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Project No. 39339

REPORT FOR ELECTRIC UTILITY INFRASTRUCTURE STORM HARDENING REQUIRED BY 16 TEX. ADMIN. CODE § 25.95	§ § § § § §	**PUBLIC UTILITY COMMISSION OF TEXAS**

AEP TEXAS INC.'S SUMMARY ON ELECTRIC UTILITY INFRASTRUCTURE STORM HARDENING REQUIRED BY 16 TEX. ADMIN. CODE § 25.95

NOW COMES AEP Texas Inc. (AEP Texas or the Company), American Electric Power operating company and files the attached Summary of the Company's Storm Hardening Plan for the Five-Year Period of 2020-2024 pursuant to 16 Tex. Admin. Code § 25.95 (TAC).

Dated: April 30, 2020

Respectfully submitted,

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By: _____
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ATTORNEY FOR AEP TEXAS INC.

AEP TEXAS INC.'S SUMMARY ON ELECTRIC UTILITY INFRASTRUCTURE STORM HARDENING REQUIRED BY 16 TEX. ADMIN. CODE § 25.95

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§25.95. Electric Utility Infrastructure Storm Hardening.

(e) Updating and contents of Storm Hardening Plan. A utility's Storm Hardening Plan shall be updated at least every five years and shall include, at a minimum, the utility's:

(1) Construction standards, policies, procedures, and practices employed to enhance the reliability of utility systems, including overhead and underground transmission and distribution facilities;

Distribution Response:

AEP Texas has taken steps seeking to strengthen its distribution system to withstand extreme weather conditions and minimize customer outage time. AEP Texas already adheres to and carries out a number of hardening activities. The Company currently designs, builds and maintains its distribution facilities in its Central and North division service areas to meet and/or exceed the current National Electric Safety Code (NESC) and American National Standard Institute (ANSI) standards established for its particular geographic areas. These standards establish guidelines for the practical safeguarding of persons during the installation, operation and maintenance of electric lines and associated equipment. The NESC and ANSI standards contain the basic provisions that are considered necessary for the safety of employees and the public under the specified conditions, and also include provisions for areas susceptible to hurricane force winds.

Although the current version of the NESC exempts structures less than 60 feet above ground or water level from the extreme wind loading criteria, AEP Texas designs new and replacement facilities to the NESC extreme wind loading criteria. Currently, the distribution line designs described in the following are used for Grade C distribution and joint use construction on structures and attachments under 60 feet in height. Where the NESC Extreme Wind Loading criteria are from 130 MPH to 140 MPH, AEP Texas uses a distribution line design that meets a wind loading of 150 MPH. Where the NESC Extreme Wind Loading criteria are from 120 MPH to 130 MPH, AEP Texas uses a distribution line design that meets a wind loading of 130 MPH. For all other Extreme Wind Loading designations, AEP Texas uses a distribution line design of 88 MPH wind loading requirements. AEP has established a minimum of 88 MPH as a corporate standard. This exceeds the 60 MPH standard for distribution facilities less than 60 feet in height.

Designers at AEP Texas utilize a computer based design program where the design is accomplished by the selection of the construction units necessary to provide the required service. This method provides for standardization of construction, materials, engineering design practices, ease of restoration, leveraged purchasing power and provision for public and employee safety. To enable this method of design, AEP Service Corporation in support of AEP Texas maintains catalogues of standard construction designs (Distribution Standards Manual) and approved standard materials (Construction Units Manual)[1]. A specific work group within the distribution engineering organization is assigned the task of reviewing potential changes, additions or enhancements to these standards with input from field personnel and industry resources. AEP Texas standards include the use of non-corrosive equipment in coastal areas subject to significant salt contamination. When needed, testing is done at a central facility for purposes of determining the adequacy of materials or standard designs.

Transmission Response:

AEP Texas currently designs, builds and maintains its transmission facilities to meet and/or exceed the current NESC and ANSI standards established for its particular geographic areas. AEP Texas also adheres to standards set forth through the NESC and Electric Reliability Council of Texas (ERCOT) guidelines. These standards establish guidelines for the practical safeguarding of persons during the installation, operation and maintenance of electric lines and associated equipment. The NESC and ANSI standards contain the basic provisions that are considered necessary for the safety of employees and the public under the specified conditions, and also include provisions for areas susceptible to hurricane force winds. AEP Texas exceeds the NESC extreme wind criteria standard by using a 140 mph wind speed criteria on its transmission line designs within approximately 50 miles of the coast.

[1] Copies of the Distribution Standards Manual and Construction Units Manual will be available at the AEP Texas offices.

(2) Vegetation Management Plan for distribution facilities, including a tree pruning methodology and pruning cycle, hazard tree identification and mitigation plans, and customer education and notification practices related to vegetation management;

Pursuant to 16 TAC §25.96(c), AEP Texas has provided its Vegetation Management summary report in its Report filing in Project No. 41831.

(3) Plans and procedures to consider infrastructure improvements for its distribution system based on smart grid concepts that provide enhanced outage resilience, faster outage restoration, and/or grid self-healing;

Distribution Response:

Through the Company's Advanced Metering Infrastructure (AMI) initiative, AEP Texas has integrated current AMI technology with its Outage Management System (OMS). The combination of the AMI technology and the OMS enhances system reliability by assisting in the self-healing and restoration process. The AMI, along with the Supervisory Control and Data Acquisition (SCADA) system, helps identify the location and scope of an outage by combining information from multiple advanced meters in the area. This will provide a quicker outage restoration process. The AMI radio system is presently being used as the communication medium for the sectionalizing and circuit reconfiguration schemes that are now operational. These schemes will become more powerful and numerous in the future as new distribution infrastructure is added, which will allow them to make sectionalizing and reconfiguration decisions based on real-time system readings and corresponding circuit analysis. These readings, taken from many field devices, along with the programmed intelligence of a central operating system, will allow circuit reconfiguration schemes to expand well beyond what was possible given the limitations of older technology. All of the information transfer between line and substation devices will be communicated via the AMI radio system.

AEP Texas uses the AMI system to detect and report abnormal voltages on the distribution system which can improve customer distribution service satisfaction. When a high voltage is detected, reports are generated to indicate the meters that recorded elevated voltages for multiple intervals. The location of the transformer serving these meters is then relayed to local service technicians that make a determination regarding whether the high voltage reading is valid or a malfunction of the meter. Using this process, the cause for the high voltage can be

remedied during normal working hours using scheduled clearances because the problem is identified prior to an equipment failure.

(4) Plans and procedures to enhance post storm damage assessment, including enhanced data collection methods for damaged poles and fallen trees;

Distribution Response:

AEP Texas employs a damage assessment procedure for failures of distribution equipment using tools such as laptops, handheld data collection devices and drones to report specific pole damage including conductor, attachments and equipment installed on damaged poles. This data is available to designers and standards engineers to analyze in order to identify failure trends or limitations in designs that can be improved. Field damage assessment personnel also provide specific information concerning a failure if a design or material improvement opportunity is identified.

In the event that a hurricane or other event impacts the AEP Texas territory, the failure causes noted in damage assessment reports will be analyzed to identify opportunities to increase the ability of designs to withstand high winds. AEP Texas continues to evaluate and analyze post storm damage assessment to determine improvement opportunities for enhanced data collection.

Transmission Response:

AEP Texas utilizes an emergency patrol for transmission damage assessment. An emergency patrol is normally driven by unplanned events such as transmission line operational problems, storms, outages, etc. Emergency patrol may be performed from an aircraft or by walking, driving or some combination thereof, as needed to quickly identify major defects.

The results of the emergency patrol are communicated to AEP's Transmission Dispatch Center. The Transmission Dispatch Center notes a cause code for each outage in the Transmission Outage Reporting database. Cause codes provide information that assist in determining if the outage was weather, equipment failure, or vegetation related.

Also, emergency patrol results are communicated to AEP's Transmission Maintenance personnel who coordinate material and labor for repairs. Conditions are documented via either paper, video or voice recording and then are mitigated or entered into an Integrated Transmission

Information System database for repairs per AEP guidelines. If coordination to rectify a vegetation issue is needed, the results of the patrol are also communicated to AEP's Transmission Forestry personnel.

(5) Transmission and distribution pole construction standards, pole attachment policies, and pole testing schedule;

Distribution Response:

AEP Texas' pole construction standards are addressed in the overall construction standards noted in (e)(1) above. Proposed third party attachments are reviewed for every distribution pole and a structural analysis is performed to identify needed construction to maintain structural requirements consistent with the standards. AEP Texas has a ground line inspection program for wood distribution poles with a 10 year inspection and treatment cycle. The program calls for an excavation inspection and ground line treatment of poles that show excess deterioration. Poles that are found to be in a state of deterioration are submitted for replacement. The inspection and treatment cycle for this program is under review.

Transmission Response:

As stated above, AEP Texas currently designs, builds and maintains its transmission facilities to meet and/or exceed the current NESC and ANSI standards established for its particular geographic areas. AEP Texas' policy generally does not allow attachments to Company transmission poles. Special exception requests for consideration will be forwarded to AEP's Transmission Line Engineering Department for review. The AEP Texas guidelines for wood pole, ground line inspections and treatment are as follows:

- 12 year frequency for wood poles in AWPA decay zone 5; and
- 15 year frequency for wood poles in AWPA decay zone 3 & 4.

Aerial inspections are completed once per year on all lines. Comprehensive inspections are completed for each line on a frequency between five and twelve years depending on structure material and location.

(6) **Distribution feeder inspection schedule;**

Distribution Response:

AEP Texas has several different inspection schedules which vary depending on the type and location of facilities being inspected.

