employee compensation.

Represented (union) employees, whose compensation is tied to collective bargaining agreements, do not have compensation tied to reliability performance.

RMP~~/DPU~~ Conclusion: RMP presently has adequate incentives in place in its non-represented employee compensation system to target employee attention to maintain or improve power system reliability. Reliability-based incentives for represented employees could be discussed in the future, if needed.

Incident Review

Major incidents affecting industrial customer reliability are investigated until the root cause is found and an appropriate correction is recommended. The resources dedicated to such investigation are determined on a case-by-case basis, depending on the scale and complexity of the incident.

By design, the electrical system interrupts the flow of electricity when a fault (short circuit or similar event) occurs on the system. Thus, interruptions are a normal part of RMP system performance. RMP often considers whether the event could have been avoided, if it was limited to as small an audience as possible, and whether supply was restored quickly enough. Thus many incidents, while unfortunate, are normal for the particular class of system involved. An example of this is a lightning strike that causes no interruption, but results in a voltage sag that may impact highly sensitive downstream customer equipment. Even for this kind of incident the event is given a review to see if utility equipment operated as designed. If it didn't or there is a question regarding proper operation, a more thorough review is made. Power quality events that have a significant customer impact are given equal treatment to more traditional reliability incidents (such as sustained or momentary interruptions) having equivalent impact. A recent report from such an investigation is attached as Appendix 1.

Disclosure of findings from such an investigation—both good and bad—is promptly made to the affected industrial customer. Customer involvement in these investigations is welcomed and encouraged when such involvement speeds the process, clarifies the impact of the event and does not hinder the outcome. Experience, however, has shown that substantial customer involvement in the utility side of the investigation tends to slow down the process. It is therefore usually best to leave the investigating to those with a detailed understanding of the equipment and system operating guidelines while keeping customers periodically informed of their progress.

Finally, large-scale major events as defined by the IEEE 1366 standard, are always reviewed and never "excluded." Reports from such reviews are filed with regulators and are a matter of public record for all utility customers.

RMP~~/DPU~~ Conclusion: Events having adverse reliability impacts on RMP's industrial customers are adequately and efficiently reviewed with present processes, depending on scale and complexity. RMP may invite customer participation in the incident review when the event results in a customer impact of significant dollar value.

Higher Level Procedures

Rocky Mountain Power has established operational and maintenance procedures based on a variety of factors, such as voltage class, number of operations, or age of equipment. These established procedures are used to develop operational and maintenance programs to maintain facilities according to specific criteria so that all facilities are kept in proper working condition. RMP does not support higher level operational and maintenance programs for facilities which provide service to specific customers unless a specific agreement which includes appropriate funding allocations has been entered into. However, RMP continues to improve system-wide reliability for all of its customers as described below.

The incident review processes described in the prior section are part of a more fundamental philosophy called *continuous improvement (CI).* A more global name, leading to world class quality and service, is *total quality management (TQM)*. This is a mindset that causes one to always strive for a better way, even after one has become "best in class".

At the company level TQM principles are implemented by establishing four elements:

- Institutionalize continuous improvement (CI)
- Focus on process change by identifying improvement areas
- Establish teams or task forces to improve work processes
- Empower the teams to change and use the new work processes

Prior to MEHC's leadership PacifiCorp made substantial process improvements in some areas using TQM principles. Under MEHC's leadership CI is an even more important core philosophy to be used for all of RMP's customers. It is reflected in MEHC's fundamental business process statement of

Plan > Execute > Measure > Correct.

As the company continues to refine its implementation of this business process, the first element of TQM is in place: broadening the institutionalization of CI. A very recent example serves to informally illustrate the other three elements.

Prior to 2006, PacifiCorp had targeted to improve its system level reliability performance by an average 2% improvement per year. In 2006 it received customer satisfaction scores that suggested in spite of improving system-level performance customers believed greater reliability should be delivered. Thus, mid-2006 RMP identified a need to modify its approach to improving reliability by also reducing the number of customers experiencing high numbers of multiple interruptions. A task force was formed to improve RMP's work processes in this area. A recent internally-developed graphical tool and newer metrics were brought to bear on this problem. By December of 2006 new major work processes were approved and coordinated across RMP and have been launched in 2007. These new work processes are now underway, efficiently putting TQM principles into action at RMP.

RMP has implemented other programs to improve its reliability and power quality. (green sheets, 21st century, etc.) However, a more complete discussion of the wide variety of initiatives undertaken in past years is beyond the scope of this document. The above example demonstrates the recent sharpening of focus of a long-standing and ongoing continuous improvement process to deliver better service to customers.

