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Annual Reliability and Power Quality Report – 1 July 2010 - 30 June 2011

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Executive Summary

This Annual Reliability and Power Quality Report allows the Government, the community and other stakeholders to see how Western Power's electricity network is performing with respect to obligations under Schedule 1 of the *Electricity Industry (Network Quality and Reliability of Supply) Code 2005* (the Code).

The reliability performance of the Western Power Network in 2010/11 compared to the previous year has improved.

There were a number of Western Power activities throughout the reporting period which delivered this reliability improvement to customers. These initiatives and activities included deployment of specific auto-reclosers and load break switching equipment; continuation of the State Underground Power Program targeted infrastructure rebuilds and augmentation; and routine and targeted maintenance programs.

The reliability improvement this year was also attributed by the reduction in the impact of interruptions caused by environmental factors such as inclement weather, flora and fauna. These influences, however, caused adverse affects on the reliability of supply within the rural areas, as such programs will continue to be implemented to address the reliability of supply in these areas.

The Power Quality compliance level of 8% Total Harmonic Distortion ("THD") was met for all sites 100% of the time.

The total number of customer interruptions lasting greater than 12 hours improved by 48%, subsequently there was a reduction in the number of customer claims for extended outages.

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1 Purpose

The purpose of the Annual Reliability and Power Quality Report (this report) is to present the performance of the Western Power Network in accordance with Schedule 1 of the *Electricity Industry (Network Quality and Reliability of Supply) Code 2005* (the Code), for the reporting period 1 July 2010 to 30 June 2011.

The Code, established by the Minister for Energy under the *Electricity Industry Act 2004* sets out quality standards to network operators in relation to voltage fluctuations, harmonics, planned or significant interruptions. Section 27 of the Code states that a transmitter and distributor must publish a report setting out the information described in Schedule 1 of the Code (Schedule 1).

Western Power's commitment is to work with the Office of Energy and the Economic Regulation Authority (Authority) to ensure that the data presented in this report interprets the Code requirements correctly.

Caution should be taken when comparing the figures stated in this report with other reliability performance reporting publications produced by Western Power. For example Western Power is required to report on industry standard definitions, subsequent performance and its network reliability to the Authority, different from the measures defined in the Code¹.

1.1 Definitions

Terminology used in this report is in accordance with definitions presented in Item 1 to Item 3 of Schedule 1.

For the purposes of this report, the discrete area *all other areas of the State* as stated in Items 2 (c) and 3 (c) of Schedule 1, will be referred to as Rural areas and will be specific to the Western Power Network.

In reference to Item 11 of Schedule 1:

- 'SAIDI' (System Average Interruption Duration Index) refers to item 11(d)
- 'SAIFI' (System Average Frequency Interruption Duration Index) refers to item 11(b)
- 'CAIDI' (Customer Average Interruption Duration Index) refers to item 11(a)
- 'ASAI' (Average Service Availability Index) refers to item 11(c)

¹ Specifically, section 12 of the Code

2 How to read this report

This report has been laid out in the various sections as below:

For contextual purposes:

Section 3 provides geographic details of the Western Power Network; and

Section 4 provides an overview of the actual performance of the Western Power Network and the influencing factors that impacted the performance.

For response to Code purposes:

Section 5 addresses Item 5 of Schedule 1; reporting on the number of customers that experienced power interruptions exceeding 12 hours at least once during the 12 months to 30 June 2011.

Section 6 addresses Items 6, 7 and 8 of Schedule 1; summarising the complaints which have been received, logged and subsequently actioned.

Section 7 addresses Item 9 of Schedule 1; which is the response to payment for failure to give required notice of planned interruption and payment for supply interruption exceeding 12 hours, (Section 18 and 19 respectively of the Code).

Section 8 addresses Items 11, 12 and 13 of Schedule 1; providing data which is inclusive of all protection device trips on the network greater than or equal to one minute that resulted in loss of power to customers.

Section 9 addresses Items 14 and 15 of Schedule 1; and articulates the customer percentiles of average length of interruption, total length of interruption and number of interruptions for the 12 months to 30 June 2011.

Section 10 addresses Item 4 of Schedule 1 which outlines the power quality performance of the Western Power Network in accordance with the Code.

3 Network Topology

Western Power operates and maintains the transmission and distribution electricity grid within the South West Interconnected System (SWIS) known as the Western Power Network.

The Western Power Network comprises of approximately 1,100 feeders and circuits incorporating 96,000 kilometres of conductor, 787,000 power poles and towers, 13,500 distribution substations, to provide electricity supply to approximately one million customers and 230,375 streetlights.

The Western Power Network covers a geographic area from Kalbarri down to Albany, and from Perth through to the Goldfields (Figure 1).



Figure 1: Map of Western Power's Network (grey)

4 Overview

The 2010/11 performance of the Western Power Network, compared to the previous year improved.

There were a number of activities during the year that delivered improvements in the reliability of supply to customers, namely:

- Increasing the operating / switching flexibility of the Western Power Network through deployment of 3-phase telemetered auto-reclosers and load break switches.
Auto-reclosers are a fault interrupting device used to restore supply; limit the impact the duration of an interruption; and attempt to reduce the area and number of customers affected. A load break switch installed within the network provides greater flexibility / interconnection between feeders to facilitate restoration and thus minimise the duration of an interruption;
- Installation of interconnections, replacing overhead powerlines with underground reticulation and the augmentation/upgrading of distribution feeders. These specific activities focusing on the infrastructure which contribute largely to the system SAIDI. This strategy will improve the reliability of supply within specific locations and sections of the network through the reduction of faults caused by equipment failure and wildlife (birds and animals) interacting with the network;
- The State Underground Power Program
This is a partnership, with a shared funding arrangement, between Western Power, the State Government and local Government Authorities. This program selects areas and implements the replacement of the overhead distribution network with underground reticulation. Underground power is more secure in severe weather conditions; reduces safety hazards caused by fallen powerlines; eliminates vegetation around overhead powerlines; and minimises car accidents involving network infrastructure (eg poles)
- Routine and targeted asset maintenance programs, which include the replacement of under performing assets, deteriorating assets and defective assets, such as poles, conductors and substations.

There was a reduction of interruptions caused by environmental factors predominantly outside of Western Power's control, such as inclement weather, flora and fauna. However these factors still had an adverse affect on the reliability of supply within the Rural areas:

- The most significant weather event occurred on the 29 January 2011 where a storm, consisting of lightning and strong winds, caused extensive damage to the network in the Wheatbelt and Midwest Regions. Approximately 71,000 customers were affected on the day, with winds gusting up to 126 kph.
- Another significant weather event occurred on the 28 February 2011 where an afternoon sea breeze in combination with hot, moist and volatile air produced severe thunderstorm activity and strong wind gusts in some parts of Perth. Approximately 59,000

customers were affected on the day, predominantly in the Northern suburbs, Perth Hills area and South East regions.

- Additionally, localised bushfires occurred during strong winds in the outer Perth Metropolitan area on the 6 February 2011, causing significant damage to some parts of Western Powers Network. Approximately 13,000 customers were affected for up to 3 days.

5 Interruptions exceeding 12 hours

This section is a response to Item 5 of Schedule 1 of the Code.

Code extract:

“The number of premises of small use customers the supply of electricity to which has been interrupted –

- a) For more than 12 hours continuously: or*
- b) More than the permitted number of times, as that expression is defined in section 12(1)”*

5.1 Response

Western Power Network connections (customers) = 999,372

- 54,414 customer premises experienced one interruption that exceeded 12 hours
- 9,794 customer premises that experienced more than one interruption that exceeded 12 hours

Figure 2 shows the total number of customer interruptions lasting greater than 12 hours by fault cause.

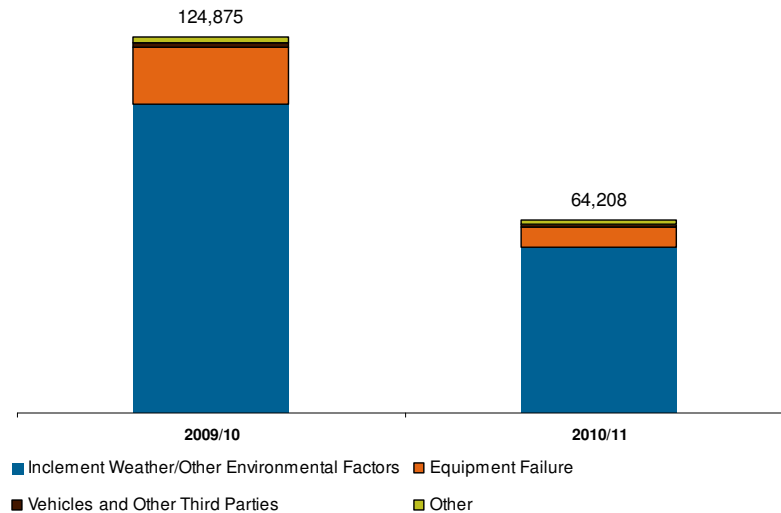


Figure 2: Customer Interruptions lasting greater than 12 hours by Fault Cause

- The interruptions for 2010/11 were predominately due to events beyond Western Power’s control such as storm and lightning activity on the 29 January 2011 and 28 February 2011 (see section 4)
- In comparison to last year fewer equipment failures occurred during hot weather conditions
- 1,118 incidents occurred where customers experienced interruptions that exceeded 12 hours. Refer to Appendix B for a complete list of customer interruptions.

Table 1: Customers that have been interrupted more than the number of times expressed in section 12(1) of the Code

| | 2009/10 | 2010/11 |
|---|---------|---------|
| Urban area (including Perth CBD) customers that have been interrupted more than 9 times | 12,616 | 6,813 |
| Rural area customers that have been interrupted more than 16 times | 1,513 | 435 |

Urban area customers experiencing more than 9 interruptions for the 12 months to 30 June 2011 were predominantly within the outer suburbs of the North East and South East parts of the Perth Metropolitan region. Rural area customers experiencing more than 16 interruptions for the 12 months to 30 June 2011 were predominantly within the Mid West and Wheatbelt regions.

Western Power constantly monitors areas where customers experience recurring interruptions and undertakes remedial action where required.

6 Customer Complaints

This section is a response to Items 6, 7 and 8 of Schedule 1.

Code extract:

“The total number of complaints received”

“The number of complaints received from customers in each of the discrete areas”

“The total amount spent by the transmitter or distributor in addressing complaints, other than by way of payment under sections 18 and 19”

6.1 Response

- The total number of complaints received were investigated as to whether a provision of Part 2 (or an instrument under 14(3)) has been met or complied with is shown in Table 2
- Table 2 also provides a breakdown in each of the discrete areas of the complaints received
- The total amount spent during the 12 months to 30 June 2011 addressing complaints (including materials and labour on the network for both CAPEX and OPEX) was \$6.86 million compared to \$7.80 million in the previous 12 months

Table 2: Complaints received in 2009/10 and 2010/11 - total and by discrete area as per Items 6 and 7 of Schedule 1.

| | # Complaints | |
|----------------------------------|--------------|--------------|
| | 2009/10 | 2010/11 |
| Perth CBD | 53 | 69 |
| Urban areas other than Perth CBD | 1,655 | 1,674 |
| Rural areas | 317 | 415 |
| Isolated systems | 43 | 36 |
| Total | 2,068 | 2,194 |

Following investigations of each customer complaint the findings were communicated to the customers. Where significant infrastructure investment was required to address the issue, works were planned, scoped and the applicable corrective action undertaken.

7 Payments to Customers

This section is a response to Item 9 of Schedule 1.

Code extract:

“The number and total amount of payments made by the transmitter or distributor under each of sections 18 and 19”

7.1 Planned Interruptions

Historically, planned power supply interruptions have been a frequent source of customer complaints. Significant changes to the planned outage notification process have meant that customers are provided with a minimum of six business days notification instead of the legislated 72 hours. Greater notification is provided to country customers. A dedicated team now exists to assist customers with any concerns they may have and as more Project Managers utilise the new centralised notification system, it is projected that the number of complaints and service standard payments will significantly decrease.

As well as improving the customer experience, these changes have also delivered in excess of \$2 million in business benefits.

Table 3 below, shows a considerable increase in service payments to customers for lack of or insufficient notification of a planned outage. Western Power believes this can be attributed to an 18 percent increase in planned outages for customer funded, maintenance and reinforcement works in the 2010/11 financial year. Further to this, increased public awareness of planned outage service payments has resulted from a spike in the number of media reports about these interruptions from one in 2009/10 to 17 in the 2010/11 financial year. Annual advertising in the Synergy Life magazine to all customers connected to the Western Power Network has also assisted in educating our customers about the availability of the service standard payment.

7.2 Extended Outage Payment Scheme

The majority of extended outage (interruption) incidents were due to events beyond Western Power’s control such as storm and lightning activity. In particular, these weather events occurred on the 29 January 2011 and the 28 February 2011 (see section 4).

Figure 2 shows the decrease in interruptions exceeding 12 hours by cause. There were fewer equipment failures and more favourable weather conditions (in comparison to last year).

Table 3: Payments in 2009/10 and 2010/11 as per Items 9 of Schedule 1

| | 2009/10 | | 2010/11 | |
|--|---------|-------------|---------|-------------|
| | Number | Value | Number | Value |
| Payments for failure to give required notice of a planned interruption | 573 | \$28,650 | 1,158 | \$57,900 |
| Payments for supply interruptions exceeding 12 hours | 34,151 | \$2,732,080 | 24,170 | \$1,933,600 |

8 Discrete Areas 4 year average

This section is a response to Items 11, 12 and 13 of Schedule 1.

Code extract:

“For each discrete area –

- a) The average length of interruption of supply to customer premises expressed in minutes*
- b) The average number of interruptions of supply to customer premises*
- c) The average percentage of time that electricity has been supplied to customer premises; and*
- d) The average length of all interruptions of supply to customer premises expressed in minutes.”*

“The information published for each paragraph of item 11 in respect of each of the 3 years ending 30 June preceding the year to which the report relates.”