Distribution Feeder Inspections

Cyclic – AEP Texas has implemented an inspection program that focuses attention to the Feeder Breaker Zone (FBZ). The FBZ is defined as all of the distribution facilities between the substation and the first automatic sectionalizing device. A team reviewing reliability enhancement techniques recognized that outages in this zone affect all customers on the feeder and recommended a shorter time-period between inspections. The program recommends inspections within the FBZ on three year intervals and all facilities outside the FBZ on six year intervals. The program consists of a visual inspection of poles, conductors, pole-mounted equipment (transformers, regulators, reclosers, capacitors, etc.) and related materials (insulators, brackets, terminations, cutouts, surge arresters, etc.). It includes inspection of foreign attachments (CATV, telephone, etc.) to the Companies' poles for any safety related electrical or mechanical defects. Electrical and mechanical defects observed are identified and the information is collected so appropriate corrective action can be taken. This program does not preclude more frequent system inspections in small areas based on either requests from local personnel or a noticeable increase in failure related outages.

Targeted Circuit – Circuits are chosen based on an analysis of the circuit's System Average Interruption Frequency Index and/or System Average Interruption Duration Index for the past year. A recommendation and action plan is generated to address specific circuit issues following the analysis of the cause, location, duration and frequency of the outages. The recommendation might include a field inspection, protective coordination study, lightning protection, tree trimming or installation of sectionalizing devices.

Daily Activities – In addition to the specific programs mentioned above, field personnel, in the course of their normal daily activities, observe the condition of the facilities and report any issues

that would affect the reliability of the electric system. Crews have the latitude to stop and correct issues if they think failure is imminent. In addition, during outages, response equipment that does not work properly is reported to the dispatch group and captured in the Abnormal Equipment Database.

(7) Plans and procedures to enhance the reliability of overhead and underground transmission and distribution facilities through the use of transmission and distribution automation;

Distribution Response:

Most of the transmission and distribution automation that has been implemented at AEP Texas involves sectionalizing in response to an over-current or loss of voltage. This has been the simplest and most available means of reducing the number of customers affected by a system failure. In addition to these automatic sectionalizing devices, AEP Texas utilizes manual sectionalizing switches (both pole mounted and pad mounted). These switches are strategically placed along feeders and taps at locations which enable isolation of damaged equipment and restoration of service to as many customers as possible while repairs are made. Fault indicating devices have been installed at many of these manual switches. These devices provide valuable information, which help make the decisions about how to proceed with service restoration. All decisions concerning the operation of any manually operated switches are made at the central dispatch center.

In recent years, AEP Texas has added SCADA to most of its distribution and transmission substations. The use of SCADA has added the capability of analyzing system problems and improved the response to such transmission and distribution problems. SCADA requires some means of communication from the field to the dispatch office and it requires relaying and communication equipment in the substation that is capable of sending information and receiving commands. AEP Texas will use a prioritized list of non-SCADA substations as a guide for future growth to the SCADA system.

Because SCADA communication was first introduced to Company substations, automation was initially added to the transmission system. This has been accomplished via automated sectionalizing switches, which are usually located in a line section between two

substations with over-current/reclosing devices. These switches are strategically placed to maintain service to as many customers as possible.

As noted in the Company's response to (e)(3), the communication system that is used for automated meter reading is now being used to implement automation on the distribution system in a manner that still provides the safety the Company requires for their employees. AEP Texas is working with manufacturers to review switching products that allow for further automation of the distribution system. AEP Texas currently has loop automation schemes that utilize both reclosers and switches. The newest of these schemes employ Intellirupter switches with pulse closing technology. These switches coordinate with each other and substation breakers to restore power to unfaulted sections of the system, speed location of faults and protect equipment from excessive fault operations. In addition to using this communication system to monitor and control advanced automated switches, AEP Texas is also investigating the viability of using this network to provide feedback from the fault indicating devices which are located at the manually operated switches mentioned above. This will speed up the decision making process because the dispatcher will have access to this information before the arrival of field personnel. These Smart Grid applications aid in limiting the effects of localized extreme weather events and accelerate the repair and service restoration activities.

Transmission Response:

AEP Texas currently designs its transmission system for SCADA. SCADA allows display of real time status such as voltage and currents and allows control to operationally important transmission switches and transmission breakers by dispatchers. SCADA provides for improved response to problems on the transmission system.

AEP Texas also currently designs its transmission system with microprocessor relays, which provide protection to the power system. Other features provided by these microprocessor relays are control, monitoring, fault location and limited fault recording. Digital fault recorders (DFRs) are also available, in selected locations throughout the system to record faults. Data is available following the event, through these relays and DFRs, to help with event analysis and to enhance reliability.

(8) Plans and procedures to comply with the most recent National Electric Safety Code (NESC) wind loading standards in hurricane prone areas for new construction and rebuilds of the transmission and distribution system;

Distribution Response:

Although the current version of the NESC exempts structures less than 60 feet above ground or water level from the extreme wind loading criteria, AEP Texas designs new and replacement facilities to the NESC extreme wind loading criteria. Currently, the following distribution line designs are used for Grade C distribution and joint use construction on structures and attachments under 60 feet in height. Where the NESC Extreme Wind Loading criteria are from 130 MPH to 140 MPH, AEP Texas uses a distribution line design that meets a wind loading of 150 MPH. Where the NESC Extreme Wind Loading criteria are from 120 MPH to 130 MPH, AEP Texas uses a distribution line design that meets a wind loading of 130 MPH. For all other Extreme Wind Loading designations, AEP Texas uses a distribution line design of 88 MPH wind loading requirements. AEP has established a minimum of 88 MPH as a corporate standard. This exceeds the 60 MPH standard for distribution facilities less than 60 feet in height.

Transmission Response:

AEP Texas currently designs, builds and maintains its transmission facilities to meet or exceed the current NESC standards. The NESC contains basic provisions that are considered necessary for the safety of employees and the public under the specified conditions, and also includes provisions for areas susceptible to hurricane force winds. AEP Texas exceeds the NESC extreme wind criteria standard by using a 140 mph wind speed criteria on its transmission line designs within approximately 50 miles of the coast.

(9) Plans and procedures to review new construction and rebuilds to the distribution system to determine whether they should be built to NESC Grade B (or equivalent) standards;

AEP Texas adheres to Grade B Construction standards according to the NESC, such as when lines cross over another overhead utility, railroad track, highways, navigable waterways or other geographic features for which a failure of the overhead line has special consequences. Additionally, AEP Texas' distribution engineering designers are trained to use Grade B Construction standards where lines are built in inaccessible areas, specific structures are required for long span lengths to prevent cascading failures, and customers require a higher degree of reliability.

10) Plans and procedures to develop a damage/outage prediction model for the transmission and distribution system;

Distribution Response:

Damage prediction models are useful for preparations to respond to predictable weather events. Hurricanes and ice storms can usually be predicted with some accuracy with enough lead time to prepare. Other weather events such as thunderstorms, wild fires and tornados, while somewhat predictable, typically occur without lead time to prepare a specific response.

1. Thunderstorms, Tornados, Wild Fires and Ice Storms – The procedures at AEP Texas for short notice weather events is centered on ensuring availability of response personnel. These personnel include employees from supply chain, service, line and engineering. Each group of employees is familiar with the type of tasks that might be required of them and are on-call for service after notification of an eminent weather event.
2. Hurricanes - AEP Texas has developed a model that attempts to predict the amount of damage to the distribution system given a storm's size and wind speed. Historical damage percentages are used for each storm wind category. Actual distribution line data is imported from an electronic mapping system. The user inputs the wind speed for each area, and the model predicts the number of downed poles, feet of damaged primary and secondary and the total estimated man-hours of repair time. These numbers are used to predict the number of needed personnel by work area, estimated material needed, and the

number of days to complete the restoration. The model is used extensively for storm preparation drill, and for actual pre-storm planning.

Transmission Response:

AEP Texas has developed a model for damage/outage prediction during hurricanes using data from its transmission line databases and data provided by the National Hurricane Center. This model has been tested using historical records.

(11) Plans and procedures for use of structures owned by other entities in the provision of distribution service, such as poles owned by telecommunications utilities; and

Distribution Response:

AEP Texas currently utilizes poles owned by other entities, such as telephone companies, in the provision of distribution service. The electric distribution systems and telecommunications networks deliver power and telecommunications services along thousands of miles of lines attached to distribution poles owned by either electric utilities or incumbent local exchange carriers (ILECs) or local telecommunications operating companies. These poles are traditionally subject to a joint use arrangement between the local electric company and ILEC in which both parties are able to limit duplicate investments and maintenance costs associated with poles for service to neighborhoods, businesses and consumers by agreeing to install a proportionate share of the pole plant. AEP Texas maintains its facilities on poles owned by ILECs when possible. The tendency of ILEC's to not extend new pole lines in recent years has resulted in AEP Texas owning a majority of the poles used to provide electric delivery service.

(12) Plans and procedures for restoration of service to priority loads and for consideration of targeted storm hardening of infrastructure used to serve priority loads.

Restoration of service to priority loads is outlined in the Emergency Response Plan (ERP) for AEP. The AEP ERP is a component of the AEP Emergency Operations Plan. The ERP details guidelines recommended assisting in setting restoration priorities. The order of restoration may vary, depending on the specific needs for the outage situation at hand. The three guidelines are (1) safety, (2) essential services, and (3) circuits (number of customers involved).

Removing unsafe conditions is the highest priority in the restoration of the service process. It is very important to make a high-level damage assessment early in the restoration process after a major event. Pursuant to 16 TAC § 25.53(g), further information concerning priorities for restoration can be found in the AEP Confidential 2020 ERP, which is a component of the AEP Emergency Operations Plan and is available for review by the Commission and Commission Staff at the Austin Offices of AEP Texas.

AEP Texas has transitioned from an Operating Company Emergency Management structure to the Incident Command System (ICS) structure for planning and responding to major events that cause sustained outages to the transmission and distribution electric system. In 2014, AEP Texas began developing the ICS structure and has completed the development by training AEP Texas and AEPSC employees on their role in the ICS. AEP Texas and AEPSC employees continue to be trained annually on the ICS and on their role in the ICS. As part of the development and training of the ICS structure, employees were required to take the Federal Emergency Management Agency National Incident Management System training courses, specifically IS-700, IS-800, IS-100 and IS-200, as well as the MGT 345. Course requirements were based on the ICS role the individual holds in the structure.