RMP~~/DPU~~ Conclusion: Reaching a higher level of performance in operation and maintenance for high-tech customers is best done through a general continuous improvement process across the company. Instilling this in RMP's corporate culture is better for all customers in the long run.

Benchmarking

TQM takes continuous improvement a step further with an awareness of what it means to be world class through benchmarking. Benchmarking for reliability and quality is done a number of ways at RMP as illustrated in Table 1.

Area	Benchmark
Sustained Interruptions	IEEE Annual Reliability Survey
Sustained Outage Durations	IEEE Annual Reliability Survey
Sustained Outage Response	IEEE Annual Reliability Survey
Annual & Monthly Historical Reliability Indices	Internal Company Reports
Industrial Customer Satisfaction	TQS Annual Census
Small Customer Satisfaction	J.D. Power Annual Survey
PQ Conditions	IEEE benchmarking doc being written

Table 1: Benchmarking at Rocky Mountain Power

RMP compares itself with other North American utilities by participating in the annual IEEE reliability survey. This surveys objective reliability statistics volunteered by participating utilities. Because this survey is a mix of all kinds of utilities (urban-rural, large-small, east-west, etc.) and one does not know exactly which other utilities are showing particular data, nor the method of data collection being performed, the benchmarking must be considered rudimentary. In spite of these issues it is the best objective-data benchmark we presently have in the country and can be used to prepare fundamental conclusions. RMP is heavily involved in reliability benchmarking and work practice efforts undertaken by the IEEE Distribution Reliability Working Group.

Large and small customers are surveyed by the TQS and J.D. Power surveys, respectively. These are opinion surveys, and therefore subjective. However, they do point out important customer perceptions about utility service, and are therefore very important as two more benchmark data points.

When we consider the quality of service as seen by the number and severity of power quality events, we find that there is no credible benchmark that is generally accessible. However, the IEEE is revising its 1250 Guide to include benchmarking data for quantities such as voltage sags, voltage fluctuations, and waveform distortions. RMP is providing leadership in this effort and contributing on a regular basis. Rather than an annual survey, the new 1250 Guide will include typical levels of these quantities for various power system configurations. These levels will be reviewed and updated every five years. This will provide benchmarking ranges against which both utilities and customers can compare for assessing service quality for PQ conditions.

RMP~~/DPU~~ Conclusion: RMP is heavily involved in reliability and quality benchmarking and best practice development, including development of service standards that apply to all customers, including high-tech customers. RMP pays a great deal of attention to these benchmarks and acts on their results as appropriate. RMP will include international benchmarking when such information becomes available with sufficient clarity to provide meaningful opportunities for comparison and improvement.

Alternative Configurations

In general, RMP reliability and power quality benchmarking activities are not conducted for systems based on customer types. However, RMP did discuss service requirements and operational procedures with a high-tech company that operates internationally to get a perspective on the international expectations. The basic finding was that reliability is heavily dependent upon the initial facilities constructed to provide service (which are largely at the discretion of the customer).

A related finding was that a high-tech business park concept has been employed in some areas. This is an economic development approach providing incentive to high-tech companies to locate in a "greenfield" project area, and serves to co-locate customers with like reliability concerns together. Higher-level redundancy is built into the electrical system. Rather than leveraging embedded facilities (typically chosen by customers to reduce transmission and delivery costs embedded in energy rates) the customers within these sites shield themselves from upsetting events that occur on much of the "grid" and build substantial redundancy within the project area. The increased capital costs to build such a system are built into a specific higher-cost rate for customers siting their plant in the park.

RMP has both kinds of high-tech customer facilities in its service territory—a higher-reliability greenfield design, funded by specific customers benefited by that reliability level, as well as more traditional designs that integrate and leverage facilities to deliver least-cost delivery and are comprised of a variety of customer types. The latter is more common because of customer funding constraints.

For new high-tech customer service requests, plans will be developed with the customer to outline potential service installations that may improve the customer's reliability, such as redundant facilities, dual feeds, higher voltage delivery, and additional protective equipment. When the customer chooses service installations beyond those required to provide basic service, existing line extension policies will be utilized to provide additional facilities or redundancy needed to decrease the probability of, but not insure against, reliability problems. These policies include paying in advance of construction for any costs over and above that required to provide basic service. Facilities charges will also be applied to these facilities to cover ongoing operation and maintenance charges incurred to provide the additional facilities.

RMP~~/DPU~~ Conclusion: The level of power-system-related process reliability for each high-tech customer is highly dependent on the configuration of the power system serving that customer. If underlying service quality issues arise, a plan will be developed that is tailored to meet that specific customer's needs within the constraints of the configuration present. If this configuration is inadequate for a customer's needs RMP will work with the customer on customer-funded capital adjustments.