“For each paragraph of item 11, the average of the 4 amounts under that paragraph in respect of the years comprising –

- a) The year to which the report relates; and*
- b) The 3 years referred to in item 12.”*

8.1 Response - Perth CBD

The SAIDI, CAIDI and SAIFI performance did not improve for the 12 months to 30 June 2011 due to interruptions attributed to faults and overloading of specific low voltage (LV) cables. The length of these interruptions was affected further as a result of resource management practices where worker fatigue is managed during long interruption periods.

Some augmentation works and redistribution of loads have been undertaken to reduce the possibility of similar interruptions occurring in the future.

Table 4: Perth CBD area reliability

| KPI | Units | Financial Year Ending 30 June | | | | 4 Year Average |
|-------|---------|-------------------------------|---------|---------|---------|----------------|
| | | 2007/08 | 2008/09 | 2009/10 | 2010/11 | |
| SAIDI | Minutes | 57 | 46 | 11 | 42 | 39 |
| SAIFI | | 0.25 | 0.30 | 0.29 | 0.37 | 0.30 |
| CAIDI | Minutes | 223 | 152 | 36 | 112 | 131 |
| ASAI | % | 99.989 | 99.991 | 99.998 | 99.992 | 99.993 |

8.2 Response - Urban areas other than Perth CBD

SAIDI and CAIDI improved in urban areas during the 12 months to 30 June 2011.

However, power line upgrades have contributed to a reduction in the impact of unplanned interruptions caused by equipment failure. Also, automated switchgear has reduced customer impact due to interruptions such as storms and other environmental events.

There was also a reduction in the impact of inclement weather and localised storm activity.

Table 5: Urban areas (other than the Perth CBD) reliability

| KPI | Units | Financial Year Ending 30 June | | | | 4 Year Average |
|-------|---------|-------------------------------|---------|---------|---------|----------------|
| | | 2007/08 | 2008/09 | 2009/10 | 2010/11 | |
| SAIDI | Minutes | 269 | 329 | 471 | 296 | 341 |
| SAIFI | | 2.91 | 2.70 | 2.72 | 2.31 | 2.66 |
| CAIDI | Minutes | 92 | 122 | 173 | 128 | 129 |
| ASAI | % | 99.949 | 99.937 | 99.910 | 99.944 | 99.935 |

8.3 Response – isolated networks (Ravensthorpe)

The figures in Table 6 contain improvements for customers in the town of Ravensthorpe that were “islanded” from the Western Power Network from 17 December 2009 to 2 February 2011, and then from 10 June 2011 to cater for peak winter load.

The reliability of Ravensthorpe when islanded, improved when compared to the previous financial year. There were no interruptions due to lightning activity in this time period. The interruptions whilst Ravensthorpe was islanded during the last financial year were predominately due to car vs pole incidents and planned interruptions.

The town of Ravensthorpe was reconnected to the grid in February 2011 with a “bridging solution”. This enables the remote start up of a local power station in the event of Western Power Network unavailability and during peak energy demands within that area.

Ravensthorpe is currently scheduled to be fully reconnected to Western Powers Network by September 2011.

Table 6: Isolated Networks (Ravensthorpe)

| KPI | Units | Financial Year Ending 30 June | | | | 4 Year Average |
|-------|---------|-------------------------------|---------|---------|---------|----------------|
| | | 2007/08 | 2008/09 | 2009/10 | 2010/11 | |
| SAIDI | Minutes | N/A | | 888 | 404 | N/A |
| SAIFI | | | | 2.47 | 3.90 | |
| CAIDI | Minutes | | | 360 | 104 | |
| ASAI | % | | | 99.831 | 99.923 | |

8.4 Response – Rural areas

The SAIDI, CAIDI and SAIFI performance was poorer for Rural areas during the 12 months to 30 June 2011. The primary reason of this increase was the storm activities experienced on the 29 January 2011 (see Section 4 for details).

Automated switchgear has reduced the impact of the interruptions on customers by reducing the restoration time.

Table 7: Rural areas reliability

| KPI | Units | Financial Year Ending 30 June | | | | 4 Year Average |
|-------|---------|-------------------------------|---------|---------|---------|----------------|
| | | 2007/08 | 2008/09 | 2009/10 | 2010/11 | |
| SAIDI | Minutes | 599 | 735 | 818 | 956 | 777 |
| SAIFI | | 4.68 | 5.07 | 5.43 | 4.43 | 4.90 |
| CAIDI | Minutes | 128 | 145 | 151 | 216 | 160 |
| ASAI | % | 99.886 | 99.860 | 99.844 | 98.818 | 99.602 |

9 Percentile values

This section is a response to Items 14 and 15 of Schedule 1.

Code extract:

“For customer premises in each discrete area, an estimate of the 25th, 50th, 75th, 90th, 95th, 98th and 100th percentile values of –

- a) The average length of interruption referred to in item 11(a)*
- b) The number of interruptions; and*
- c) The total length of interruptions.”*

“For each category of information in item 14 (a), (b) and (c), a graph showing the distribution of customer premises across the range of that category”

Percentiles are selected over the customer premise count for each discrete area.

For an example on how to interpret the tables and figures below, please see Table 9 and Figure 4. It shows that in 12 months to 30 June 2011, 50 percent of customers in urban areas had no more than 2 interruptions.

9.1 Response - Average length of interruption

Table 8 outlines the average length of interruptions to customers based on the prescribed percentiles for 12 months to 30 June 2011:

- The 100th percentile figure for Rural is due to storm activity on the 29 January 2011
- The 100th percentile figure for Urban and Perth CBD are predominantly due to storm activity on the 28 February 2011. Refer to Section 4 for details of these storms.
- 90% of the customers in the CBD is experiencing longer average length of interruption by an extra 32 minutes compared to last year
- 90% of the customers in the Urban region is experiencing shorter average length of interruption by 118 minutes compared to last year
- 90% of the customers in Rural region is experiencing longer average length of interruption by extra 99 minutes compared to last year

Table 8: Average length of interruption (minutes) percentile figures as per Item 14(a) of Schedule 1

| | 25 th | 50 th | 75 th | 90 th | 95 th | 98 th | 100 th |
|-----------|------------------|------------------|------------------|------------------|------------------|------------------|-------------------|
| Perth CBD | 0 | 0 | 0 | 51 | 101 | 176 | 820 |
| Urban | 15 | 65 | 132 | 242 | 327 | 465 | 2406 |
| Rural | 54 | 124 | 224 | 424 | 727 | 1207 | 5831 |

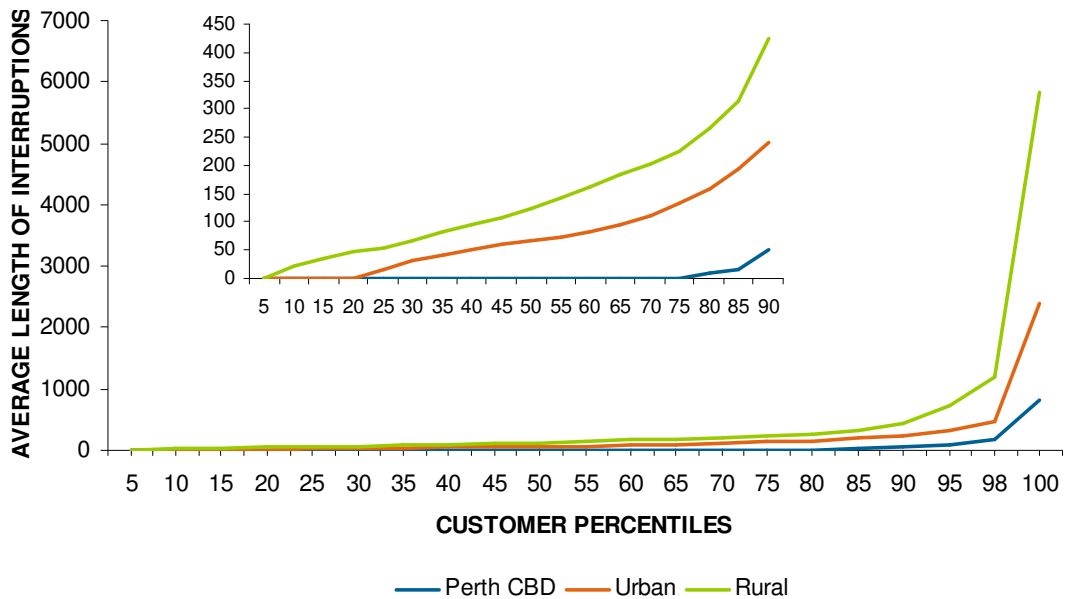


Figure 3: Average length of interruption percentile distribution as per Item 15 of Schedule 1

9.2 Response - Number of interruptions

Table 9 outlines the number of interruptions to customers based on the prescribed percentiles for 12 months to 30 June 2011.

- Approximately 76% of CBD customers experienced no interruptions
- Approximately 99% of Urban area customers experienced 9 or fewer interruptions
- Approximately 99% of Rural area customers experienced 16 or fewer interruptions
- 90% of the customers in CBD are experiencing the same number of interruption as last year
- 90% of the customers in Urban region is experiencing the one less number of interruption as last year
- 90% of the customers in Rural region is experiencing the same number of interruption as last year

Areas of Western Powers network which have a high frequency of interruptions are monitored and targeted for applicable remedial activities.

Table 9: Number of interruptions percentile figures as per Item 14(b) of Schedule 1

| | 25 th | 50 th | 75 th | 90 th | 95 th | 98 th | 100 th |
|-----------|------------------|------------------|------------------|------------------|------------------|------------------|-------------------|
| Perth CBD | 0 | 0 | 0 | 1 | 2 | 2 | 6 |
| Urban | 1 | 2 | 3 | 4 | 5 | 7 | 32 |
| Rural | 1 | 3 | 5 | 8 | 9 | 12 | 24 |

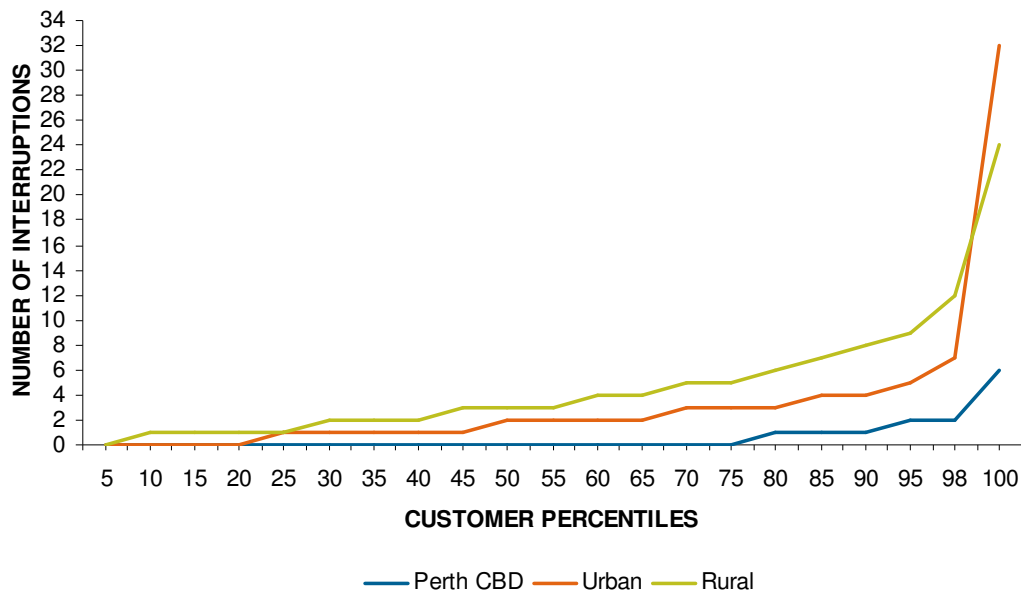


Figure 4: Number of interruptions percentile distribution as per Item 15 of Schedule 1

9.3 Response - Total length of all interruptions

For 12 months to 30 June 2011:

- Approximately 88% of Perth CBD customers experienced total interruption minutes of less than 30 minutes
- Approximately 44% of Urban area customers experienced total interruption minutes of less than 160 minutes
- Approximately 55% of Rural area customers experienced total interruption minutes of less than 290 minutes
- 90% of the customers in CBD is experiencing longer total length of interruption by extra 38 minutes compared to last year
- 90% of the customers in Urban region is experiencing shorter total length of interruption by 478 minutes compared to last year
- 90% of the customers in Rural region is experiencing a small increase in total length of interruption by extra 4 minutes compared to last year

The 100th percentile figure for Urban and Perth CBD is predominantly due to extended interruptions attributed to storm activity experienced on the 28 February.

The 100th percentile figure for Rural is predominantly due to extended interruptions attributed to the storm activity experienced on the 29 January.

Refer to Section 4 for details of these storms.