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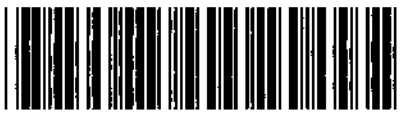

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Dated: April 30, 2021

Respectfully submitted,

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By: /s/ Melissa Gage
Melissa Gage

ATTORNEY FOR AEP TEXAS INC.

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AEP TEXAS INC.'S SUMMARY ON ELECTRIC UTILITY INFRASTRUCTURE STORM HARDENING REQUIRED BY 16 TEX. ADMIN. CODE § 25.95

Regulatory Contact: Steven Beaty
AEP Texas Regulatory Service
Phone: (512) 481-4550
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§25.95. Electric Utility Infrastructure Storm Hardening.

(e) Updating and contents of Storm Hardening Plan. A utility's Storm Hardening Plan shall be updated at least every five years and shall include, at a minimum, the utility's:

(1) Construction standards, policies, procedures, and practices employed to enhance the reliability of utility systems, including overhead and underground transmission and distribution facilities;

Distribution Response:

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Designers at AEP Texas utilize a computer based design program where the design is accomplished by the selection of the construction units necessary to provide the required service. This method provides for standardization of construction, materials, engineering design practices, ease of restoration, leveraged purchasing power and provision for public and employee safety. To enable this method of design, AEP Service Corporation in support of AEP Texas maintains catalogues of standard construction designs (Distribution Standards Manual) and approved standard materials (Construction Units Manual)[1]. A specific work group within the distribution engineering organization is assigned the task of reviewing potential changes, additions or enhancements to these standards with input from field personnel and industry resources. AEP Texas standards include the use of non-corrosive equipment in coastal areas subject to significant salt contamination. When needed, testing is done at a central facility for purposes of determining the adequacy of materials or standard designs.

Transmission Response:

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[1] Copies of the Distribution Standards Manual and Construction Units Manual will be available at the AEP Texas offices.

(2) Vegetation Management Plan for distribution facilities, including a tree pruning methodology and pruning cycle, hazard tree identification and mitigation plans, and customer education and notification practices related to vegetation management;

Pursuant to 16 TAC §25.96(c), AEP Texas has provided its Vegetation Management summary report in its Report filing in Project No. 41831.

(3) Plans and procedures to consider infrastructure improvements for its distribution system based on smart grid concepts that provide enhanced outage resilience, faster outage restoration, and/or grid self-healing;

Distribution Response:

Through the Company's Advanced Metering Infrastructure (AMI) initiative, AEP Texas has integrated current AMI technology with its Outage Management System (OMS). The combination of the AMI technology and the OMS enhances system reliability by assisting in the self-healing and restoration process. The AMI, along with the Supervisory Control and Data Acquisition (SCADA) system, helps identify the location and scope of an outage by combining information from multiple advanced meters in the area with information from substation devices. This has provided a quicker outage restoration process. The AMI radio system is presently being used as the communication medium for the sectionalizing and circuit reconfiguration schemes that are now operational. These distribution automation circuit reconfiguration (DACR) schemes use overcurrent settings in smart line sectionalizing devices along with the programmed intelligence of a central operating system, will allow circuit reconfiguration schemes to expand well beyond what was possible given the limitations of older technology. All of the information transfer between line and substation devices will be communicated via the AMI radio system. AEP Texas is currently engaged in a multi-year program of upgrading substation and line devices with the goal of making DACR schemes operational on all switchable circuits in Texas. On the circuits that have been commissioned, automatic reconfiguration and SCADA control of line devices have proven to be valuable enhancements with reference to overall circuit reliability.

AEP Texas uses the AMI system to detect and report abnormal voltages on the distribution system which can improve customer distribution service satisfaction. When a high voltage is detected, reports are generated to indicate the meters that recorded elevated voltages for multiple intervals. The location of the transformer serving these meters is then relayed to

local service technicians that make a determination regarding whether the high voltage reading is valid or a malfunction of the meter. Using this process, the cause for the high voltage can be remedied during normal working hours using scheduled clearances because the problem is identified prior to an equipment failure.

(4) Plans and procedures to enhance post storm damage assessment, including enhanced data collection methods for damaged poles and fallen trees;

Distribution Response:

AEP Texas employs a damage assessment procedure for failures of distribution equipment using tools such as laptops, handheld data collection devices and drones to report specific pole damage including conductor, attachments and equipment installed on damaged poles. This data is available to designers and standards engineers to analyze in order to identify failure trends or limitations in designs that can be improved. Field damage assessment personnel also provide specific information concerning a failure if a design or material improvement opportunity is identified.

In the event that a hurricane or other event impacts the AEP Texas territory, the failure causes noted in damage assessment reports will be analyzed to identify opportunities to increase the ability of designs to withstand high winds. AEP Texas continues to evaluate and analyze post storm damage assessment to determine improvement opportunities for enhanced data collection.

Transmission Response:

AEP Texas utilizes an emergency patrol for transmission damage assessment. An emergency patrol is normally driven by unplanned events such as transmission line operational problems, storms, outages, etc. Emergency patrol may be performed from an aircraft or by walking, driving or some combination thereof, as needed to quickly identify major defects.

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Also, emergency patrol results are communicated to AEP's Transmission Maintenance personnel who coordinate material and labor for repairs. Conditions are documented via either paper, video or voice recording and then are mitigated or entered into an Integrated Transmission Information System database for repairs per AEP guidelines. If coordination to rectify a vegetation issue is needed, the results of the patrol are also communicated to AEP's Transmission Forestry personnel.

(5) Transmission and distribution pole construction standards, pole attachment policies, and pole testing schedule;

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Distribution Feeder Inspections

Cyclic – AEP Texas has implemented an inspection program that focuses attention to the Feeder Breaker Zone (FBZ). The FBZ is defined as all of the distribution facilities between the substation and the first automatic sectionalizing device. A team reviewing reliability enhancement techniques recognized that outages in this zone affect all customers on the feeder and recommended a shorter time-period between inspections. The program recommends inspections within the FBZ on three-year intervals and all facilities outside the FBZ on six-year intervals. The program consists of a visual inspection of poles, conductors, pole-mounted equipment (transformers, regulators, reclosers, capacitors, etc.) and related materials (insulators, brackets, terminations, cutouts, surge arresters, etc.). It includes inspection of foreign attachments (CATV, telephone, etc.) to the Companies' poles for any safety related electrical or mechanical defects. Electrical and mechanical defects observed are identified and the information is collected so appropriate corrective action can be taken. This program does not preclude more frequent system inspections in small areas based on either requests from local personnel or a noticeable increase in failure related outages.

Targeted Circuit – Circuits are chosen based on an analysis of the circuit's System Average Interruption Frequency Index and/or System Average Interruption Duration Index for the past year. A recommendation and action plan is generated to address specific circuit issues following the analysis of the cause, location, duration and frequency of the outages. The recommendation might include a field inspection, protective coordination study, lightning protection, tree trimming or installation of sectionalizing devices.

Daily Activities – In addition to the specific programs mentioned above, field personnel, in the course of their normal daily activities, observe the condition of the facilities and report any issues

that would affect the reliability of the electric system. Crews have the latitude to stop and correct issues if they think failure is imminent. In addition, during outages, response equipment that does not work properly is reported to the dispatch group and captured in the Abnormal Equipment Database.

(7) Plans and procedures to enhance the reliability of overhead and underground transmission and distribution facilities through the use of transmission and distribution automation;

Distribution Response:

Most of the transmission and distribution automation that has been implemented at AEP Texas involves sectionalizing in response to an over-current or loss of voltage. This has been the simplest and most available means of reducing the number of customers affected by a system failure. In addition to these automatic sectionalizing devices, AEP Texas utilizes manual sectionalizing switches (both pole mounted and pad mounted). These switches are strategically placed along feeders and taps at locations which enable isolation of damaged equipment and restoration of service to as many customers as possible while repairs are made. Fault indicating devices have been installed at many of these manual switches. These devices provide valuable information, which help make the decisions about how to proceed with service restoration. All decisions concerning the operation of any manually operated switches are made at the central dispatch center.

In recent years, AEP Texas has added SCADA to most of its distribution and transmission substations. The use of SCADA has added the capability of analyzing system problems and improved the response to such transmission and distribution problems. SCADA requires some means of communication from the field to the dispatch office and it requires relaying and communication equipment in the substation that is capable of sending information and receiving commands. AEP Texas will use a prioritized list of non-SCADA substations as a guide for future growth to the SCADA system.

Because SCADA communication was first introduced to Company substations, automation was initially added to the transmission system. This has been accomplished via automated sectionalizing switches, which are usually located in a line section between two

substations with over-current/reclosing devices. These switches are strategically placed to maintain service to as many customers as possible.

As noted in the Company's response to (e)(3), the communication system that is used for automated meter reading is now being used to implement automation on the distribution system in a manner that still provides the safety the Company requires for their employees. AEP Texas is involved in a multi-year project to purchase and install switching products that allow for further automation of the distribution system. AEP Texas began this project using simple loop automation schemes that utilize both reclosers and switches. In recent years, automation controls have become more sophisticated by using programming and communications between devices to determine the best reconfiguration solution based on the current voltage and current readings at each device. The most common line device in use at AEP Texas is the S&C Intellirupter switch that is equipped with pulse closing technology. These switches coordinate with each other and substation breakers to restore power to unfaulted sections of the system, speed location of faults and protect equipment from excessive fault operations. In addition to using this communication system to monitor and control advanced automated switches, AEP Texas is also investigating the viability of using this network to provide feedback from the fault indicating devices which are located at the manually operated switches mentioned above. This will speed up the decision making process because the dispatcher will have access to this information before the arrival of field personnel. These Smart Grid applications aid in limiting the effects of localized extreme weather events and accelerate the repair and service restoration activities.

Transmission Response:

AEP Texas currently designs its transmission system for SCADA. SCADA allows display of real time status such as voltage and currents and allows control to operationally important transmission switches and transmission breakers by dispatchers. SCADA provides for improved response to problems on the transmission system.