EMC

A fundamental concept in power quality circles is *electromagnetic compatibility* (EMC). This is the idea that the power supplied by the utility must be electrically compatible with the customer's equipment using that power. If the supplied power is compatible with the load then the quality of the power is adequate for that load and EMC is achieved. When the two are incompatible then one looks to the technical standards, and perhaps contractual agreements, to judge where the remediation ought to take place. In most cases the least-cost remedy is selected to achieve EMC.

The EMC concept is important when discussing service quality standards because some equipment is just too sensitive to normal utility disturbances. For these cases, cost effectively achieving EMC can require changes on the plant equipment side. A good example of this is the recommendation that semiconductor equipment conform to the SEMI F47 standard for voltage sag immunity. This standard establishes limits of both magnitude and duration of a voltage sag. In most cases, if this voltage sag tolerance standard were to be rigorously followed by semiconductor processing equipment manufacturers there would be far fewer events that would shut down semiconductor manufacturing processes than at present. This same idea also applies to other industries with the parallel IEC 61000-4-34 voltage sag tolerance equipment testing standard. Additional information on the SEMI F47 standard can be found at "http://www.semi.org".

RMP~~/DPU~~ Conclusion: While RMP cannot promise that its electrical service quality will always conform to defined voltage sag tolerance limits, it can usually assure customers that excursions from the levels of performance defined by these standards will be rare. And if customer equipment tolerance conforms to such standards, customer process interruptions will also be rare.

Incentive Program for In-plant PQ Solutions

As indicated in the EMC section above, one way to help process equipment ride through disturbances is to "immunize" equipment to a standard level of disturbance immunity. This can be a painstaking endeavor in a plant with much integrated process equipment. To assist with this effort Singapore Power offered a financial incentive to its high-tech customers. This program was called Power Quality Solutions (PQS). A copy of some correspondence from this program is attached as Appendix 2. One thing that is not detailed in Appendix 2 is how such a program was funded.

RMP is not opposed to a program such as PQS if a public or private funding source can be obtained. However, it seems that responding to such a need on a case-by-case basis would be more cost effective with less overhead than administering a new program. Indeed, RMP has a history of working with its sensitive customers on customer-funded disturbance immunity initiatives.

RMP~~/DPU~~ Conclusion: Plant-side equipment immunity to disturbances is most cost-effectively achieved on a case-by-case basis with RMP offering guidance and assistance as required. RMP is willing to administer a broader-based disturbance immunity program only if additional appropriate funding can be obtained for such a program.

Problem Resolution

Even though RMP's reliability and service quality continue to improve with the programs that have been put in place, sometimes issues arise. For such issues RMP is committed to work with customers—specifically high-tech customers—on clearly identifying the problems and proposing cost-effective solutions. Some of the measures that RMP takes to do this are to:

- Provide power quality monitoring equipment at customer locations as required, to obtain information that will aid in identification and remediation of power quality/reliability events affecting high-tech customers.

- RMP account management will provide proactive communication with customers regarding abnormal power quality/reliability events. This will include open communication with customers regarding the cause of the event and steps being taken to remedy the problem, as well as communication on operations and maintenance work to be performed on key equipment servicing their facility.

- Follow established operational and maintenance procedures to ensure facilities serving these customers are properly maintained and functioning. If such procedures are found to be inadequate, RMP will change the procedures as prudence dictates.

Overall Conclusions

Maintaining high standards of electrical service quality for all customers is important to Rocky Mountain Power. RMP also recognizes that industrial customers have more at stake when partial or complete loss of power occurs and has dedicated staff to serve the needs of these customers. Beyond this, however, differentiated service levels for individual customers, without commensurate funding, is problematic.

RMP has taken reasonable steps to assure that the quality of service is high for its customers. Present efforts follow a continuous improvement philosophy within an informal TQM discipline, taking existing low rates and other constraints into account. This discipline includes such actions as
ensuring employees are motivated to deliver reliable service;
reviewing incidents appropriate for incident scale and complexity;
benchmarking internally, within utility peer groups, and against industry standards; and
working closely with customers to resolve problems and make prudent changes.

RMP welcomes helpful customer involvement and feedback about RMP's service levels and methods. In particular, RMP encourages root-cause analysis methods employed by most of its high-tech customers for reviewing power disturbances. Such methods of investigation complement RMP's processes and make it a better utility, enhancing RMP's efforts to continuously improve.

Appendices

1. **Incident Report—Fault on 46 kV Power System near the Boeing Facility**
2. **Singapore Power in-plant incentive program for PQ solutions**