Table 10: Total length of interruptions (minutes) percentile figures as per Item 14(c) of Schedule 1

| | 25 th | 50 th | 75 th | 90 th | 95 th | 98 th | 100 th |
|-----------|------------------|------------------|------------------|------------------|------------------|------------------|-------------------|
| Perth CBD | 0 | 0 | 4 | 59 | 148 | 397 | 1567 |
| Urban | 25 | 141 | 357 | 692 | 1021 | 1707 | 8574 |
| Rural | 113 | 429 | 1135 | 2113 | 3159 | 4542 | 12643 |

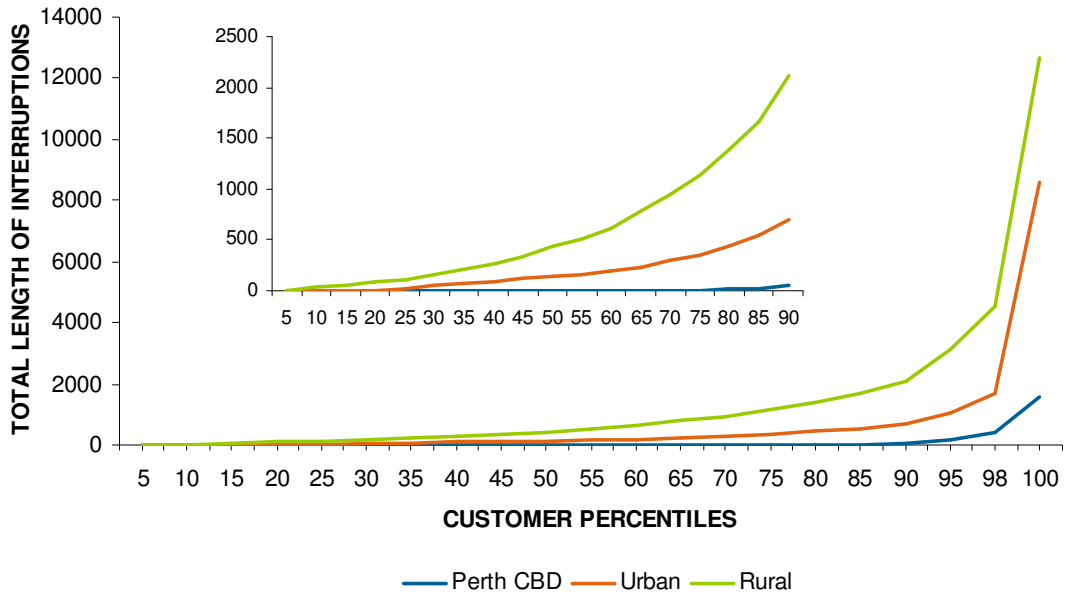


Figure 5: Total length of interruptions percentile distribution as per Item 15 of Schedule 1

10 Power Quality

This section is a response to Item 4 of Schedule 1.

Code extract:

“In respect of each failure by the transmitter or distributor to comply with a provision of this Code or an instrument under Section 14(3) (as identified by monitoring records or under section 24 or following a complaint) –

- a) The total number of breaches of each provision; and*
- b) The remedial action taken in each case*

10.1 Response

Permanent Power Quality (PQ) meters have been deployed in different parts of the LV distribution network to monitor the quality of customers' supply. This section of the report is in relation to the compliance of the LV distribution network², which in turn is reflective of the high voltage distribution network.

The program of installing permanent PQ meters continues with an additional 12 devices deployed for the 12 months to 30 June 2011. This brings the total number of PQ meters operating on the network to 96.

The compliance level of 8% Total Harmonic Distortion (“THD”) was met for all sites 100% of the time.

See Appendix A for details pertaining to power quality compliance.

² As no code non-compliance or complaints have been received in regards to harmonic or flicker on the transmission network, there are no breaches to report.

Appendix A. Power Quality Compliance

A.1 Harmonics Compliance

Harmonic voltage distortion is caused by particular types of equipment that are connected to the network. Harmonic voltage distortion can impose extra strain on the network and other equipment connected to it. The voltage distortion levels arising from harmonics in the network are to be contained within the compatibility levels given in Part 2 Section 7 of the Code. Western Power's Technical Rules provide the requirements that must be met by equipment connecting to the distribution and transmission networks.

To assist the management of harmonics on the distribution network, Western Power has developed tools based on requirements specified in applicable standards³. These tools are used for new commercial and industrial loads to assign the allowable level of voltage harmonics emitted in the network when connected.

Figures 6 and 7 are representative of the THD present at the customer and distribution transformer sites respectively. The median THD recorded by the permanent PQ meters is approximately 2.5% for the customer sites and 2.0% for the transformer sites. The compliance level of 8% THD was met for all sites 100% of the time. The Western Power planning level of 6.5% was met 99.97% of the time for customer sites and 99.98% of the time for transformer sites. Investigations have identified that a very small number of customer loads were the source of harmonic distortion, contributing to exceeding the Western Power planning level. However, this is a local issue and not adversely impacting customers living in close proximity. Because of this, no further action is required.

³ Australian Standard AS61000 series and the methodologies stated PQ Handbook HB264

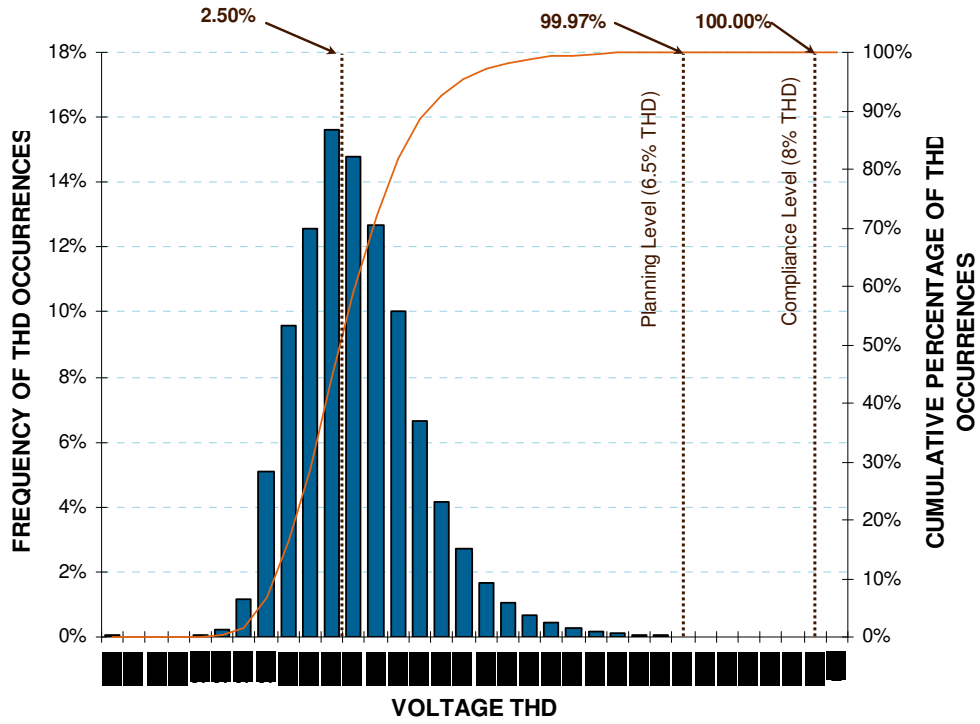


Figure 6: Percentage of THD for aggregate of 40 customer permanent PQ meters recording sites

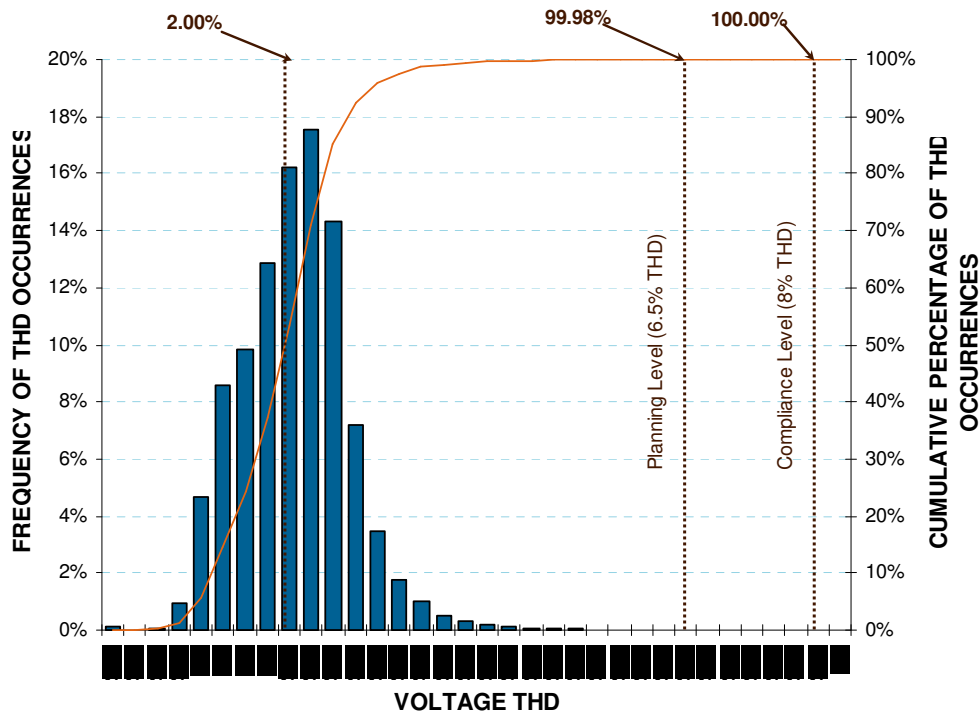


Figure 7: Percentage of THD for aggregate of 56 transformer permanent PQ meters recording sites

A.2 Voltage Variation Compliance

Voltages must be maintained within $\pm 6\%$ of the nominal supply voltage according to the *Electricity Act 1945* Section 25(1)(d) (“the Act”). The nominal voltage for the purposes of the Act and the Code is 240 V single-phase and 415 V three-phase. According to Western Power’s Technical Rules the steady state voltage must be within the following limits:

- $\pm 6\%$ of the nominal voltage during normal conditions
- $\pm 8\%$ of the nominal voltage during maintenance conditions
- $\pm 10\%$ of the nominal voltage during emergency conditions

Figures 8 and 9 represent the frequency of variations in voltage levels for customer and transformer sites as recorded by the permanent PQ meters.

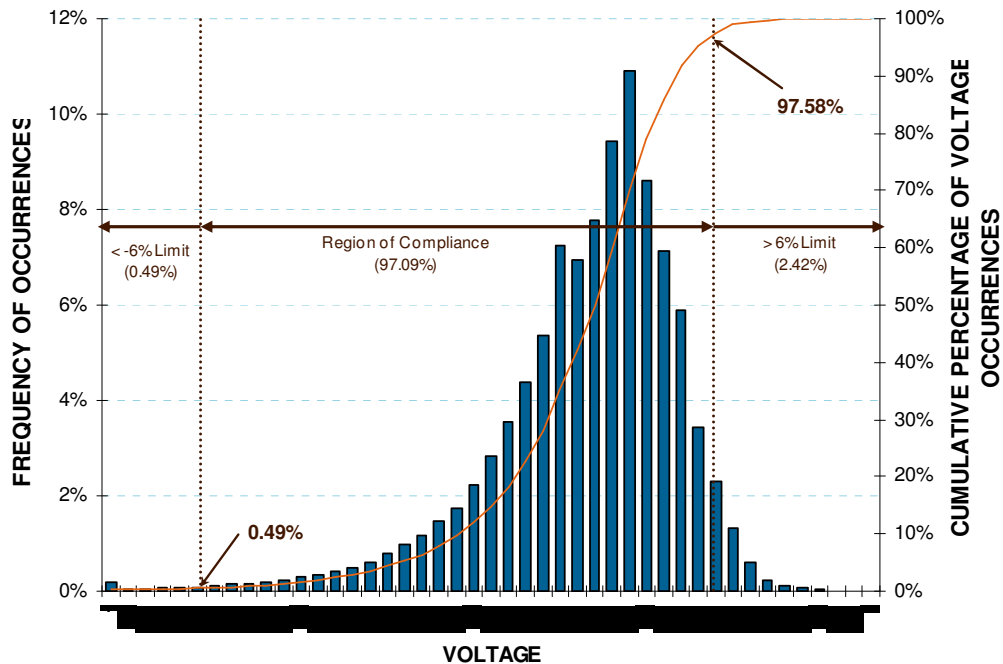


Figure 8: Voltage distribution for aggregate of 40 permanent PQ meters at customer sites

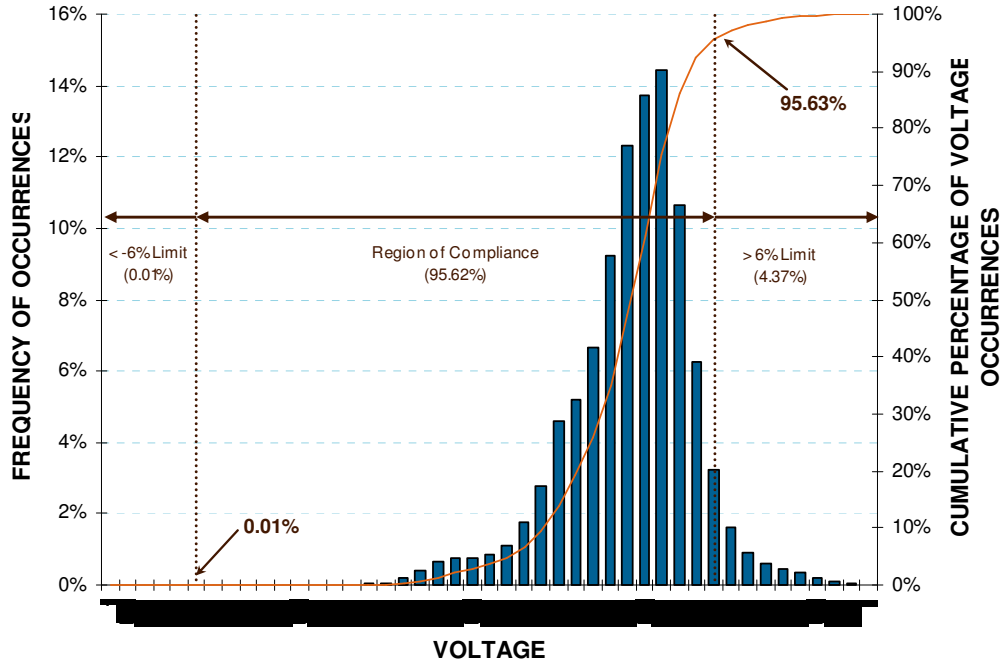


Figure 9: Voltage distribution for aggregate of 56 permanent PQ meters at transformer sites

Figures 8 and 9 showed that the voltage levels were maintained within the required limits for 97.09% of the time at customer sites, and 95.62% of the time at transformer sites.

The voltage lower limit (240V -6%) was not met for 0.49% and 0.01% of the time of customer and transformer sites respectively of the time recorded. These recordings can be mostly attributed to short term peak loads.