AEP Texas also currently designs its transmission system with microprocessor relays, which provide protection to the power system. Other features provided by these microprocessor relays are control, monitoring, fault location and limited fault recording. Digital fault recorders (DFRs) are also available, in selected locations throughout the system to record faults. Data is

available following the event, through these relays and DFRs, to help with event analysis and to enhance reliability.

(8) Plans and procedures to comply with the most recent National Electric Safety Code (NESC) wind loading standards in hurricane prone areas for new construction and rebuilds of the transmission and distribution system;

Distribution Response:

Although the current version of the NESC exempts structures less than 60 feet above ground or water level from the extreme wind loading criteria, AEP Texas designs new and replacement facilities to the NESC extreme wind loading criteria. Currently, the following distribution line designs are used for Grade C distribution and joint use construction on structures and attachments under 60 feet in height. Where the NESC Extreme Wind Loading criteria are from 130 MPH to 140 MPH, AEP Texas uses a distribution line design that meets a wind loading of 150 MPH. Where the NESC Extreme Wind Loading criteria are from 120 MPH to 130 MPH, AEP Texas uses a distribution line design that meets a wind loading of 130 MPH. For all other Extreme Wind Loading designations, AEP Texas uses a distribution line design of 88 MPH wind loading requirements. AEP has established a minimum of 88 MPH as a corporate standard. This exceeds the 60 MPH standard for distribution facilities less than 60 feet in height.

Transmission Response:

AEP Texas currently designs, builds and maintains its transmission facilities to meet or exceed the current NESC standards. The NESC contains basic provisions that are considered necessary for the safety of employees and the public under the specified conditions, and also includes provisions for areas susceptible to hurricane force winds. AEP Texas exceeds the NESC extreme wind criteria standard by using a 140 mph wind speed criteria on its transmission line designs within approximately 50 miles of the coast.

(9) Plans and procedures to review new construction and rebuilds to the distribution system to determine whether they should be built to NESC Grade B (or equivalent) standards;

AEP Texas adheres to Grade B Construction standards according to the NESC, such as when lines cross over another overhead utility, railroad track, highways, navigable waterways or other geographic features for which a failure of the overhead line has special consequences. Additionally, AEP Texas' distribution engineering designers are trained to use Grade B Construction standards where lines are built in inaccessible areas, specific structures are required for long span lengths to prevent cascading failures, and customers require a higher degree of reliability.

10) Plans and procedures to develop a damage/outage prediction model for the transmission and distribution system;

Distribution Response:

Damage prediction models are useful for preparations to respond to predictable weather events. Hurricanes and ice storms can usually be predicted with some accuracy with enough lead time to prepare. Other weather events such as thunderstorms, wild fires and tornados, while somewhat predictable, typically occur without lead time to prepare a specific response.

1. Thunderstorms, Tornados, Wild Fires and Ice Storms – The procedures at AEP Texas for short notice weather events is centered on ensuring availability of response personnel. These personnel include employees from supply chain, service, line and engineering. Each group of employees is familiar with the type of tasks that might be required of them and are on-call for service after notification of an eminent weather event.
2. Hurricanes - AEP Texas has developed a model that attempts to predict the amount of damage to the distribution system given a storm's size and wind speed. Historical damage percentages are used for each storm wind category. Actual distribution line data is imported from an electronic mapping system. The user inputs the wind speed for each area, and the model predicts the number of downed poles, feet of damaged primary and secondary and the total estimated man-hours of repair time. These numbers are used to predict the number of needed personnel by work area, estimated material needed, and the

number of days to complete the restoration. The model is used extensively for storm preparation drill, and for actual pre-storm planning.

Transmission Response:

AEP Texas has developed a model for damage/outage prediction during hurricanes using data from its transmission line databases and data provided by the National Hurricane Center. This model has been tested using historical records.

(11) Plans and procedures for use of structures owned by other entities in the provision of distribution service, such as poles owned by telecommunications utilities; and

Distribution Response:

AEP Texas currently utilizes poles owned by other entities, such as telephone companies, in the provision of distribution service. The electric distribution systems and telecommunications networks deliver power and telecommunications services along thousands of miles of lines attached to distribution poles owned by either electric utilities or incumbent local exchange carriers (ILECs) or local telecommunications operating companies. These poles are traditionally subject to a joint use arrangement between the local electric company and ILEC in which both parties are able to limit duplicate investments and maintenance costs associated with poles for service to neighborhoods, businesses and consumers by agreeing to install a proportionate share of the pole plant. AEP Texas maintains its facilities on poles owned by ILECs when possible. The tendency of ILEC's to not extend new pole lines in recent years has resulted in AEP Texas owning a majority of the poles used to provide electric delivery service.

(12) Plans and procedures for restoration of service to priority loads and for consideration of targeted storm hardening of infrastructure used to serve priority loads.

Restoration of service to priority loads is outlined in the Emergency Response Plan (ERP) for AEP. The AEP ERP is a component of the AEP Emergency Operations Plan. The ERP details guidelines recommended assisting in setting restoration priorities. The order of restoration may vary, depending on the specific needs for the outage situation at hand. The three guidelines are (1) safety, (2) essential services, and (3) circuits (number of customers involved).

Removing unsafe conditions is the highest priority in the restoration of the service process. It is very important to make a high-level damage assessment early in the restoration process after a major event. Pursuant to 16 TAC § 25.53(g), further information concerning priorities for restoration can be found in the AEP Confidential ERP, which is a component of the AEP Emergency Operations Plan and is available for review by the Commission and Commission Staff at the Austin Offices of AEP Texas.

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Project No. 39339

REPORT FOR ELECTRIC UTILITY INFRASTRUCTURE STORM HARDENING REQUIRED BY 16 TEX. ADMIN. CODE § 25.95	**§ § § §**	**PUBLIC UTILITY COMMISSION OF TEXAS**

AEP TEXAS INC.'S SUMMARY ON ELECTRIC UTILITY INFRASTRUCTURE STORM HARDENING REQUIRED BY 16 TEX. ADMIN. CODE § 25.95

NOW COMES AEP Texas Inc. (AEP Texas or the Company), American Electric Power operating company and files the attached Summary of the Company's Storm Hardening Plan for the Five-Year Period of 2023-2026 pursuant to 16 Tex. Admin. Code § 25.95 (TAC).

Dated: April 29, 2022

Respectfully submitted,

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ATTORNEY FOR AEP TEXAS INC.

AEP TEXAS INC.'S SUMMARY ON ELECTRIC UTILITY INFRASTRUCTURE STORM HARDENING REQUIRED BY 16 TEX. ADMIN. CODE § 25.95

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§25.95. Electric Utility Infrastructure Storm Hardening.

(e) Updating and contents of Storm Hardening Plan. A utility's Storm Hardening Plan shall be updated at least every five years and shall include, at a minimum, the utility's:

(1) Construction standards, policies, procedures, and practices employed to enhance the reliability of utility systems, including overhead and underground transmission and distribution facilities;

Distribution Response:

AEP Texas has taken steps seeking to strengthen its distribution system to withstand extreme weather conditions and minimize customer outage time. AEP Texas already adheres to and carries out a number of hardening activities. The Company currently designs, builds and maintains its distribution facilities in its Central and North division service areas to meet and/or exceed the current National Electric Safety Code (NESC) and American National Standard Institute (ANSI) standards established for its particular geographic areas. These standards establish guidelines for the practical safeguarding of persons during the installation, operation and maintenance of electric lines and associated equipment. The NESC and ANSI standards contain the basic provisions that are considered necessary for the safety of employees and the public under the specified conditions, and also include provisions for areas susceptible to hurricane force winds.

Although the current version of the NESC exempts structures less than 60 feet above ground or water level from the extreme wind loading criteria, AEP Texas designs new and replacement facilities to the NESC extreme wind loading criteria. Currently, the distribution line designs described in the following are used for Grade C distribution and joint use construction on structures and attachments under 60 feet in height. Where the NESC Extreme Wind Loading criteria are from 130 MPH to 140 MPH, AEP Texas uses a distribution line design that meets a wind loading of 150 MPH. Where the NESC Extreme Wind Loading criteria are from 120 MPH to 130 MPH, AEP Texas uses a distribution line design that meets a wind loading of 130 MPH. For all other Extreme Wind Loading designations, AEP Texas uses a distribution line design of 88 MPH wind loading requirements. AEP has established a minimum of 88 MPH as a corporate standard in the NESC Light Loading Zone. This exceeds the 60 MPH standard for distribution facilities less than 60 feet in height.

Designers at AEP Texas utilize a computer-based design program where the design is accomplished by the selection of the construction units necessary to provide the required service. This method provides for standardization of construction, materials, engineering design practices, ease of restoration, leveraged purchasing power, and provision for public and employee safety. To enable this method of design, American Electric Power Service Corporation (AEPSC) in support of AEP Texas maintains catalogues of standard construction designs (Distribution Standards Manual) and approved standard materials (Construction Units Manual)[1]. A specific work group within the distribution engineering organization is assigned the task of reviewing potential changes, additions, or enhancements to these standards with input from field personnel and industry resources. AEP Texas standards include the use of non-corrosive equipment in coastal areas subject to significant salt contamination. When needed, testing is done at a central facility for purposes of determining the adequacy of materials or standard designs.

Transmission Response:

AEP Texas currently designs its transmission facilities to meet or exceed the loadings in the current National Electric Safety Code (NESC:ANSI C2) and the American Society of Civil Engineers Manual No. 74: Guidelines for Electrical Transmission Line Structural Loading. These standards combine physical risk parameters with historical weather data, such as wind speed, ice loading, and temperature, to provide maps that geographically identify the appropriate weather loading used to insure the safe, reliable operation of the electric system. Thus, for the AEP Texas system, the design wind loading ranges from 90 mph on the inland portion of the system increasing with potential exposure to hurricane force winds up to 140 mph nearest the coast.

[1] Copies of the Distribution Standards Manual and Construction Units Manual will be available at the AEP Texas offices.

(2) Vegetation Management Plan for distribution facilities, including a tree pruning methodology and pruning cycle, hazard tree identification and mitigation plans, and customer education and notification practices related to vegetation management;

Pursuant to 16 TAC §25.96(c), AEP Texas has provided its Vegetation Management summary report in its Report filing in Project No. 41831.

(3) Plans and procedures to consider infrastructure improvements for its distribution system based on smart grid concepts that provide enhanced outage resilience, faster outage restoration, and/or grid self-healing;

Distribution Response:

Through the Company's Advanced Metering Infrastructure (AMI) initiative, AEP Texas has integrated current AMI technology with its Outage Management System (OMS). The combination of the AMI technology and the OMS enhances system reliability by assisting in the self-healing and restoration process. The AMI, along with the Supervisory Control and Data Acquisition (SCADA) system, helps identify the location and scope of an outage by combining information from multiple advanced meters in the area with information from substation devices. This has provided a quicker outage restoration process. The AMI radio system is presently being used as the communication medium for the sectionalizing and circuit reconfiguration schemes that are now operational. These distribution automation circuit reconfiguration (DACR) schemes use overcurrent settings in smart line sectionalizing devices along with the programmed intelligence of a central operating system and will allow circuit reconfiguration schemes to expand well beyond what was possible given the limitations of older technology. All of the information transfer between line and substation devices will be communicated via the AMI radio system. AEP Texas is currently engaged in a multi-year program of upgrading substation and line devices with the goal of making DACR schemes operational on all switchable circuits in Texas. On the circuits that have been commissioned, automatic reconfiguration and SCADA control of line devices have proven to be valuable enhancements with reference to overall circuit reliability.

AEP Texas uses the AMI system to detect and report abnormal voltages on the distribution system, which can improve customer distribution service satisfaction. When a high voltage is detected, reports are generated to indicate the meters that recorded elevated voltages

for multiple intervals. The location of the transformer serving these meters is then relayed to local service technicians that make a determination regarding whether the high voltage reading is valid or a malfunction of the meter. Using this process, the cause for the high voltage can be remedied during normal working hours using scheduled clearances because the problem is identified prior to an equipment failure.

(4) Plans and procedures to enhance post storm damage assessment, including enhanced data collection methods for damaged poles and fallen trees;

Distribution Response:

AEP Texas employs a damage assessment procedure for failures of distribution equipment using tools such as laptops, handheld data collection devices and drones to report specific pole damage including conductor, attachments and equipment installed on damaged poles. This data is available to designers and standards engineers to analyze in order to identify failure trends or limitations in designs that can be improved. Field damage assessment personnel also provide specific information concerning a failure if a design or material improvement opportunity is identified.

In the event that a hurricane or other event impacts the AEP Texas territory, the failure causes noted in damage assessment reports will be analyzed to identify opportunities to increase the ability of designs to withstand high winds. AEP Texas continues to evaluate and analyze post storm damage assessment reports to determine improvement opportunities for enhanced data collection.

Transmission Response:

AEP Texas utilizes an emergency patrol for transmission damage assessment. An emergency patrol is normally driven by unplanned events, such as transmission line operational problems, storms, outages, etc. Emergency patrol may be performed from an aircraft or by walking, driving or some combination thereof, as needed to quickly identify major defects.

The results of the emergency patrol are communicated to AEP's Transmission Dispatch Center. The Transmission Dispatch Center notes a cause code for each outage in the Transmission Outage Reporting database. Cause codes provide information that assist in determining if the outage was weather, equipment failure, or vegetation related.

Also, emergency patrol results are communicated to AEP's Transmission Maintenance personnel who coordinate material and labor for repairs. Conditions are documented using paper, video or voice recording and then are mitigated or entered into an Integrated Transmission Information System database for repairs per AEP guidelines. If coordination to rectify a vegetation issue is needed, the results of the patrol are also communicated to AEP's Transmission Forestry personnel.

(5) Transmission and distribution pole construction standards, pole attachment policies, and pole testing schedule;

Distribution Response:

AEP Texas' pole construction standards are addressed in the overall construction standards noted in (e)(1) above. Proposed third party attachments are reviewed for every distribution pole and a structural analysis is performed to identify needed construction to maintain structural requirements consistent with the standards.

Transmission Response:

As stated above, AEP Texas currently designs, builds, and maintains its transmission facilities to meet and/or exceed the current NESC and ANSI standards established for its particular geographic areas. AEP Texas' policy generally does not allow attachments to Company transmission poles. Special exception requests for consideration will be forwarded to AEP's Transmission Line Engineering Department for review. The AEP Texas guidelines for wood pole, ground line inspections and treatment are as follows:

- 12 year frequency for wood poles in AWPA decay zone 5; and
- 15 year frequency for wood poles in AWPA decay zone 3 & 4.

Aerial inspections are completed once per year on all lines. Comprehensive inspections are completed for each line on a frequency between five and twelve years depending on structure material and location.

(6) **Distribution feeder inspection schedule;**

Distribution Response:

AEP Texas has several different inspection schedules which vary depending on the type and location of facilities being inspected.

Distribution Feeder Inspections

Cyclic – AEP Texas has implemented an inspection program that focuses attention to the Feeder Breaker Zone (FBZ). The FBZ is defined as all of the distribution facilities between the substation and the first automatic sectionalizing device. A team reviewing reliability enhancement techniques recognized that outages in this zone affect all customers on the feeder and recommended a shorter time-period between inspections. The program recommends inspections within the FBZ on three-year intervals and all facilities outside the FBZ on six-year intervals. The program consists of a visual inspection of poles, conductors, pole-mounted equipment (transformers, regulators, reclosers, capacitors, etc.) and related materials (insulators, brackets, terminations, cutouts, surge arresters, etc.). It includes inspection of foreign attachments (CATV, telephone, etc.) to the Companies' poles for any safety related electrical or mechanical defects. Electrical and mechanical defects observed are identified and the information is collected so appropriate corrective action can be taken. This program does not preclude more frequent system inspections in small areas based on requests from local personnel or a noticeable increase in failure related outages.

Targeted Circuit – Circuits are chosen based on an analysis of the circuit's System Average Interruption Frequency Index and/or System Average Interruption Duration Index for the past year. A recommendation and action plan is generated to address specific circuit issues following the analysis of the cause, location, duration, and frequency of the outages. The recommendation might include a field inspection, protective coordination study, lightning protection, tree trimming, or installation of sectionalizing devices.

Daily Activities – In addition to the specific programs mentioned above, field personnel, in the course of their normal daily activities, observe the condition of the facilities and report any issues

that would affect the reliability of the electric system. Crews have the latitude to stop and correct issues if they think failure is imminent. In addition, during outages, response equipment that does not work properly is reported to the dispatch group and captured in the Abnormal Equipment Database.

(7) Plans and procedures to enhance the reliability of overhead and underground transmission and distribution facilities through the use of transmission and distribution automation;

Distribution Response:

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Transmission Response:

AEP Texas currently designs its transmission system for SCADA. SCADA allows display of real time status such as voltage and currents and allows control to operationally important transmission switches and transmission breakers by dispatchers. SCADA provides for improved response to problems on the transmission system.

AEP Texas also currently designs its transmission system with microprocessor relays, which provide protection to the power system. Other features provided by these microprocessor relays are control, monitoring, fault location and limited fault recording. Digital fault recorders (DFRs) are also available in selected locations throughout the system to record faults. Data is

available following the event through these relays and DFRs to help with event analysis and to enhance reliability.

(8) Plans and procedures to comply with the most recent National Electric Safety Code (NESC) wind loading standards in hurricane prone areas for new construction and rebuilds of the transmission and distribution system;

Distribution Response:

Although the current version of the NESC exempts structures less than 60 feet above ground or water level from the extreme wind loading criteria, AEP Texas designs new and replacement facilities to the NESC extreme wind loading criteria. Currently, the following distribution line designs are used for Grade C distribution and joint use construction on structures and attachments under 60 feet in height. Where the NESC Extreme Wind Loading criteria are from 130 MPH to 140 MPH, AEP Texas uses a distribution line design that meets a wind loading of 150 MPH. Where the NESC Extreme Wind Loading criteria are from 120 MPH to 130 MPH, AEP Texas uses a distribution line design that meets a wind loading of 130 MPH. For all other Extreme Wind Loading designations, AEP Texas uses a distribution line design of 88 MPH wind loading requirements. AEP has established a minimum of 88 MPH as a corporate standard. This exceeds the 60 MPH standard for distribution facilities less than 60 feet in height.

Transmission Response:

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(9) Plans and procedures to review new construction and rebuilds to the distribution system to determine whether they should be built to NESC Grade B (or equivalent) standards;

AEP Texas adheres to Grade B Construction standards according to the NESC, such as when lines cross over another overhead utility, railroad track, highways, navigable waterways, or other geographic features for which a failure of the overhead line has special consequences. Additionally, AEP Texas' distribution engineering designers are trained to use Grade B Construction standards when lines are built in inaccessible areas, specific structures are required for long span lengths to prevent cascading failures, and customers require a higher degree of reliability.

10) Plans and procedures to develop a damage/outage prediction model for the transmission and distribution system;

Distribution Response:

Damage prediction models are useful for preparations to respond to predictable weather events. Hurricanes and ice storms can usually be predicted with some accuracy with enough lead time to prepare. Other weather events such as thunderstorms, wild fires and tornados, while somewhat predictable, typically occur without lead time to prepare a specific response.

1. Thunderstorms, Tornados, and Wild Fires – The procedures at AEP Texas for short notice weather events is centered on ensuring availability of response personnel. These personnel include employees from supply chain, service, line, and engineering. Each group of employees is familiar with the type of tasks that might be required of them and are on-call for service after notification of an eminent weather event.
2. Hurricanes and Ice Storms - AEP Texas has developed a model that attempts to predict the amount of damage to the distribution system given a storm's size and wind speed. Historical damage percentages are used for each storm wind category. Actual distribution line data is imported from an electronic mapping system. The user inputs the wind speed for each area, and the model predicts the number of downed poles, feet of damaged primary and secondary and the total estimated man-hours of repair time. These numbers are used to predict the number of needed personnel by work area, estimated

material needed, and the number of days to complete the restoration. The model is used extensively for storm preparation drill, and for actual pre-storm planning.