The voltage upper limit (240V +6%) was exceeded at many customer and transformer sites for 2.42% and 4.37% of the time respectively. The contributing factors to exceeding the high voltage limit occurring at the LV side of a distribution transformer are:

- variations in the setpoint voltage of the Automatic Voltage Regulator (AVR) of the power transformer at the zone substation
- voltage variances of $\pm 1.5\%$ about the setpoint before the AVR responds to restore voltage levels within the tolerance range of $\pm 1.5\%$
- periods of very light loads on the network
- the increasing penetration of photovoltaic solar systems that cause voltage rise on the network

The locations represented by the permanent PQ meters have a median voltage of approximately 250V for the transformer sites and 248V for customer sites. This illustrates that the distribution network generally complies with the Code under 'normal operating' conditions.

Given the global market of equipment and appliances, and the greater penetration of customer renewable energy systems, a national consistency in the management of voltages within the distribution network and within the customer's installation is necessary. In addition there are some inconsistencies across jurisdictions on declared voltage levels and the corresponding ranges. In the interest of national consistency in managing the voltage levels within the network, and within the customer's installation, the Energy Networks Association ("ENA") and Standards Australia are developing standards and overall strategies for determining compliance.

Western Power is involved in this work and subsequently will leverage off the outcomes to develop similar strategies and implementation plans over the next five years.

A.3 Voltage Unbalance Compliance

Power is distributed to customers by way of 3 phase electricity, in which each phase's voltage is displaced by 120° and of equal magnitudes. In this situation the supply is considered to be a "balanced" supply. Phase unbalance is caused by significantly differing loads across each phase which result in unequal voltage levels and possibly phase displacements. Such situations can have a detrimental effect particularly on equipment that required all three phases to operate.

The Code does not specify voltage unbalance requirements but they are stated in the Technical Rules in terms of ratio of "negative phase" sequence to "positive phase" sequence. The requirement for LV ratios is to be less than 2%.

All measurements were recorded as positive and negative sequence components by the permanent PQ meters and the unbalance results calculated.

Figure 10 and Figure 11 depict the occurrences of voltage unbalance between 0 and 3% for customer and transformer permanent PQ meter sites. These figures show that the voltage unbalance is well within the limit for 99.29% of the time for customer sites and 99.60% for transformer sites. A number of sites have slightly exceeded the limit for short periods. For the affected transformer sites this has been mainly due to long HV distribution circuits supplying the respective transformer. Customer sites which are affected are more determined by the customer's own loading on each phase with a small contribution from the networks imbalance seen at the transformer sites.

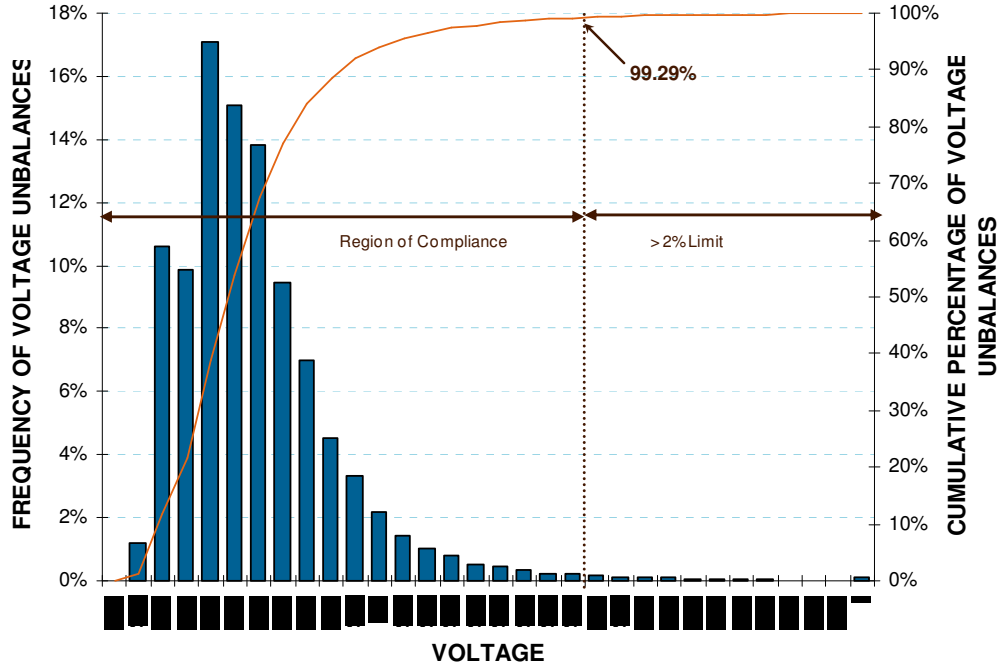


Figure 10: Voltage unbalance for aggregated recordings for 40 permanent PQ meter customer sites

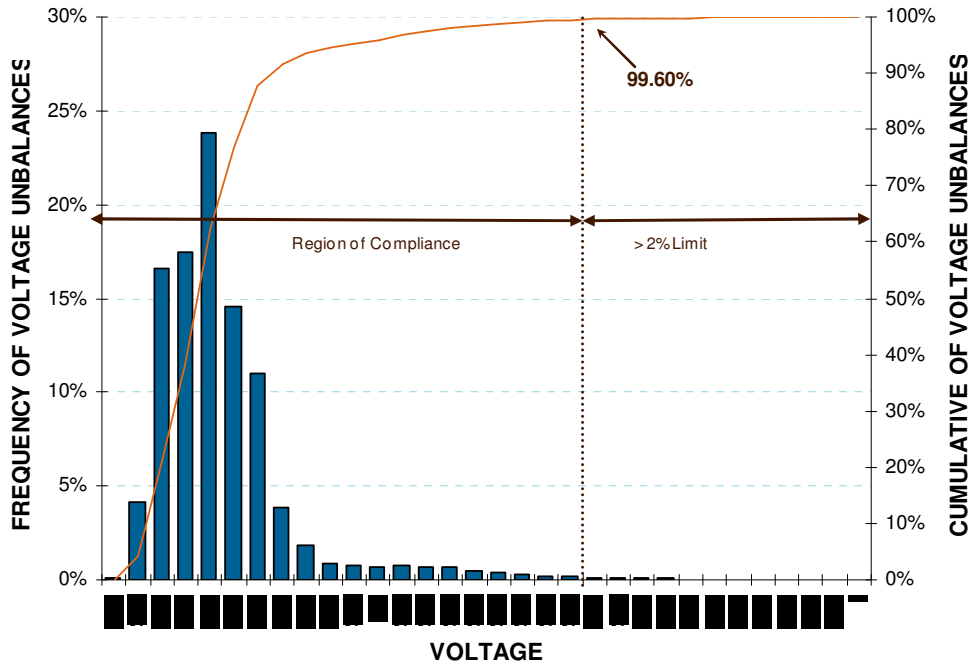


Figure 11: Voltage unbalance for aggregated recordings for 56 permanent PQ meter transformer sites

A.4 Summary

The non-compliances reported in preceding sections are of relatively short duration in respect to the entire measurement period. Overall, there has been no significant change in non-compliance levels since the last report. As a result, no further action is required.

Appendix B. List of Customer Interruptions Greater than 12 Hours

| Interruption | First Restoration (hours) after 12 hours | Final Restoration (hours) | Customers Affected |
|--------------|--|---------------------------|--------------------|
| 1 | 19.5 | 19.52 | 2 |
| 2 | 16.95 | 64.22 | 8 |
| 3 | 14.85 | 14.85 | 12 |
| 4 | 23.38 | 23.38 | 3 |
| 5 | 19.6 | 19.6 | 93 |
| 6 | 12.66 | 12.66 | 104 |
| 7 | 14.18 | 14.18 | 485 |
| 8 | 50.94 | 50.94 | 1 |
| 9 | 27.68 | 27.68 | 1 |
| 10 | 20.34 | 20.34 | 1 |
| 11 | 12.94 | 12.94 | 1 |
| 12 | 12.83 | 12.83 | 1 |
| 13 | 17.61 | 17.61 | 1 |
| 14 | 14.42 | 14.42 | 1 |
| 15 | 12.61 | 12.61 | 1 |
| 16 | 16.86 | 16.86 | 1 |
| 17 | 22.46 | 22.46 | 3 |
| 18 | 15.65 | 15.65 | 4 |
| 19 | 18.55 | 18.55 | 6 |
| 20 | 12.63 | 12.63 | 4 |
| 21 | 17.93 | 17.93 | 3 |
| 22 | 13.22 | 13.22 | 19 |
| 23 | 17.32 | 17.32 | 4 |
| 24 | 12.65 | 12.65 | 1 |
| 25 | 16.13 | 16.13 | 221 |
| 26 | 17.45 | 17.45 | 162 |
| 27 | 15.23 | 15.23 | 1 |
| 28 | 33.59 | 33.59 | 35 |
| 29 | 14.17 | 14.17 | 69 |
| 30 | 27.4 | 27.4 | 15 |
| 31 | 20.83 | 20.83 | 39 |
| 32 | 13.63 | 14.93 | 44 |
| 33 | 18.08 | 18.08 | 6 |
| 34 | 17.92 | 17.92 | 1 |
| 35 | 16.76 | 25.88 | 6 |
| 36 | 17.92 | 17.92 | 1 |
| 37 | 17.71 | 17.71 | 6 |
| 38 | 15.25 | 15.25 | 1 |
| 39 | 18.17 | 18.17 | 1 |
| 40 | 17.65 | 17.65 | 1 |
| 41 | 14.79 | 14.79 | 1 |
| 42 | 18.26 | 18.26 | 2 |
| 43 | 17.98 | 17.98 | 1 |
| 44 | 13.66 | 13.66 | 1 |
| 45 | 20.62 | 20.62 | 1 |
| 46 | 14.15 | 14.15 | 1 |
| 47 | 14.82 | 14.82 | 75 |
| 48 | 18.35 | 18.35 | 1 |
| 49 | 15.89 | 16.49 | 354 |
| 50 | 15.58 | 15.58 | 1 |
| 51 | 13.54 | 13.54 | 35 |
| 52 | 14.88 | 14.88 | 64 |

| Interruption | First Restoration (hours) after 12 hours | Final Restoration (hours) | Customers Affected |
|--------------|--|---------------------------|--------------------|
| 53 | 13.25 | 13.25 | 1 |
| 54 | 13.67 | 13.67 | 1 |
| 55 | 15.7 | 15.7 | 117 |
| 56 | 12.64 | 12.64 | 29 |
| 57 | 15.14 | 15.14 | 123 |
| 58 | 13.63 | 13.63 | 1 |
| 59 | 17.46 | 17.46 | 1 |
| 60 | 12.26 | 12.26 | 15 |
| 61 | 12.79 | 12.79 | 1 |
| 62 | 14.1 | 14.1 | 1 |
| 63 | 12.8 | 12.8 | 4 |
| 64 | 12.88 | 12.88 | 1 |
| 65 | 18.09 | 18.09 | 1 |
| 66 | 14.37 | 14.37 | 1 |
| 67 | 16.51 | 19.57 | 36 |
| 68 | 14.29 | 14.29 | 1 |
| 69 | 14.17 | 14.17 | 1 |
| 70 | 14.66 | 14.66 | 1 |
| 71 | 17.84 | 17.84 | 46 |
| 72 | 18.11 | 18.11 | 1 |
| 73 | 12.92 | 12.92 | 1 |
| 74 | 13.2 | 13.2 | 1 |
| 75 | 14.05 | 14.05 | 9 |
| 76 | 19.35 | 19.35 | 1 |
| 77 | 17.85 | 21.5 | 35 |
| 78 | 14.54 | 14.54 | 1 |
| 79 | 18.12 | 18.12 | 9 |
| 80 | 15.32 | 15.32 | 1 |
| 81 | 13.91 | 13.91 | 1 |
| 82 | 97.57 | 97.57 | 1 |
| 83 | 15.27 | 15.27 | 1 |
| 84 | 12.74 | 12.74 | 1 |
| 85 | 13.25 | 13.25 | 10 |
| 86 | 12.18 | 12.18 | 54 |
| 87 | 14.67 | 14.67 | 1 |
| 88 | 12.33 | 12.33 | 1 |
| 89 | 22.6 | 22.6 | 40 |
| 90 | 13.68 | 13.68 | 5 |
| 91 | 18.7 | 18.7 | 12 |
| 92 | 12.29 | 12.29 | 1 |
| 93 | 70.76 | 70.76 | 1 |
| 94 | 87.54 | 87.54 | 1 |
| 95 | 12.41 | 12.41 | 42 |
| 96 | 13.82 | 13.82 | 1 |
| 97 | 61.52 | 61.52 | 1 |
| 98 | 16.27 | 16.27 | 42 |
| 99 | 14.88 | 14.88 | 1 |
| 100 | 17.12 | 17.12 | 1 |
| 101 | 22.84 | 22.84 | 1 |
| 102 | 23.81 | 23.81 | 1 |
| 103 | 17.89 | 17.89 | 5 |
| 104 | 21.89 | 21.89 | 1 |
| 105 | 14.27 | 14.27 | 1 |
| 106 | 19.17 | 19.17 | 1 |
| 107 | 16.89 | 16.89 | 1 |
| 108 | 18 | 18 | 62 |
| 109 | 22.79 | 22.79 | 2 |
| 110 | 12.78 | 12.78 | 2 |
| 111 | 15.8 | 15.8 | 27 |
| 112 | 12.77 | 14.56 | 24 |