Transmission Response:

AEP Texas has developed a model for damage/outage prediction during hurricanes using data from its transmission line databases and data provided by the National Hurricane Center. This model has been tested using historical records.

(11) Plans and procedures for use of structures owned by other entities in the provision of distribution service, such as poles owned by telecommunications utilities; and

Distribution Response:

AEP Texas currently utilizes poles owned by other entities, such as telephone companies, in the provision of distribution service. The electric distribution systems and telecommunications networks deliver power and telecommunications services along thousands of miles of lines attached to distribution poles owned by either electric utilities or incumbent local exchange carriers (ILECs) or local telecommunications operating companies. These poles are traditionally subject to a joint use arrangement between the local electric company and ILEC in which both parties are able to limit duplicate investments and maintenance costs associated with poles for service to neighborhoods, businesses and consumers by agreeing to install a proportionate share of the pole plant. AEP Texas maintains its facilities on poles owned by ILECs when possible. The tendency of ILEC's to not extend new pole lines in recent years has resulted in AEP Texas owning a majority of the poles used to provide electric delivery service.

(12) Plans and procedures for restoration of service to priority loads and for consideration of targeted storm hardening of infrastructure used to serve priority loads.

Restoration of service to priority loads is outlined in the Emergency Response Plan (ERP) for AEP. The AEP ERP is a component of the AEP Emergency Operations Plan. The ERP details guidelines recommended assisting in setting restoration priorities. The order of restoration may vary, depending on the specific needs for the outage situation at hand. The three guidelines are (1) safety, (2) essential services, and (3) circuits (number of customers involved).

Removing unsafe conditions is the highest priority in the restoration of service process. It is very important to make a high-level damage assessment early in the restoration process after a major event. Pursuant to 16 TAC § 25.53(c)(1)(D), further information concerning priorities for restoration can be found in the AEP Confidential ERP, which is a component of the AEP Emergency Operations Plan and is available for review by the Commission and Commission Staff at the Austin Offices of AEP Texas.

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REPORT FOR ELECTRIC UTILITY INFRASTRUCTURE STORM HARDENING REQUIRED BY 16 TEX. ADMIN. CODE § 25.95	§ § § § § §	**PUBLIC UTILITY COMMISSION OF TEXAS**

AEP TEXAS INC.'S SUMMARY ON ELECTRIC UTILITY INFRASTRUCTURE STORM HARDENING REQUIRED BY 16 TEX. ADMIN. CODE § 25.95

NOW COMES AEP Texas Inc. (AEP Texas or the Company), American Electric Power operating company and files the attached Summary of the Company's Storm Hardening Plan for the Five-Year Period of 2023-2027 pursuant to 16 Tex. Admin. Code § 25.95 (TAC).

Dated: May 1, 2023

Respectfully submitted,

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ATTORNEY FOR AEP TEXAS INC.

AEP TEXAS INC.'S SUMMARY ON ELECTRIC UTILITY INFRASTRUCTURE STORM HARDENING REQUIRED BY 16 TEX. ADMIN. CODE § 25.95

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§25.95. Electric Utility Infrastructure Storm Hardening.

(e) Updating and contents of Storm Hardening Plan. A utility's Storm Hardening Plan shall be updated at least every five years and shall include, at a minimum, the utility's:

(1) Construction standards, policies, procedures, and practices employed to enhance the reliability of utility systems, including overhead and underground transmission and distribution facilities;

Distribution Response:

AEP Texas has taken steps seeking to strengthen its distribution system to withstand extreme weather conditions and minimize customer outage time. The Company currently designs, builds and maintains its distribution facilities in its Central and North division service areas to meet and/or exceed the current National Electric Safety Code (NESC) and American National Standard Institute (ANSI) standards established for its geographic areas. These standards establish guidelines for the practical safeguarding of persons during the installation, operation and maintenance of electric lines and associated equipment. The NESC and ANSI standards contain the basic provisions that are considered necessary for the safety of employees and the public under the specified conditions, and also include provisions for areas susceptible to hurricane force winds.

Although the current version of the NESC exempts structures less than 60 feet above ground or water level from the extreme wind loading criteria, AEP Texas designs new and replacement facilities to the NESC extreme wind loading criteria. Currently, the distribution line designs described in the following are used for Grade C distribution and joint use construction on structures and attachments under 60 feet in height. Where the NESC Extreme Wind Loading criteria are from 130 MPH to 140 MPH, AEP Texas uses a distribution line design that meets a wind loading of 150 MPH. Where the NESC Extreme Wind Loading criteria are from 120 MPH to 130 MPH, AEP Texas uses a distribution line design that meets a wind loading of 130 MPH. For all other Extreme Wind Loading designations, AEP Texas uses a distribution line design of 88 MPH wind loading requirements. AEP has established a minimum of 88 MPH as a corporate standard in the NESC Light Loading Zone. This exceeds the 60 MPH standard for distribution facilities less than 60 feet in height.

Designers at AEP Texas utilize a computer-based design program where the design is accomplished by the selection of the construction units necessary to provide the required service. This method provides for standardization of construction, materials, engineering design practices, ease of restoration, leveraged purchasing power, and provision for public and employee safety. To enable this method of design, American Electric Power Service Corporation (AEPSC) in support of AEP Texas maintains catalogues of standard construction designs (Distribution Standards Manual) and approved standard materials (Construction Units Manual)[1]. A specific work group within the distribution engineering organization is assigned the task of reviewing potential changes, additions, or enhancements to these standards with input from field personnel and industry resources. AEP Texas standards include the use of non-corrosive equipment in coastal areas subject to significant salt contamination. When needed, testing is done at a central facility for purposes of determining the adequacy of materials or standard designs.

Transmission Response:

AEP Texas currently designs its transmission facilities to meet or exceed the loadings in the current National Electric Safety Code (NESC:ANSI C2) and the American Society of Civil Engineers Manual No. 74: Guidelines for Electrical Transmission Line Structural Loading. These standards combine physical risk parameters with historical weather data, such as wind speed, ice loading, and temperature, to provide maps that geographically identify the appropriate weather loading used to insure the safe, reliable operation of the electric system. Thus, for the AEP Texas system, the design wind loading ranges from 90 mph on the inland portion of the system increasing with potential exposure to hurricane force winds up to 140 mph nearest the coast.

[1] Copies of the Distribution Standards Manual and Construction Units Manual are available at the AEP Texas offices.

(2) Vegetation Management Plan for distribution facilities, including a tree pruning methodology and pruning cycle, hazard tree identification and mitigation plans, and customer education and notification practices related to vegetation management;

Pursuant to 16 TAC §25.96(c), AEP Texas has provided its Vegetation Management summary report in its Report filing in Project No. 41831.

(3) Plans and procedures to consider infrastructure improvements for its distribution system based on smart grid concepts that provide enhanced outage resilience, faster outage restoration, and/or grid self-healing;

Distribution Response:

Through the Company's Advanced Metering Infrastructure (AMI) initiative, AEP Texas has integrated current AMI technology with its Outage Management System (OMS). The combination of the AMI technology and the OMS enhances system reliability by assisting in the self-healing and restoration process. The AMI, along with the Supervisory Control and Data Acquisition (SCADA) system, helps identify the location and scope of an outage by combining information from multiple advanced meters in the area with information from substation devices. This provides a quicker outage restoration process. The AMI radio system is presently being used as the communication medium for the sectionalizing and circuit reconfiguration schemes. These distribution automation circuit reconfiguration (DACR) schemes use overcurrent settings in smart line sectionalizing devices along with the programmed intelligence of a central operating system and will allow circuit reconfiguration schemes to expand well beyond what was possible with older technology. All of the information transfer between line and substation devices is communicated via the AMI radio system. AEP Texas is currently engaged in a multi-year program of upgrading substation and line devices with the goal of making DACR schemes operational on all switchable circuits in Texas. On the circuits that have been commissioned, automatic reconfiguration and SCADA control of line devices have proven to be valuable enhancements with reference to overall circuit reliability.

AEP Texas uses the AMI system to detect and report abnormal voltages on the distribution system, which can improve customer distribution service satisfaction. When a high voltage is detected, reports are generated to indicate the meters that recorded elevated voltages for multiple intervals. The location of the transformer serving these meters is then relayed to

local service technicians that make a determination regarding whether the high voltage reading is valid or a malfunction of the meter. Using this process, the cause for the high voltage can be remedied during normal working hours using scheduled clearances because the problem is identified prior to an equipment failure.

(4) Plans and procedures to enhance post storm damage assessment, including enhanced data collection methods for damaged poles and fallen trees;

Distribution Response:

AEP Texas employs a damage assessment procedure for failures of distribution equipment using tools such as laptops, handheld data collection devices and drones to report specific pole damage including conductor, attachments and equipment installed on damaged poles. This data is available to designers and standards engineers to analyze in order to identify failure trends or limitations in designs that can be improved. Field damage assessment personnel also provide specific information concerning a failure if a design or material improvement opportunity is identified.

In the event that a hurricane or other event impacts the AEP Texas territory, the failure causes noted in damage assessment reports will be analyzed to identify opportunities to increase the ability of designs to withstand high winds. AEP Texas continues to evaluate and analyze post storm damage assessment reports to determine improvement opportunities for enhanced data collection.

Transmission Response:

AEP Texas utilizes an emergency patrol for transmission damage assessment. An emergency patrol is normally driven by unplanned events, such as transmission line operational problems, storms, outages, etc. Emergency patrol may be performed from an aircraft or by walking, driving or some combination thereof, as needed to quickly identify major defects.

The results of the emergency patrol are communicated to AEP's Transmission Dispatch Center. The Transmission Dispatch Center notes a cause code for each outage in the Transmission Outage Reporting database. Cause codes provide information that assist in determining if the outage was weather, equipment failure, or vegetation related.