| Interruption | First Restoration (hours) after 12 hours | Final Restoration (hours) | Customers Affected |
|--------------|--|---------------------------|--------------------|
| 113 | 13.2 | 13.2 | 119 |
| 114 | 13.47 | 14.45 | 36 |
| 115 | 15.88 | 15.88 | 34 |
| 116 | 12.05 | 17.13 | 21 |
| 117 | 21.98 | 21.98 | 11 |
| 118 | 19.12 | 19.12 | 1 |
| 119 | 17.58 | 17.58 | 1 |
| 120 | 13 | 14.38 | 15 |
| 121 | 25.23 | 25.23 | 1 |
| 122 | 18.37 | 18.37 | 5 |
| 123 | 21.81 | 21.81 | 1 |
| 124 | 15.8 | 15.8 | 1 |
| 125 | 12.79 | 12.79 | 1 |
| 126 | 16.16 | 16.16 | 26 |
| 127 | 17.64 | 17.64 | 1 |
| 128 | 41.32 | 41.32 | 1 |
| 129 | 14.76 | 14.76 | 12 |
| 130 | 13.85 | 13.85 | 1 |
| 131 | 15.89 | 15.89 | 24 |
| 132 | 13.66 | 13.66 | 1 |
| 133 | 15.35 | 15.35 | 1 |
| 134 | 16.52 | 16.52 | 1 |
| 135 | 15.19 | 15.19 | 39 |
| 136 | 13.99 | 13.99 | 1 |
| 137 | 15.83 | 15.88 | 10 |
| 138 | 16.62 | 16.62 | 1 |
| 139 | 44.68 | 44.68 | 1 |
| 140 | 12.9 | 12.9 | 1 |
| 141 | 13.11 | 13.11 | 5 |
| 142 | 79.46 | 79.46 | 1 |
| 143 | 15.38 | 15.38 | 8 |
| 144 | 16.01 | 16.01 | 11 |
| 145 | 27.9 | 27.9 | 1 |
| 146 | 17.04 | 17.04 | 1 |
| 147 | 14.04 | 14.04 | 1 |
| 148 | 19.32 | 19.32 | 36 |
| 149 | 73.85 | 73.85 | 2 |
| 150 | 24.13 | 24.13 | 2 |
| 151 | 12.77 | 12.77 | 76 |
| 152 | 17.65 | 17.65 | 10 |
| 153 | 21.45 | 21.45 | 7 |
| 154 | 16.17 | 19.82 | 17 |
| 155 | 15.08 | 15.08 | 11 |
| 156 | 25.17 | 25.17 | 1 |
| 157 | 12.67 | 12.67 | 85 |
| 158 | 12.28 | 12.28 | 339 |
| 159 | 14.52 | 14.52 | 1 |
| 160 | 16.6 | 16.6 | 1 |
| 161 | 15 | 15 | 72 |
| 162 | 17.48 | 17.48 | 5 |
| 163 | 13.9 | 13.9 | 13 |
| 164 | 29.38 | 29.38 | 37 |
| 165 | 14.59 | 14.59 | 8 |
| 166 | 41.92 | 41.92 | 1 |
| 167 | 13.56 | 13.56 | 14 |
| 168 | 17.44 | 17.44 | 1 |
| 169 | 17.44 | 17.44 | 1 |
| 170 | 12.09 | 12.09 | 17 |
| 171 | 24.45 | 24.45 | 1 |
| 172 | 12.18 | 12.18 | 102 |

| Interruption | First Restoration (hours) after 12 hours | Final Restoration (hours) | Customers Affected |
|--------------|--|---------------------------|--------------------|
| 173 | 17.78 | 17.78 | 5 |
| 174 | 13.97 | 13.97 | 41 |
| 175 | 14.11 | 19.69 | 39 |
| 176 | 16.62 | 16.62 | 49 |
| 177 | 18.77 | 18.77 | 4 |
| 178 | 14.13 | 14.13 | 15 |
| 179 | 18.31 | 18.31 | 8 |
| 180 | 23.58 | 23.58 | 1 |
| 181 | 12.54 | 12.54 | 1 |
| 182 | 16.33 | 16.33 | 22 |
| 183 | 19.16 | 19.16 | 18 |
| 184 | 12.68 | 12.68 | 15 |
| 185 | 20.46 | 20.46 | 1 |
| 186 | 12.59 | 12.59 | 1 |
| 187 | 22.88 | 22.88 | 1 |
| 188 | 15.11 | 15.11 | 1 |
| 189 | 15.07 | 15.07 | 1 |
| 190 | 13.06 | 13.06 | 1 |
| 191 | 15.53 | 16.78 | 50 |
| 192 | 28.63 | 28.63 | 1 |
| 193 | 18.03 | 18.03 | 1 |
| 194 | 18.3 | 18.3 | 2 |
| 195 | 27.66 | 27.66 | 1 |
| 196 | 12.44 | 12.44 | 6 |
| 197 | 18.38 | 18.38 | 1 |
| 198 | 17.65 | 17.65 | 1 |
| 199 | 15.58 | 15.58 | 1 |
| 200 | 13.3 | 13.3 | 1 |
| 201 | 19.82 | 19.82 | 1 |
| 202 | 17.33 | 17.33 | 1 |
| 203 | 21.11 | 21.11 | 9 |
| 204 | 24.07 | 24.07 | 9 |
| 205 | 20.42 | 20.42 | 1 |
| 206 | 17.15 | 17.15 | 71 |
| 207 | 19.86 | 19.86 | 1 |
| 208 | 14.12 | 14.12 | 1 |
| 209 | 18.38 | 18.38 | 1 |
| 210 | 15.94 | 15.94 | 1 |
| 211 | 16.72 | 16.72 | 1 |
| 212 | 12.71 | 12.71 | 1 |
| 213 | 14.33 | 14.33 | 84 |
| 214 | 17.18 | 17.18 | 1 |
| 215 | 13.36 | 13.36 | 1 |
| 216 | 14.81 | 14.81 | 1 |
| 217 | 20.99 | 20.99 | 1 |
| 218 | 16.71 | 16.71 | 1 |
| 219 | 12.51 | 12.51 | 22 |
| 220 | 19.51 | 19.51 | 2 |
| 221 | 12.43 | 12.43 | 1 |
| 222 | 13.09 | 13.09 | 1 |
| 223 | 16.69 | 16.69 | 1 |
| 224 | 44.85 | 47.57 | 2 |
| 225 | 16.82 | 16.82 | 17 |
| 226 | 12.32 | 12.32 | 1 |
| 227 | 15.78 | 24.38 | 12 |
| 228 | 18.72 | 18.72 | 7 |
| 229 | 14.84 | 14.84 | 1 |
| 230 | 13.28 | 13.28 | 1 |
| 231 | 14.17 | 21.25 | 40 |
| 232 | 12.1 | 15.29 | 40 |

| Interruption | First Restoration (hours) after 12 hours | Final Restoration (hours) | Customers Affected |
|--------------|--|---------------------------|--------------------|
| 233 | 29.87 | 29.87 | 5 |
| 234 | 26.15 | 26.15 | 1 |
| 235 | 17.4 | 17.4 | 24 |
| 236 | 15.81 | 15.81 | 14 |
| 237 | 13.01 | 13.01 | 18 |
| 238 | 24.2 | 24.2 | 1 |
| 239 | 16.84 | 16.84 | 1 |
| 240 | 15.75 | 15.75 | 1 |
| 241 | 12.07 | 12.07 | 18 |
| 242 | 12.33 | 12.33 | 1 |
| 243 | 12.9 | 12.9 | 10 |
| 244 | 13.47 | 13.47 | 1 |
| 245 | 12.58 | 12.58 | 1 |
| 246 | 17.22 | 17.22 | 1 |
| 247 | 13.33 | 13.33 | 1 |
| 248 | 12.79 | 12.79 | 31 |
| 249 | 16.89 | 16.89 | 25 |
| 250 | 15.96 | 15.96 | 1 |
| 251 | 15.51 | 15.51 | 11 |
| 252 | 17.4 | 17.4 | 77 |
| 253 | 13.41 | 13.41 | 47 |
| 254 | 14 | 14 | 124 |
| 255 | 13.11 | 13.11 | 93 |
| 256 | 12.72 | 12.73 | 16 |
| 257 | 12.41 | 12.41 | 2 |
| 258 | 17.45 | 17.45 | 54 |
| 259 | 13.1 | 13.1 | 12 |
| 260 | 15.57 | 15.57 | 25 |
| 261 | 16 | 16 | 1 |
| 262 | 19.13 | 19.13 | 74 |
| 263 | 12.28 | 12.28 | 1 |
| 264 | 14.69 | 14.69 | 1 |
| 265 | 12.52 | 12.52 | 66 |
| 266 | 12.68 | 12.68 | 123 |
| 267 | 14.07 | 14.07 | 94 |
| 268 | 15.18 | 15.18 | 15 |
| 269 | 12.8 | 12.8 | 3 |
| 270 | 13.75 | 13.75 | 27 |
| 271 | 12.52 | 12.52 | 3 |
| 272 | 14.73 | 14.73 | 1 |
| 273 | 23.38 | 23.38 | 4 |
| 274 | 18.79 | 18.79 | 3 |
| 275 | 16 | 16 | 13 |
| 276 | 18.42 | 18.42 | 24 |
| 277 | 13.03 | 13.03 | 102 |
| 278 | 12.08 | 12.08 | 6 |
| 279 | 21.33 | 23.88 | 3 |
| 280 | 16.94 | 16.94 | 1 |
| 281 | 21.99 | 21.99 | 20 |
| 282 | 16.99 | 16.99 | 1 |
| 283 | 14.76 | 14.76 | 1 |
| 284 | 15.81 | 15.81 | 4 |
| 285 | 18.23 | 18.23 | 30 |
| 286 | 16.03 | 26.28 | 294 |
| 287 | 25.18 | 25.18 | 5 |
| 288 | 25.58 | 25.58 | 5 |
| 289 | 22.9 | 22.9 | 92 |
| 290 | 24.47 | 24.47 | 11 |
| 291 | 17.39 | 17.39 | 2 |
| 292 | 17.61 | 17.61 | 1 |

| Interruption | First Restoration (hours) after 12 hours | Final Restoration (hours) | Customers Affected |
|--------------|--|---------------------------|--------------------|
| 293 | 20.09 | 20.09 | 9 |
| 294 | 15.24 | 15.24 | 1 |
| 295 | 18.5 | 18.5 | 3 |
| 296 | 15.57 | 15.57 | 1 |
| 297 | 15.83 | 15.83 | 1 |
| 298 | 42.8 | 42.8 | 1 |
| 299 | 17.33 | 17.33 | 1 |
| 300 | 15.85 | 15.85 | 1 |
| 301 | 14.38 | 14.38 | 1 |
| 302 | 16.66 | 16.66 | 1 |
| 303 | 13.02 | 13.02 | 1 |
| 304 | 15.01 | 15.01 | 3 |
| 305 | 34.86 | 34.86 | 1 |
| 306 | 15.59 | 15.59 | 126 |
| 307 | 16.69 | 16.69 | 1 |
| 308 | 20.9 | 20.9 | 2 |
| 309 | 12.85 | 12.85 | 1 |
| 310 | 17.42 | 47.32 | 77 |
| 311 | 23.73 | 23.73 | 1 |
| 312 | 13.26 | 13.26 | 113 |
| 313 | 14.46 | 14.46 | 1 |
| 314 | 15.1 | 15.1 | 37 |
| 315 | 13.49 | 14.59 | 21 |
| 316 | 16.4 | 16.4 | 11 |
| 317 | 12.01 | 12.01 | 1 |
| 318 | 14.95 | 15.38 | 67 |
| 319 | 12.35 | 12.35 | 80 |
| 320 | 12.08 | 12.08 | 103 |
| 321 | 14.31 | 14.31 | 1 |
| 322 | 17.34 | 18.86 | 55 |
| 323 | 19.67 | 19.67 | 1 |
| 324 | 12.31 | 12.31 | 121 |
| 325 | 20.24 | 20.24 | 43 |
| 326 | 16.63 | 16.63 | 1 |
| 327 | 28.79 | 28.79 | 48 |
| 328 | 45.89 | 70.76 | 35 |
| 329 | 18.79 | 18.79 | 7 |
| 330 | 23.02 | 23.02 | 1 |
| 331 | 20.92 | 20.92 | 1 |
| 332 | 25.99 | 25.99 | 12 |
| 333 | 23.13 | 23.13 | 185 |
| 334 | 15.24 | 15.24 | 24 |
| 335 | 14.64 | 14.64 | 1 |
| 336 | 19.97 | 19.97 | 1 |
| 337 | 13.29 | 13.29 | 19 |
| 338 | 22.66 | 22.66 | 1 |
| 339 | 13.68 | 13.68 | 1 |
| 340 | 19.29 | 19.29 | 1 |
| 341 | 23.22 | 23.22 | 16 |
| 342 | 18.64 | 18.64 | 1 |
| 343 | 21.78 | 21.78 | 1 |
| 344 | 18.39 | 18.39 | 1 |
| 345 | 18.29 | 18.29 | 1 |
| 346 | 18.28 | 18.28 | 1 |
| 347 | 21.11 | 21.11 | 1 |
| 348 | 15.62 | 15.62 | 1 |
| 349 | 13.22 | 15.42 | 58 |
| 350 | 19.33 | 19.33 | 1 |
| 351 | 17.72 | 17.72 | 2 |
| 352 | 14.55 | 14.55 | 1 |

| Interruption | First Restoration (hours) after 12 hours | Final Restoration (hours) | Customers Affected |
|--------------|--|---------------------------|--------------------|
| 353 | 17.12 | 17.12 | 74 |
| 354 | 15.19 | 15.19 | 272 |
| 355 | 15.51 | 15.51 | 138 |
| 356 | 13.44 | 13.44 | 1 |
| 357 | 12.36 | 12.36 | 1 |
| 358 | 12.49 | 12.49 | 1,124 |
| 359 | 37.97 | 37.97 | 1 |
| 360 | 30.51 | 30.51 | 65 |
| 361 | 35.41 | 35.41 | 11 |
| 362 | 24.83 | 24.83 | 1 |
| 363 | 24.4 | 24.4 | 48 |
| 364 | 29.92 | 29.92 | 1 |
| 365 | 32.28 | 76.16 | 12 |
| 366 | 29.71 | 29.71 | 1 |
| 367 | 33.17 | 33.17 | 1 |
| 368 | 28.98 | 28.98 | 48 |
| 369 | 26.76 | 26.76 | 22 |
| 370 | 19.61 | 19.81 | 319 |
| 371 | 24.33 | 24.33 | 1 |
| 372 | 12.6 | 12.6 | 99 |
| 373 | 26.6 | 144.13 | 44 |
| 374 | 27.44 | 27.44 | 1 |
| 375 | 21.47 | 21.47 | 567 |
| 376 | 119.23 | 119.23 | 25 |
| 377 | 69.15 | 69.15 | 18 |
| 378 | 26.46 | 26.46 | 23 |
| 379 | 98.24 | 98.24 | 66 |
| 380 | 122.88 | 122.88 | 50 |
| 381 | 27.87 | 52.63 | 840 |
| 382 | 100.24 | 100.33 | 62 |
| 383 | 27.45 | 27.45 | 452 |
| 384 | 24.06 | 24.06 | 684 |
| 385 | 26.72 | 26.72 | 1,231 |
| 386 | 17.23 | 28.74 | 1,477 |
| 387 | 19.55 | 21.85 | 627 |
| 388 | 21.97 | 50.82 | 37 |
| 389 | 99.02 | 99.02 | 1 |
| 390 | 75.16 | 75.16 | 1 |
| 391 | 45.11 | 45.11 | 12 |
| 392 | 75.05 | 75.05 | 1 |
| 393 | 68.7 | 94.43 | 26 |
| 394 | 24.01 | 43.91 | 1,056 |
| 395 | 98.42 | 98.42 | 1 |
| 396 | 42.31 | 42.31 | 16 |
| 397 | 16.81 | 51.09 | 928 |
| 398 | 69.95 | 69.95 | 33 |
| 399 | 43.44 | 43.44 | 1,196 |
| 400 | 25.21 | 25.21 | 2 |
| 401 | 20.74 | 20.74 | 74 |
| 402 | 48.09 | 48.09 | 13 |
| 403 | 18.5 | 19.43 | 77 |
| 404 | 33 | 68.75 | 31 |
| 405 | 25.21 | 25.21 | 69 |
| 406 | 16.57 | 16.57 | 1 |
| 407 | 18.35 | 18.35 | 92 |
| 408 | 27.03 | 27.03 | 178 |
| 409 | 25.24 | 25.24 | 24 |
| 410 | 20.68 | 20.68 | 1 |
| 411 | 20.98 | 20.98 | 44 |
| 412 | 20.29 | 20.29 | 1 |

| Interruption | First Restoration (hours) after 12 hours | Final Restoration (hours) | Customers Affected |
|--------------|--|---------------------------|--------------------|
| 413 | 22.26 | 122.8 | 2,772 |
| 414 | 25.64 | 25.64 | 1 |
| 415 | 24.26 | 24.26 | 1 |
| 416 | 18.2 | 18.23 | 1,559 |
| 417 | 21.67 | 21.67 | 1 |
| 418 | 24.86 | 24.86 | 1 |
| 419 | 47.17 | 47.17 | 2 |
| 420 | 12.37 | 12.37 | 1 |
| 421 | 15.3 | 15.3 | 1 |
| 422 | 15.65 | 15.65 | 18 |
| 423 | 18.4 | 18.4 | 229 |
| 424 | 12.08 | 14.2 | 82 |
| 425 | 14.86 | 14.86 | 1 |
| 426 | 69.37 | 69.37 | 1 |
| 427 | 17.14 | 17.14 | 1 |
| 428 | 12.99 | 12.99 | 1 |
| 429 | 22.75 | 22.75 | 7 |
| 430 | 16.33 | 16.33 | 3 |
| 431 | 12.12 | 12.12 | 2 |
| 432 | 41.44 | 41.44 | 1 |
| 433 | 21.19 | 21.19 | 1 |
| 434 | 93.51 | 93.51 | 1 |
| 435 | 13.71 | 13.71 | 9 |
| 436 | 20.7 | 20.7 | 1 |
| 437 | 21.59 | 21.59 | 1 |
| 438 | 61.93 | 61.93 | 1 |
| 439 | 41.01 | 41.01 | 125 |
| 440 | 64.97 | 64.97 | 15 |
| 441 | 65.3 | 65.3 | 1 |
| 442 | 21.14 | 21.14 | 1 |
| 443 | 36.76 | 36.76 | 1 |
| 444 | 14.11 | 14.11 | 1 |
| 445 | 40.49 | 40.49 | 25 |
| 446 | 60.55 | 60.55 | 1 |
| 447 | 39.91 | 39.91 | 1 |
| 448 | 40.98 | 40.98 | 1 |
| 449 | 15.06 | 15.06 | 1 |
| 450 | 13.76 | 13.76 | 1 |
| 451 | 12.06 | 12.06 | 1 |
| 452 | 36.8 | 36.8 | 1 |
| 453 | 18.59 | 18.59 | 1 |
| 454 | 12.39 | 12.39 | 3 |
| 455 | 13.08 | 13.08 | 4 |
| 456 | 19 | 19 | 1 |
| 457 | 13.7 | 13.7 | 1 |
| 458 | 41.44 | 41.44 | 17 |
| 459 | 12.39 | 12.39 | 97 |
| 460 | 56.32 | 56.32 | 1 |
| 461 | 37.51 | 37.51 | 19 |
| 462 | 47.45 | 47.45 | 1 |
| 463 | 31.24 | 31.24 | 1 |
| 464 | 27.69 | 27.69 | 10 |
| 465 | 31.05 | 31.05 | 1 |
| 466 | 30.93 | 30.93 | 1 |
| 467 | 26.5 | 26.5 | 1 |
| 468 | 25.89 | 25.89 | 1 |
| 469 | 52.85 | 52.85 | 37 |
| 470 | 34.06 | 34.06 | 42 |
| 471 | 21.02 | 21.02 | 15 |
| 472 | 31.04 | 31.04 | 76 |

| Interruption | First Restoration (hours) after 12 hours | Final Restoration (hours) | Customers Affected |
|--------------|--|---------------------------|--------------------|
| 473 | 32.67 | 32.67 | 7 |
| 474 | 45.31 | 45.31 | 1 |
| 475 | 49.07 | 49.07 | 3 |
| 476 | 47.05 | 98.24 | 212 |
| 477 | 29.38 | 91.6 | 545 |
| 478 | 21.14 | 21.14 | 100 |
| 479 | 21.11 | 21.11 | 54 |
| 480 | 22.62 | 22.62 | 1 |
| 481 | 71.7 | 121.03 | 67 |
| 482 | 24.92 | 24.92 | 1 |
| 483 | 24.91 | 24.91 | 1 |
| 484 | 21.78 | 21.78 | 248 |
| 485 | 24.44 | 24.44 | 55 |
| 486 | 20.18 | 20.18 | 47 |
| 487 | 20.76 | 20.76 | 1 |
| 488 | 65.32 | 65.32 | 1 |
| 489 | 14.1 | 14.1 | 102 |
| 490 | 48.23 | 48.23 | 1 |
| 491 | 18.06 | 18.06 | 1 |
| 492 | 19.03 | 19.03 | 1 |
| 493 | 18.25 | 18.25 | 1 |
| 494 | 13.7 | 13.7 | 78 |
| 495 | 42.72 | 42.72 | 4 |
| 496 | 28.17 | 117.93 | 219 |
| 497 | 19.24 | 19.24 | 1 |
| 498 | 95.04 | 95.04 | 53 |
| 499 | 16.79 | 16.79 | 1 |
| 500 | 14.68 | 14.68 | 125 |
| 501 | 35.5 | 35.5 | 1 |
| 502 | 14.51 | 14.51 | 1 |
| 503 | 68.38 | 68.38 | 1 |
| 504 | 13.44 | 13.44 | 1 |
| 505 | 117.88 | 117.88 | 2 |
| 506 | 32.1 | 32.1 | 11 |
| 507 | 61.38 | 61.38 | 56 |
| 508 | 54.36 | 54.36 | 1 |
| 509 | 56.97 | 56.97 | 1 |
| 510 | 21.6 | 21.6 | 73 |
| 511 | 15.69 | 15.69 | 1 |
| 512 | 56.24 | 56.24 | 18 |
| 513 | 19.45 | 19.45 | 1 |
| 514 | 23.11 | 23.11 | 1 |
| 515 | 16.85 | 16.85 | 1 |
| 516 | 20.18 | 20.18 | 1 |
| 517 | 15.91 | 15.91 | 1 |
| 518 | 23.73 | 23.73 | 1 |
| 519 | 25.1 | 25.1 | 1 |
| 520 | 65.28 | 65.28 | 1 |
| 521 | 15.04 | 15.04 | 1 |
| 522 | 13.9 | 13.9 | 1 |
| 523 | 20.2 | 20.2 | 11 |
| 524 | 15.75 | 15.75 | 1 |
| 525 | 15.62 | 15.62 | 1 |
| 526 | 13.29 | 13.29 | 1 |
| 527 | 23.39 | 23.39 | 1 |
| 528 | 21.3 | 21.3 | 1 |
| 529 | 20.3 | 20.3 | 1 |
| 530 | 17.44 | 17.44 | 1 |
| 531 | 16.91 | 16.91 | 1 |
| 532 | 18.72 | 18.72 | 13 |

| Interruption | First Restoration (hours) after 12 hours | Final Restoration (hours) | Customers Affected |
|--------------|--|---------------------------|--------------------|
| 533 | 20.35 | 20.35 | 33 |
| 534 | 12.49 | 12.49 | 1 |
| 535 | 40.78 | 40.78 | 1 |
| 536 | 17.83 | 17.84 | 33 |
| 537 | 13.7 | 13.7 | 1 |
| 538 | 16.73 | 16.73 | 1 |
| 539 | 42.65 | 42.65 | 64 |
| 540 | 14.1 | 14.1 | 1 |
| 541 | 96.03 | 96.03 | 1 |
| 542 | 30.2 | 30.2 | 4 |
| 543 | 119.57 | 119.57 | 1 |
| 544 | 27.87 | 27.87 | 1 |
| 545 | 69.37 | 146.66 | 51 |
| 546 | 69.48 | 69.48 | 1 |
| 547 | 49.92 | 49.92 | 1 |
| 548 | 29.12 | 29.12 | 1 |
| 549 | 96.74 | 96.74 | 35 |
| 550 | 141.29 | 141.29 | 4 |
| 551 | 27.77 | 27.77 | 37 |
| 552 | 23.29 | 23.29 | 1 |
| 553 | 24.16 | 24.16 | 1 |
| 554 | 24.56 | 24.56 | 1 |
| 555 | 164.55 | 164.55 | 1 |
| 556 | 16.72 | 21.33 | 22 |
| 557 | 21.77 | 21.77 | 45 |
| 558 | 15.87 | 15.87 | 1 |
| 559 | 28.94 | 28.94 | 1 |
| 560 | 14.9 | 15.68 | 24 |
| 561 | 120.21 | 120.21 | 1 |
| 562 | 31.4 | 31.4 | 1 |
| 563 | 27 | 27 | 1 |
| 564 | 29.48 | 29.48 | 45 |
| 565 | 25.42 | 25.42 | 26 |
| 566 | 51.25 | 51.25 | 67 |
| 567 | 166.25 | 166.25 | 1 |
| 568 | 26.59 | 26.59 | 1 |
| 569 | 121.02 | 121.02 | 53 |
| 570 | 44.72 | 44.72 | 3 |
| 571 | 144.73 | 144.73 | 7 |
| 572 | 165.4 | 165.4 | 4 |
| 573 | 28.33 | 28.33 | 42 |
| 574 | 22.44 | 22.44 | 5 |
| 575 | 120.41 | 120.41 | 23 |
| 576 | 169.27 | 169.27 | 27 |
| 577 | 16.21 | 16.21 | 1 |
| 578 | 70.49 | 70.49 | 1 |
| 579 | 164.47 | 164.47 | 31 |
| 580 | 123.47 | 123.47 | 1 |
| 581 | 22.35 | 22.35 | 1 |
| 582 | 13.11 | 20.57 | 664 |
| 583 | 66.4 | 66.4 | 1 |
| 584 | 13.41 | 13.41 | 1 |
| 585 | 125.87 | 125.87 | 1 |
| 586 | 37.42 | 37.42 | 1 |
| 587 | 82.82 | 82.82 | 1 |
| 588 | 166.07 | 166.07 | 1 |
| 589 | 26.66 | 26.66 | 1 |
| 590 | 29.06 | 29.06 | 1 |
| 591 | 24.47 | 24.47 | 23 |
| 592 | 27.43 | 27.43 | 1 |

| Interruption | First Restoration (hours) after 12 hours | Final Restoration (hours) | Customers Affected |
|--------------|--|---------------------------|--------------------|
| 593 | 22.7 | 22.7 | 1 |
| 594 | 20.34 | 20.34 | 14 |
| 595 | 15.31 | 15.31 | 1 |
| 596 | 14.91 | 14.91 | 1 |
| 597 | 26.89 | 26.89 | 1 |
| 598 | 21.69 | 21.69 | 1 |
| 599 | 12.91 | 12.91 | 2 |
| 600 | 17.04 | 17.04 | 1 |
| 601 | 14.69 | 14.69 | 25 |
| 602 | 16.49 | 16.49 | 1 |
| 603 | 14.31 | 14.31 | 6 |
| 604 | 25.97 | 25.97 | 1 |
| 605 | 168.77 | 168.77 | 18 |
| 606 | 46.45 | 46.45 | 1 |
| 607 | 53.31 | 53.31 | 1 |
| 608 | 143.18 | 143.18 | 7 |
| 609 | 49.31 | 49.31 | 1 |
| 610 | 23.35 | 23.35 | 4 |
| 611 | 49.32 | 49.32 | 1 |
| 612 | 27.48 | 27.48 | 31 |
| 613 | 14.11 | 14.11 | 1 |
| 614 | 13.98 | 13.98 | 16 |
| 615 | 13.71 | 13.71 | 233 |
| 616 | 55.75 | 55.75 | 1 |
| 617 | 46.55 | 46.55 | 1 |
| 618 | 25.06 | 25.06 | 1 |
| 619 | 33.22 | 33.22 | 1 |
| 620 | 14.05 | 14.05 | 1 |
| 621 | 28.69 | 28.69 | 1 |
| 622 | 21.18 | 21.18 | 1 |
| 623 | 14.46 | 14.46 | 32 |
| 624 | 26.54 | 26.54 | 52 |
| 625 | 21.87 | 21.87 | 1 |
| 626 | 14.67 | 18.55 | 706 |
| 627 | 44.58 | 44.58 | 12 |
| 628 | 22.79 | 41.79 | 1,601 |
| 629 | 76.65 | 76.65 | 3 |
| 630 | 24.78 | 24.78 | 1 |
| 631 | 12.05 | 12.1 | 463 |
| 632 | 26.18 | 26.22 | 15 |
| 633 | 15.67 | 15.67 | 1 |
| 634 | 22.22 | 22.22 | 1 |
| 635 | 16.38 | 16.38 | 1 |
| 636 | 17.38 | 17.38 | 39 |
| 637 | 12.02 | 12.02 | 1 |
| 638 | 12.04 | 12.04 | 10 |
| 639 | 46.53 | 46.53 | 1 |
| 640 | 12.11 | 12.11 | 193 |
| 641 | 20.61 | 20.61 | 6 |
| 642 | 17.49 | 17.49 | 3 |
| 643 | 12.44 | 12.44 | 11 |
| 644 | 26.46 | 26.46 | 1 |
| 645 | 21.79 | 21.79 | 3 |
| 646 | 15.89 | 15.89 | 1 |
| 647 | 12.02 | 12.02 | 1 |
| 648 | 18.98 | 18.98 | 1 |
| 649 | 21.85 | 21.85 | 1 |
| 650 | 36.75 | 36.75 | 2 |
| 651 | 19.35 | 19.35 | 4 |
| 652 | 44.9 | 44.9 | 12 |