Also, emergency patrol results are communicated to AEP's Transmission Maintenance personnel who coordinate material and labor for repairs. Conditions are documented using paper, video or voice recording and then are mitigated or entered into an Integrated Transmission Information System database for repairs per AEP guidelines. If coordination to rectify a vegetation issue is needed, the results of the patrol are also communicated to AEP's Transmission Forestry personnel.

(5) Transmission and distribution pole construction standards, pole attachment policies, and pole testing schedule;

Distribution Response:

AEP Texas' pole construction standards are addressed in the overall construction standards noted in (e)(1) above. Proposed third party attachments are reviewed for every distribution pole and a structural analysis is performed to identify needed construction to maintain structural requirements consistent with the standards.

Transmission Response:

As stated above, AEP Texas currently designs, builds, and maintains its transmission facilities to meet and/or exceed the current NESC and ANSI standards established for its particular geographic areas. AEP Texas' policy generally does not allow attachments to Company transmission poles. Special exception requests for consideration will be forwarded to AEP's Transmission Line Engineering Department for review. The AEP Texas guidelines for wood pole, ground line inspections and treatment are as follows:

- 12 year frequency for wood poles in AWPA decay zone 5; and
- 15 year frequency for wood poles in AWPA decay zone 3 & 4.

Aerial inspections are completed once per year on all lines. Comprehensive inspections are completed for each line on a frequency between five and twelve years depending on structure material and location.

(6) **Distribution feeder inspection schedule;**

Distribution Response:

AEP Texas has several different inspection schedules which vary depending on the type and location of facilities being inspected.

Distribution Feeder Inspections

Cyclic – AEP Texas has implemented an inspection program that focuses attention to the Feeder Breaker Zone (FBZ). The FBZ is defined as all of the distribution facilities between the substation and the first automatic sectionalizing device. A team reviewing reliability enhancement techniques recognized that outages in this zone affect all customers on the feeder and recommended a shorter time-period between inspections. The program recommends inspections within the FBZ on three-year intervals and all facilities outside the FBZ on six-year intervals. The program consists of a visual inspection of poles, conductors, pole-mounted equipment (transformers, regulators, reclosers, capacitors, etc.) and related materials (insulators, brackets, terminations, cutouts, surge arresters, etc.). It includes inspection of foreign attachments (CATV, telephone, etc.) to the Companies' poles for any safety related electrical or mechanical defects. Electrical and mechanical defects observed are identified and the information is collected so appropriate corrective action can be taken. This program does not preclude more frequent system inspections in small areas based on requests from local personnel or a noticeable increase in failure related outages.

Targeted Circuit – Circuits are chosen based on an analysis of the circuit's System Average Interruption Frequency Index and/or System Average Interruption Duration Index for the past year. A recommendation and action plan is generated to address specific circuit issues following the analysis of the cause, location, duration, and frequency of the outages. The recommendation might include a field inspection, protective coordination study, lightning protection, tree trimming, or installation of sectionalizing devices.

Daily Activities – In addition to the specific programs mentioned above, field personnel, in the course of their normal daily activities, observe the condition of the facilities and report any issues

that would affect the reliability of the electric system. Crews have the latitude to stop and correct issues if they think failure is imminent. In addition, during outages, response equipment that does not work properly is reported to the dispatch group and captured in the Abnormal Equipment Database.

(7) Plans and procedures to enhance the reliability of overhead and underground transmission and distribution facilities through the use of transmission and distribution automation;

Distribution Response:

Most of the transmission and distribution automation that has been implemented at AEP Texas involves sectionalizing in response to an over-current or loss of voltage. This has been the simplest and most available means of reducing the number of customers affected by a system failure. In addition to these automatic sectionalizing devices, AEP Texas utilizes manual sectionalizing switches (both pole mounted and pad mounted). These switches are strategically placed along feeders and taps at locations which enable isolation of damaged equipment and restoration of service to as many customers as possible while repairs are made. Fault indicating devices have been installed at many of these manual switches. These devices provide valuable information, which help make the decisions about how to proceed with service restoration. All decisions concerning the operation of any manually operated switches are coordinated at the central dispatch center.

In recent years, AEP Texas has added SCADA to most of its distribution and transmission substations. The use of SCADA has added the capability of analyzing system problems and improved the response to such transmission and distribution problems. SCADA requires some means of communication from the field to the dispatch office and it requires relaying and communication equipment in the substation that is capable of sending information and receiving commands. AEP Texas will use a prioritized list of non-SCADA substations as a guide for future growth to the SCADA system.

Because SCADA communication was first introduced to Company substations, automation was initially added to the transmission system. This has been accomplished via automated sectionalizing switches, which are usually located in a line section between two

substations with over-current/reclosing devices. These switches are strategically placed to maintain service to as many customers as possible.

As noted in the Company's response to (e)(3), the communication system that is used for automated meter reading is now being used to implement automation on the distribution system in a manner that still provides the safety the Company requires for their employees. AEP Texas is involved in a multi-year project to purchase and install switching products that allow for further automation of the distribution system. AEP Texas began this project using simple loop automation schemes that utilize both reclosers and switches. In recent years, automation controls have become more sophisticated by using programming and communications between devices to determine the best reconfiguration solution based on the current voltage and current readings at each device. The most common line device in use at AEP Texas is the S&C Intellirupter switch that is equipped with pulse closing technology. These switches coordinate with each other and substation breakers to restore power to unfaulted sections of the system, speed location of faults and protect equipment from excessive fault operations. In addition to using this communication system to monitor and control advanced automated switches, AEP Texas is also investigating the viability of using this network to provide feedback from the fault indicating devices which are located at the manually operated switches mentioned above. This will speed up the decision making process because the dispatcher will have access to this information before the arrival of field personnel. These Smart Grid applications aid in limiting the effects of localized extreme weather events and accelerate the repair and service restoration activities.

Transmission Response:

AEP Texas currently designs its transmission system for SCADA. SCADA allows display of real time status such as voltage and currents and allows control to operationally important transmission switches and transmission breakers by dispatchers. SCADA provides for improved response to problems on the transmission system.

AEP Texas also currently designs its transmission system with microprocessor relays, which provide protection to the power system. Other features provided by these microprocessor relays are control, monitoring, fault location and limited fault recording. Digital fault recorders (DFRs) are also available in selected locations throughout the system to record faults. Data is

available following the event through these relays and DFRs to help with event analysis and to enhance reliability. Phasor Monitor Unit data may also be available in some locations.

(8) Plans and procedures to comply with the most recent National Electric Safety Code (NESC) wind loading standards in hurricane prone areas for new construction and rebuilds of the transmission and distribution system;

Distribution Response:

Although the current version of the NESC exempts structures less than 60 feet above ground or water level from the extreme wind loading criteria, AEP Texas designs new and replacement facilities to the NESC extreme wind loading criteria. Currently, the following distribution line designs are used for Grade C distribution and joint use construction on structures and attachments under 60 feet in height. Where the NESC Extreme Wind Loading criteria are from 130 MPH to 140 MPH, AEP Texas uses a distribution line design that meets a wind loading of 150 MPH. Where the NESC Extreme Wind Loading criteria are from 120 MPH to 130 MPH, AEP Texas uses a distribution line design that meets a wind loading of 130 MPH. For all other Extreme Wind Loading designations, AEP Texas uses a distribution line design of 88 MPH wind loading requirements. AEP has established a minimum of 88 MPH as a corporate standard. This exceeds the 60 MPH standard for distribution facilities less than 60 feet in height.

Transmission Response:

AEP Texas currently designs its transmission facilities to meet or exceed the loadings in the current National Electric Safety Code (NESC: ANSI C2) and the American Society of Civil Engineers Manual No. 74: Guidelines for Electrical Transmission Line Structural Loading. These standards combine physical risk parameters with historical weather data, such as wind speed, ice loading, and temperature, to provide maps that geographically identify the appropriate weather loading used to insure the safe, reliable operation of the electric system. Thus, for the AEP Texas transmission system, the design wind loading ranges from 90 mph on the inland portion of the system increasing with potential exposure to hurricane force winds up to 140 mph nearest the coast.

(9) Plans and procedures to review new construction and rebuilds to the distribution system to determine whether they should be built to NESC Grade B (or equivalent) standards;

AEP Texas adheres to Grade B Construction standards according to the NESC guidelines, such as when lines cross over another overhead utility, railroad track, highways, navigable waterways, or other geographic features for which a failure of the overhead line has special consequences. Additionally, AEP Texas' distribution engineering designers are trained to use Grade B Construction standards when lines are built in inaccessible areas or specific structures are required for long span lengths.

10) Plans and procedures to develop a damage/outage prediction model for the transmission and distribution system;

Distribution Response:

Damage prediction models are useful for preparations to respond to predictable weather events. Hurricanes and ice storms can usually be predicted with some accuracy with enough lead time to prepare. Other weather events such as thunderstorms, wild fires and tornados, while somewhat predictable, typically occur without lead time to prepare a specific response.

1. Thunderstorms, Tornados, and Wild Fires – The procedures at AEP Texas for short notice weather events is centered on ensuring availability of response personnel. These personnel include employees from supply chain, service, line, and engineering. Each group of employees is familiar with the type of tasks that might be required of them and are on-call for service after notification of an eminent weather event.
2. Hurricanes and Ice Storms - AEP Texas has developed a model that attempts to predict the amount of damage to the distribution system given a storm's size and wind speed. Historical damage percentages are used for each storm wind category. Actual distribution line data is imported from an electronic mapping system. The user inputs the wind speed for each area, and the model predicts the number of downed poles, feet of damaged primary and secondary and the total estimated man-hours of repair time. These numbers are used to predict the number of needed personnel by work area, estimated

material needed, and the number of days to complete the restoration. The model is used extensively for storm preparation drill, and for actual pre-storm planning.