| Interruption | First Restoration (hours) after 12 hours | Final Restoration (hours) | Customers Affected |
|--------------|--|---------------------------|--------------------|
| 653 | 18.99 | 18.99 | 15 |
| 654 | 24.73 | 24.73 | 11 |
| 655 | 18.24 | 18.24 | 1 |
| 656 | 16.86 | 16.86 | 12 |
| 657 | 22.87 | 22.87 | 4 |
| 658 | 20.12 | 20.12 | 14 |
| 659 | 20.27 | 23.64 | 59 |
| 660 | 17.79 | 17.79 | 1 |
| 661 | 18.34 | 18.34 | 3 |
| 662 | 25.17 | 25.17 | 1 |
| 663 | 44.82 | 45.05 | 77 |
| 664 | 14.87 | 14.87 | 14 |
| 665 | 20.17 | 20.17 | 1 |
| 666 | 17.98 | 23.28 | 4 |
| 667 | 24.25 | 24.25 | 25 |
| 668 | 42.05 | 42.05 | 1 |
| 669 | 19.49 | 19.49 | 1 |
| 670 | 12.95 | 13.34 | 221 |
| 671 | 16.01 | 16.01 | 1 |
| 672 | 40.8 | 40.8 | 1 |
| 673 | 16.56 | 16.56 | 7 |
| 674 | 21.4 | 21.4 | 22 |
| 675 | 18.89 | 18.89 | 2 |
| 676 | 14.24 | 14.24 | 1 |
| 677 | 12.3 | 12.3 | 5 |
| 678 | 19.16 | 19.16 | 1 |
| 679 | 19.58 | 19.58 | 20 |
| 680 | 19.02 | 19.02 | 16 |
| 681 | 20.38 | 20.38 | 25 |
| 682 | 20.17 | 20.17 | 1 |
| 683 | 16.38 | 16.38 | 1 |
| 684 | 12.5 | 12.5 | 62 |
| 685 | 13.5 | 13.5 | 1 |
| 686 | 19.25 | 19.25 | 1 |
| 687 | 12.16 | 12.16 | 122 |
| 688 | 13.78 | 13.78 | 28 |
| 689 | 14.61 | 14.61 | 1 |
| 690 | 12.73 | 12.73 | 1 |
| 691 | 20.56 | 20.56 | 1 |
| 692 | 13.86 | 13.86 | 1 |
| 693 | 13.5 | 13.5 | 16 |
| 694 | 35.97 | 35.97 | 1 |
| 695 | 17.07 | 17.07 | 1 |
| 696 | 14.33 | 14.33 | 14 |
| 697 | 12.11 | 12.11 | 1 |
| 698 | 25.6 | 25.6 | 2 |
| 699 | 23.31 | 23.31 | 1 |
| 700 | 20.56 | 20.56 | 1 |
| 701 | 21.35 | 21.35 | 1 |
| 702 | 19.98 | 20.27 | 27 |
| 703 | 18.55 | 18.55 | 1 |
| 704 | 16.15 | 16.15 | 1 |
| 705 | 16.73 | 16.73 | 1 |
| 706 | 18.43 | 18.43 | 1 |
| 707 | 18.77 | 18.77 | 7 |
| 708 | 43.03 | 43.03 | 11 |
| 709 | 44.92 | 44.92 | 4 |
| 710 | 29.77 | 29.77 | 10 |
| 711 | 44.38 | 44.38 | 436 |
| 712 | 29.52 | 29.52 | 8 |

| Interruption | First Restoration (hours) after 12 hours | Final Restoration (hours) | Customers Affected |
|--------------|--|---------------------------|--------------------|
| 713 | 18.7 | 18.7 | 2 |
| 714 | 20.43 | 20.43 | 1 |
| 715 | 15.29 | 15.29 | 2 |
| 716 | 36.99 | 55.92 | 16 |
| 717 | 14.64 | 14.64 | 1 |
| 718 | 29.22 | 29.22 | 2 |
| 719 | 25.05 | 25.05 | 6 |
| 720 | 23.07 | 23.07 | 1 |
| 721 | 19.08 | 19.08 | 15 |
| 722 | 19.03 | 22.12 | 5 |
| 723 | 18.62 | 18.62 | 5 |
| 724 | 13.94 | 13.94 | 63 |
| 725 | 17.41 | 17.41 | 26 |
| 726 | 21.28 | 21.28 | 1 |
| 727 | 28.43 | 28.43 | 35 |
| 728 | 27.01 | 27.01 | 20 |
| 729 | 23.79 | 23.79 | 1 |
| 730 | 13.74 | 13.74 | 4 |
| 731 | 16.93 | 16.93 | 1 |
| 732 | 68.84 | 68.84 | 1 |
| 733 | 22.29 | 22.29 | 1 |
| 734 | 16.47 | 16.47 | 1 |
| 735 | 19.79 | 46.48 | 53 |
| 736 | 20.8 | 20.8 | 1 |
| 737 | 16.52 | 16.52 | 812 |
| 738 | 18.4 | 18.4 | 1 |
| 739 | 12.23 | 12.23 | 17 |
| 740 | 29.7 | 29.7 | 1 |
| 741 | 20.38 | 20.38 | 1 |
| 742 | 37.63 | 37.63 | 12 |
| 743 | 22.7 | 28.32 | 40 |
| 744 | 43.1 | 43.1 | 1 |
| 745 | 19.13 | 19.13 | 1 |
| 746 | 71.5 | 71.5 | 1 |
| 747 | 20.8 | 20.8 | 1 |
| 748 | 18.7 | 18.7 | 1 |
| 749 | 30.78 | 30.78 | 20 |
| 750 | 26.88 | 26.88 | 1 |
| 751 | 19.97 | 24.89 | 64 |
| 752 | 26.35 | 26.35 | 1 |
| 753 | 18.89 | 18.89 | 1 |
| 754 | 62.01 | 62.01 | 1 |
| 755 | 19 | 19 | 1 |
| 756 | 21.73 | 21.73 | 1 |
| 757 | 18.32 | 18.32 | 1 |
| 758 | 17.1 | 38.58 | 27 |
| 759 | 20.63 | 20.63 | 1 |
| 760 | 23.25 | 25.4 | 32 |
| 761 | 14.58 | 14.58 | 4 |
| 762 | 16.65 | 16.65 | 1 |
| 763 | 19.93 | 19.93 | 1 |
| 764 | 17.08 | 17.08 | 1 |
| 765 | 59.34 | 59.34 | 1 |
| 766 | 13.6 | 13.6 | 1 |
| 767 | 12.96 | 12.96 | 1 |
| 768 | 13.32 | 13.32 | 1 |
| 769 | 14.37 | 14.37 | 1 |
| 770 | 16.28 | 16.28 | 1 |
| 771 | 14.16 | 14.16 | 1 |
| 772 | 27.95 | 27.95 | 1 |

| Interruption | First Restoration (hours) after 12 hours | Final Restoration (hours) | Customers Affected |
|--------------|--|---------------------------|--------------------|
| 773 | 45.64 | 45.64 | 1 |
| 774 | 45.38 | 45.38 | 1 |
| 775 | 25.17 | 25.17 | 1 |
| 776 | 22.01 | 22.01 | 1 |
| 777 | 26.62 | 26.62 | 5 |
| 778 | 21.55 | 21.55 | 1 |
| 779 | 30.46 | 30.46 | 1 |
| 780 | 49.48 | 49.48 | 13 |
| 781 | 12.42 | 31.44 | 3,029 |
| 782 | 22.83 | 23.31 | 978 |
| 783 | 27.1 | 31.45 | 991 |
| 784 | 19.22 | 26.93 | 3,121 |
| 785 | 21.76 | 47.91 | 39 |
| 786 | 21.56 | 53.23 | 368 |
| 787 | 13.85 | 13.85 | 1 |
| 788 | 22.91 | 22.91 | 1 |
| 789 | 23.77 | 48.3 | 1,729 |
| 790 | 28.98 | 29.01 | 581 |
| 791 | 22.62 | 22.62 | 174 |
| 792 | 27.37 | 49.7 | 1,793 |
| 793 | 23.55 | 23.55 | 1 |
| 794 | 20.15 | 20.23 | 1,032 |
| 795 | 23.26 | 50.11 | 356 |
| 796 | 39.77 | 40.75 | 607 |
| 797 | 26.8 | 44.78 | 1,031 |
| 798 | 13.71 | 48.97 | 698 |
| 799 | 51.15 | 51.15 | 1 |
| 800 | 30.64 | 30.64 | 623 |
| 801 | 14.95 | 14.95 | 11 |
| 802 | 16.02 | 16.02 | 1 |
| 803 | 14.54 | 14.54 | 1 |
| 804 | 14.55 | 14.55 | 265 |
| 805 | 17.09 | 18.21 | 1,628 |
| 806 | 20.55 | 20.55 | 53 |
| 807 | 12.99 | 23.33 | 200 |
| 808 | 53.95 | 53.95 | 1 |
| 809 | 19.04 | 19.04 | 5 |
| 810 | 22.8 | 22.8 | 77 |
| 811 | 24.55 | 24.55 | 1 |
| 812 | 16.87 | 16.87 | 124 |
| 813 | 21.33 | 21.33 | 1 |
| 814 | 24.49 | 24.49 | 1 |
| 815 | 13.58 | 13.59 | 500 |
| 816 | 18.23 | 18.23 | 104 |
| 817 | 43.48 | 43.48 | 1 |
| 818 | 20.1 | 20.1 | 97 |
| 819 | 14.72 | 14.72 | 1 |
| 820 | 18.07 | 18.07 | 1 |
| 821 | 18.56 | 18.56 | 1 |
| 822 | 17.23 | 17.23 | 1 |
| 823 | 16.53 | 16.53 | 71 |
| 824 | 12.47 | 12.47 | 182 |
| 825 | 20.24 | 20.24 | 1 |
| 826 | 14.08 | 14.08 | 95 |
| 827 | 20.64 | 20.64 | 1 |
| 828 | 20.13 | 20.13 | 1 |
| 829 | 20.17 | 20.17 | 4 |
| 830 | 13.15 | 16.82 | 734 |
| 831 | 13.81 | 13.81 | 1 |
| 832 | 19.66 | 19.66 | 24 |

| Interruption | First Restoration (hours) after 12 hours | Final Restoration (hours) | Customers Affected |
|--------------|--|---------------------------|--------------------|
| 833 | 17.88 | 17.88 | 1 |
| 834 | 18.87 | 19.47 | 53 |
| 835 | 13.91 | 13.91 | 1 |
| 836 | 17.79 | 17.79 | 118 |
| 837 | 29.33 | 29.33 | 156 |
| 838 | 17.51 | 17.51 | 34 |
| 839 | 21.47 | 28.35 | 216 |
| 840 | 40.73 | 40.73 | 1 |
| 841 | 16.03 | 16.03 | 39 |
| 842 | 14.25 | 14.25 | 1 |
| 843 | 14.8 | 14.8 | 8 |
| 844 | 14.88 | 14.88 | 1 |
| 845 | 25.85 | 25.85 | 64 |
| 846 | 15.69 | 15.69 | 7 |
| 847 | 12.87 | 12.87 | 1 |
| 848 | 17.9 | 17.9 | 1 |
| 849 | 30.96 | 30.96 | 1 |
| 850 | 12.83 | 12.83 | 4 |
| 851 | 19.86 | 19.86 | 251 |
| 852 | 35.66 | 35.66 | 108 |
| 853 | 48.03 | 48.03 | 1 |
| 854 | 19.63 | 19.63 | 88 |
| 855 | 45.96 | 45.96 | 1 |
| 856 | 22.36 | 22.36 | 1 |
| 857 | 17.51 | 17.51 | 2 |
| 858 | 23.58 | 23.58 | 3 |
| 859 | 12 | 12 | 1 |
| 860 | 21.75 | 21.75 | 12 |
| 861 | 23.09 | 23.09 | 27 |
| 862 | 30.68 | 30.68 | 1 |
| 863 | 23.73 | 23.73 | 7 |
| 864 | 18.75 | 18.75 | 1 |
| 865 | 25.39 | 25.39 | 1 |
| 866 | 36.71 | 36.71 | 1 |
| 867 | 24.47 | 24.47 | 1 |
| 868 | 59.08 | 59.08 | 35 |
| 869 | 17.07 | 17.07 | 1 |
| 870 | 23.31 | 23.31 | 1 |
| 871 | 43.65 | 43.65 | 2 |
| 872 | 27.24 | 27.24 | 93 |
| 873 | 40.47 | 40.47 | 275 |
| 874 | 18.37 | 18.37 | 134 |
| 875 | 28.97 | 28.97 | 4 |
| 876 | 28.83 | 28.83 | 51 |
| 877 | 40.31 | 40.31 | 148 |
| 878 | 15.68 | 15.68 | 1 |
| 879 | 45.01 | 45.01 | 4 |
| 880 | 48.26 | 48.26 | 2 |
| 881 | 18.12 | 18.12 | 1 |
| 882 | 14.33 | 15.74 | 5 |
| 883 | 46.09 | 46.09 | 22 |
| 884 | 54.67 | 54.67 | 29 |
| 885 | 24.96 | 24.96 | 51 |
| 886 | 45.63 | 45.63 | 21 |
| 887 | 12.67 | 12.67 | 1 |
| 888 | 14.92 | 14.92 | 1 |
| 889 | 35.29 | 35.29 | 1 |
| 890 | 38.42 | 38.42 | 1 |
| 891 | 54.67 | 54.7 | 32 |
| 892 | 50.68 | 50.68 | 36 |

| Interruption | First Restoration (hours) after 12 hours | Final Restoration (hours) | Customers Affected |
|--------------|--|---------------------------|--------------------|
| 893 | 43.59 | 43.59 | 23 |
| 894 | 14.56 | 14.56 | 1 |
| 895 | 22.38 | 22.38 | 52 |
| 896 | 36.87 | 36.87 | 23 |
| 897 | 20.67 | 20.67 | 44 |
| 898 | 14.12 | 14.12 | 136 |
| 899 | 15.84 | 15.84 | 1 |
| 900 | 16.99 | 16.99 | 38 |
| 901 | 25.53 | 25.53 | 14 |
| 902 | 22.95 | 22.95 | 1 |
| 903 | 22.62 | 22.62 | 5 |
| 904 | 25.42 | 25.42 | 1 |
| 905 | 76.13 | 76.13 | 2 |
| 906 | 69.6 | 69.6 | 17 |
| 907 | 18.7 | 18.7 | 1 |
| 908 | 18.11 | 18.11 | 1 |
| 909 | 15.72 | 15.72 | 1 |
| 910 | 20.26 | 20.26 | 1 |
| 911 | 16.06 | 16.06 | 1 |
| 912 | 15.34 | 15.34 | 1 |
| 913 | 18.22 | 18.22 | 1 |
| 914 | 12.48 | 12.48 | 1 |
| 915 | 23.1 | 23.1 | 1 |
| 916 | 13.46 | 13.46 | 1 |
| 917 | 59.28 | 59.28 | 24 |
| 918 | 14.59 | 14.59 | 52 |
| 919 | 16.91 | 16.91 | 1 |
| 920 | 12.23 | 12.23 | 53 |
| 921 | 91.73 | 91.73 | 1 |
| 922 | 26.71 | 26.71 | 1 |
| 923 | 13.95 | 13.95 | 1 |
| 924 | 14.37 | 14.37 | 1 |
| 925 | 19.2 | 19.2 | 1 |
| 926 | 19.36 | 19.36 | 1 |
| 927 | 18.87 | 18.87 | 1 |
| 928 | 13.06 | 13.06 | 1 |
| 929 | 23.72 | 23.72 | 3 |
| 930 | 17.05 | 17.05 | 16 |
| 931 | 12.07 | 12.07 | 78 |
| 932 | 17.51 | 17.51 | 87 |
| 933 | 19.2 | 19.2 | 73 |
| 934 | 20.63 | 20.63 | 1 |
| 935 | 40.59 | 40.59 | 180 |
| 936 | 15.38 | 15.38 | 5 |
| 937 | 50.91 | 50.91 | 1 |
| 938 | 19.06 | 19.06 | 1 |
| 939 | 13.21 | 13.21 | 16 |
| 940 | 12.29 | 12.29 | 52 |
| 941 | 12.99 | 88.46 | 23 |
| 942 | 18.65 | 18.65 | 1 |
| 943 | 13.59 | 13.59 | 1 |
| 944 | 13.4 | 13.4 | 1 |
| 945 | 20.51 | 20.51 | 24 |
| 946 | 17.85 | 17.85 | 1 |
| 947 | 17.83 | 17.83 | 1 |
| 948 | 21.58 | 21.58 | 4 |
| 949 | 21.72 | 21.72 | 27 |
| 950 | 15.93 | 15.93 | 1 |
| 951 | 19.9 | 19.9 | 1 |
| 952 | 18.67 | 18.67 | 15 |

| Interruption | First Restoration (hours) after 12 hours | Final Restoration (hours) | Customers Affected |
|--------------|--|---------------------------|--------------------|
| 953 | 15.95 | 15.95 | 1 |
| 954 | 15.96 | 15.96 | 1 |
| 955 | 45.68 | 45.68 | 6 |
| 956 | 18.07 | 18.07 | 2 |
| 957 | 16.05 | 16.05 | 12 |
| 958 | 21.77 | 21.77 | 4 |
| 959 | 15.52 | 15.52 | 15 |
| 960 | 12.5 | 12.5 | 1 |
| 961 | 25.59 | 25.59 | 1 |
| 962 | 14.64 | 14.64 | 1 |
| 963 | 12.56 | 14.91 | 25 |
| 964 | 14.76 | 14.76 | 1 |
| 965 | 14.05 | 18.74 | 645 |
| 966 | 15.02 | 15.02 | 1 |
| 967 | 13.84 | 13.84 | 1 |
| 968 | 15.81 | 15.81 | 10 |
| 969 | 12.7 | 12.7 | 14 |
| 970 | 16.32 | 16.32 | 1 |
| 971 | 18.73 | 18.73 | 1 |
| 972 | 28.55 | 28.55 | 1 |
| 973 | 15.88 | 15.88 | 1 |
| 974 | 16.96 | 16.96 | 1 |
| 975 | 12.55 | 12.55 | 1 |
| 976 | 12.53 | 12.53 | 1 |
| 977 | 26.15 | 26.15 | 1 |
| 978 | 25.29 | 25.29 | 1 |
| 979 | 17.02 | 17.02 | 1 |
| 980 | 17.66 | 17.66 | 1 |
| 981 | 18.11 | 18.11 | 29 |
| 982 | 16.32 | 16.32 | 7 |
| 983 | 15.69 | 15.69 | 1 |
| 984 | 32.37 | 32.37 | 1 |
| 985 | 16.21 | 16.21 | 12 |
| 986 | 14.28 | 14.28 | 1 |
| 987 | 16.49 | 16.49 | 5 |
| 988 | 19.6 | 19.6 | 1 |
| 989 | 22.42 | 22.42 | 4 |
| 990 | 21.78 | 21.78 | 1 |
| 991 | 13.45 | 13.45 | 1 |
| 992 | 26.88 | 26.88 | 1 |
| 993 | 12.98 | 12.98 | 39 |
| 994 | 23.47 | 23.47 | 9 |
| 995 | 16.32 | 16.32 | 178 |
| 996 | 14.98 | 14.98 | 1 |
| 997 | 13.85 | 13.85 | 1 |
| 998 | 20.09 | 20.09 | 2 |
| 999 | 13.88 | 13.88 | 1 |
| 1,000 | 17.74 | 17.74 | 1 |
| 1,001 | 15.96 | 15.96 | 186 |
| 1,002 | 32.04 | 32.04 | 1 |
| 1,003 | 14.65 | 14.65 | 1 |
| 1,004 | 13.39 | 13.39 | 1 |
| 1,005 | 15.45 | 15.45 | 1 |
| 1,006 | 14.92 | 14.92 | 1 |
| 1,007 | 128.14 | 128.14 | 1 |
| 1,008 | 15.73 | 15.73 | 1 |
| 1,009 | 44.95 | 44.95 | 1 |
| 1,010 | 22.23 | 22.23 | 49 |
| 1,011 | 16.39 | 16.39 | 1 |
| 1,012 | 12.32 | 12.32 | 1 |

| Interruption | First Restoration (hours) after 12 hours | Final Restoration (hours) | Customers Affected |
|--------------|--|---------------------------|--------------------|
| 1,013 | 15.74 | 15.74 | 1 |
| 1,014 | 12.49 | 12.49 | 1 |
| 1,015 | 20.49 | 20.49 | 1 |
| 1,016 | 17.39 | 17.39 | 1 |
| 1,017 | 44.23 | 44.23 | 134 |
| 1,018 | 14.2 | 14.22 | 218 |
| 1,019 | 13.83 | 13.83 | 71 |
| 1,020 | 12.48 | 12.48 | 1 |
| 1,021 | 15.19 | 15.19 | 1 |
| 1,022 | 13.54 | 13.54 | 1 |
| 1,023 | 15.5 | 15.5 | 30 |
| 1,024 | 14.23 | 14.23 | 2 |
| 1,025 | 21.19 | 21.19 | 1 |
| 1,026 | 13.82 | 13.82 | 6 |
| 1,027 | 16.89 | 16.89 | 1 |
| 1,028 | 14 | 14 | 1 |
| 1,029 | 20.01 | 20.01 | 1 |
| 1,030 | 13.34 | 13.34 | 28 |
| 1,031 | 13.87 | 13.87 | 1 |
| 1,032 | 12.03 | 12.03 | 1 |
| 1,033 | 12.85 | 12.85 | 11 |
| 1,034 | 13.41 | 13.41 | 10 |
| 1,035 | 22.59 | 22.59 | 1 |
| 1,036 | 12.24 | 12.24 | 3 |
| 1,037 | 12.09 | 12.09 | 8 |
| 1,038 | 20.51 | 20.51 | 1 |
| 1,039 | 12.08 | 12.08 | 1 |
| 1,040 | 12.08 | 12.08 | 20 |
| 1,041 | 22.78 | 22.78 | 2 |
| 1,042 | 20.32 | 20.32 | 1 |
| 1,043 | 27.59 | 27.59 | 26 |
| 1,044 | 16.79 | 16.79 | 14 |
| 1,045 | 21.64 | 21.64 | 3 |
| 1,046 | 23.21 | 23.21 | 5 |
| 1,047 | 13.15 | 13.15 | 411 |
| 1,048 | 21.96 | 21.96 | 1 |
| 1,049 | 22.04 | 22.04 | 50 |
| 1,050 | 16.71 | 16.71 | 2 |
| 1,051 | 26.49 | 26.87 | 66 |
| 1,052 | 23.39 | 23.39 | 37 |
| 1,053 | 13.43 | 13.43 | 1 |
| 1,054 | 19.08 | 19.08 | 1 |
| 1,055 | 12.03 | 12.03 | 1 |
| 1,056 | 12.43 | 12.43 | 1 |
| 1,057 | 12.47 | 12.47 | 1 |
| 1,058 | 17.01 | 17.01 | 1 |
| 1,059 | 12.12 | 13 | 4 |
| 1,060 | 13.69 | 13.69 | 2 |
| 1,061 | 36.2 | 36.2 | 96 |
| 1,062 | 12.16 | 12.16 | 1 |
| 1,063 | 14.31 | 14.31 | 1 |
| 1,064 | 14.31 | 14.31 | 113 |
| 1,065 | 13.58 | 13.58 | 11 |
| 1,066 | 14.55 | 14.55 | 1 |
| 1,067 | 14.85 | 14.85 | 71 |
| 1,068 | 20.71 | 20.71 | 1 |
| 1,069 | 18.06 | 22.46 | 55 |
| 1,070 | 16.47 | 16.47 | 1 |
| 1,071 | 14.51 | 14.51 | 1 |
| 1,072 | 16.38 | 16.38 | 1 |

| Interruption | First Restoration (hours) after 12 hours | Final Restoration (hours) | Customers Affected |
|--------------|--|---------------------------|--------------------|
| 1,073 | 23.27 | 23.27 | 1 |
| 1,074 | 15.95 | 15.95 | 1 |
| 1,075 | 15.12 | 15.12 | 1 |
| 1,076 | 12.46 | 12.46 | 50 |
| 1,077 | 25.19 | 25.2 | 12 |
| 1,078 | 18 | 18 | 1 |
| 1,079 | 16.65 | 16.65 | 15 |
| 1,080 | 12.56 | 12.56 | 1 |
| 1,081 | 12.02 | 12.02 | 61 |
| 1,082 | 12.02 | 12.02 | 1 |
| 1,083 | 13.87 | 13.87 | 18 |
| 1,084 | 21.75 | 21.75 | 1 |
| 1,085 | 14.4 | 14.4 | 239 |
| 1,086 | 25.93 | 25.93 | 1 |
| 1,087 | 15.79 | 15.79 | 7 |
| 1,088 | 16.83 | 16.83 | 1 |
| 1,089 | 21.07 | 21.07 | 1 |
| 1,090 | 18.84 | 18.84 | 1 |
| 1,091 | 17.8 | 17.8 | 1 |
| 1,092 | 15.02 | 15.02 | 1 |
| 1,093 | 12.3 | 12.3 | 1 |
| 1,094 | 17.42 | 17.42 | 78 |
| 1,095 | 13.28 | 13.28 | 1 |
| 1,096 | 13.27 | 13.27 | 1 |
| 1,097 | 12.65 | 12.65 | 81 |
| 1,098 | 17.63 | 17.63 | 5 |
| 1,099 | 16.96 | 16.96 | 1 |
| 1,100 | 14.85 | 14.85 | 17 |
| 1,101 | 14.63 | 14.63 | 22 |
| 1,102 | 12.77 | 12.77 | 43 |
| 1,103 | 13.29 | 13.29 | 1 |
| 1,104 | 12.26 | 26.58 | 1,062 |
| 1,105 | 14.49 | 14.49 | 1 |
| 1,106 | 14.25 | 28.53 | 32 |
| 1,107 | 26.54 | 26.54 | 1 |
| 1,108 | 24.58 | 24.58 | 17 |
| 1,109 | 19.07 | 19.07 | 1 |
| 1,110 | 24.68 | 24.68 | 3 |
| 1,111 | 12.74 | 12.74 | 4 |
| 1,112 | 18.67 | 18.67 | 1 |
| 1,113 | 18.44 | 18.44 | 21 |
| 1,114 | 14.49 | 14.49 | 1 |
| 1,115 | 15.04 | 15.04 | 8 |
| 1,116 | 13.32 | 13.32 | 15 |
| 1,117 | 21.62 | 21.62 | 1 |
| 1,118 | 21.16 | 21.16 | 79 |