(11) Plans and procedures for use of structures owned by other entities in the provision of distribution service, such as poles owned by telecommunications utilities; and

Distribution Response:

AEP Texas currently utilizes poles owned by other entities, such as telephone companies, in the provision of distribution service. The electric distribution systems and telecommunications networks deliver power and telecommunications services along thousands of miles of lines attached to distribution poles owned by either electric utilities or incumbent local exchange carriers (ILECs) or local telecommunications operating companies. These poles are traditionally subject to a joint use arrangement between the local electric company and ILEC in which both parties are able to limit duplicate investments and maintenance costs associated with poles for service to neighborhoods, businesses and consumers by agreeing to install a proportionate share of the pole plant. AEP Texas maintains its facilities on poles owned by ILECs when possible. The tendency of ILEC's to not extend new pole lines in recent years has resulted in AEP Texas owning a majority of the poles used to provide electric delivery service.

(12) Plans and procedures for restoration of service to priority loads and for consideration of targeted storm hardening of infrastructure used to serve priority loads.

Restoration of service to priority loads is outlined in the Emergency Response Plan (ERP) for AEP. The AEP ERP is a component of the AEP Emergency Operations Plan. The ERP details guidelines recommended assisting in setting restoration priorities. The order of restoration may vary, depending on the specific needs for the outage situation at hand. The three guidelines are (1) safety, (2) essential services, and (3) circuits (number of customers involved). Removing unsafe conditions is the highest priority in the restoration of service process. It is very important to make a high-level damage assessment early in the restoration process after a major event. Pursuant to 16 TAC § 25.53(e)(B)(ii), further information concerning priorities for restoration can be found in the AEP Confidential ERP, which is a component of the AEP

Emergency Operations Plan and is available for review by the Commission and Commission Staff at the Austin Offices of AEP Texas.

Filing Receipt

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Project No. 39339

REPORT FOR ELECTRIC UTILITY INFRASTRUCTURE STORM HARDENING REQUIRED BY 16 TEX. ADMIN. CODE § 25.95	§ § § § §	**PUBLIC UTILITY COMMISSION OF TEXAS**

AEP TEXAS INC.'S SUMMARY ON ELECTRIC UTILITY INFRASTRUCTURE STORM HARDENING REQUIRED BY 16 TEX. ADMIN. CODE § 25.95

NOW COMES AEP Texas Inc. (AEP Texas or the Company), American Electric Power operating company and files the attached Summary of the Company's Storm Hardening Plan for the Five-Year Period of 2024-2028 pursuant to 16 Tex. Admin. Code § 25.95 (TAC).

Dated: May 1, 2024

Respectfully submitted,

American Electric Power
400 W. 15th Street, Suite 1520
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By: /s/ Melissa Gage
Melissa Gage

ATTORNEY FOR AEP TEXAS INC.

AEP TEXAS INC.'S SUMMARY ON ELECTRIC UTILITY INFRASTRUCTURE STORM HARDENING REQUIRED BY 16 TEX. ADMIN. CODE § 25.95

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§25.95. Electric Utility Infrastructure Storm Hardening.

(e) Updating and contents of Storm Hardening Plan. A utility's Storm Hardening Plan shall be updated at least every five years and shall include, at a minimum, the utility's:

(1) Construction standards, policies, procedures, and practices employed to enhance the reliability of utility systems, including overhead and underground transmission and distribution facilities;

Distribution Response:

AEP Texas has taken steps seeking to strengthen its distribution system to withstand extreme weather conditions and minimize customer outage time. The Company currently designs, builds and maintains its distribution facilities in its Central and North division service areas to meet and/or exceed the current National Electric Safety Code (NESC) and American National Standard Institute (ANSI) standards established for its geographic areas. These standards establish guidelines for the practical safeguarding of persons during the installation, operation and maintenance of electric lines and associated equipment. The NESC and ANSI standards contain the basic provisions that are considered necessary for the safety of employees and the public under the specified conditions, and also include provisions for areas susceptible to hurricane force winds.

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Transmission Response:

AEP Texas currently designs its transmission facilities to meet or exceed the loadings in the current National Electric Safety Code (NESC:ANSI C2) and the American Society of Civil Engineers Manual No. 74: Guidelines for Electrical Transmission Line Structural Loading. These standards combine physical risk parameters with historical weather data, such as wind speed, ice loading, and temperature, to provide maps that geographically identify the appropriate weather loading used to insure the safe, reliable operation of the electric system. Thus, for the AEP Texas system, the design wind loading ranges from 90 mph on the inland portion of the system increasing with potential exposure to hurricane force winds up to 130 mph nearest the coast.

[1] Copies of the Distribution Standards Manual and Construction Units Manual are available at the AEP Texas offices.

(2) Vegetation Management Plan for distribution facilities, including a tree pruning methodology and pruning cycle, hazard tree identification and mitigation plans, and customer education and notification practices related to vegetation management;

Pursuant to 16 TAC §25.96(c), AEP Texas has provided its Vegetation Management summary report in its Report filing in Project No. 41831.

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Distribution Response:

Through the Company's Advanced Metering Infrastructure (AMI) initiative, AEP Texas has integrated current AMI technology with its Outage Management System (OMS). The combination of the AMI technology and the OMS enhances system reliability by assisting in the self-healing and restoration process. The AMI, along with the Supervisory Control and Data Acquisition (SCADA) system, helps identify the location and scope of an outage by combining information from multiple advanced meters in the area with information from substation devices. This provides a quicker outage restoration process. The AMI radio system is presently being used as the communication medium for the sectionalizing and circuit reconfiguration schemes. These distribution automation circuit reconfiguration (DACR) schemes use overcurrent settings in smart line sectionalizing devices along with the programmed intelligence of a central operating system and will allow circuit reconfiguration schemes to expand well beyond what was possible with older technology. All of the information transfer between line and substation devices is communicated via the AMI radio system. AEP Texas is currently engaged in a multi-year program of upgrading substation and line devices with the goal of making DACR schemes operational on all switchable circuits in Texas. On the circuits that have been commissioned, automatic reconfiguration and SCADA control of line devices have proven to be valuable enhancements with reference to overall circuit reliability.

AEP Texas uses the AMI system to detect and report abnormal voltages on the distribution system, which can improve customer distribution service satisfaction. When a high voltage is detected, reports are generated to indicate the meters that recorded elevated voltages for multiple intervals. The location of the transformer serving these meters is then relayed to

local service technicians that make a determination regarding whether the high voltage reading is valid or a malfunction of the meter. Using this process, the cause for the high voltage can be remedied during normal working hours using scheduled clearances because the problem is identified prior to an equipment failure.

(4) Plans and procedures to enhance post storm damage assessment, including enhanced data collection methods for damaged poles and fallen trees;

Distribution Response:

AEP Texas employs a damage assessment procedure for failures of distribution equipment using tools such as laptops, handheld data collection devices and drones to report specific pole damage including conductor, attachments and equipment installed on damaged poles. This data is available to designers and standards engineers to analyze in order to identify failure trends or limitations in designs that can be improved. Field damage assessment personnel also provide specific information concerning a failure if a design or material improvement opportunity is identified.

In the event that a hurricane or other event impacts the AEP Texas territory, the failure causes noted in damage assessment reports will be analyzed to identify opportunities to increase the ability of designs to withstand high winds. AEP Texas continues to evaluate and analyze post storm damage assessment reports to determine improvement opportunities for enhanced data collection.

Transmission Response:

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The results of the emergency patrol are communicated to AEP's Transmission Dispatch Center. The Transmission Dispatch Center notes a cause code for each outage in the Transmission Outage Reporting database. Cause codes provide information that assist in determining if the outage was weather, equipment failure, or vegetation related.

Also, emergency patrol results are communicated to AEP's Transmission Maintenance personnel who coordinate material and labor for repairs. Conditions are documented using paper, video or voice recording and then are mitigated or entered into an Integrated Transmission Information System database for repairs per AEP guidelines. If coordination to rectify a vegetation issue is needed, the results of the patrol are also communicated to AEP's Transmission Forestry personnel.

(5) Transmission and distribution pole construction standards, pole attachment policies, and pole testing schedule;

Distribution Response:

AEP Texas' pole construction standards are addressed in the overall construction standards noted in (e)(1) above. Proposed third party attachments are reviewed for every distribution pole and a structural analysis is performed to identify needed construction to maintain structural requirements consistent with the standards. AEP Texas has a groundline inspection program for wood distribution poles as outlined in its specification 125 standard.

Transmission Response:

As stated above, AEP Texas currently designs, builds, and maintains its transmission facilities to meet and/or exceed the current NESC and ANSI standards established for its particular geographic areas. AEP Texas' policy generally does not allow attachments to Company transmission poles. Special exception requests for consideration will be forwarded to AEP's Transmission Line Engineering Department for review. The AEP Texas guidelines for wood pole, ground line inspections and treatment are as follows:

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- 15 year frequency for wood poles in AWPA decay zone 3 & 4.

Aerial inspections are completed once per year on all lines. Comprehensive inspections are completed for each line on a frequency between five and twelve years depending on structure material and location.

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Distribution Feeder Inspections

Cyclic – AEP Texas has implemented an inspection program that focuses attention to the Feeder Breaker Zone (FBZ). The FBZ is defined as all of the distribution facilities between the substation and the first automatic sectionalizing device. A team reviewing reliability enhancement techniques recognized that outages in this zone affect all customers on the feeder and recommended a shorter time-period between inspections. The program recommends inspections within the FBZ on three-year intervals and all facilities outside the FBZ on six-year intervals. The program consists of a visual inspection of poles, conductors, pole-mounted equipment (transformers, regulators, reclosers, capacitors, etc.) and related materials (insulators, brackets, terminations, cutouts, surge arresters, etc.). It includes inspection of foreign attachments (CATV, telephone, etc.) to the Companies' poles for any safety related electrical or mechanical defects. Electrical and mechanical defects observed are identified and the information is collected so appropriate corrective action can be taken. This program does not preclude more frequent system inspections in small areas based on requests from local personnel or a noticeable increase in failure related outages.

Targeted Circuit – Circuits are chosen based on an analysis of the circuit's System Average Interruption Frequency Index and/or System Average Interruption Duration Index for the past year. A recommendation and action plan is generated to address specific circuit issues following the analysis of the cause, location, duration, and frequency of the outages. The recommendation might include a field inspection, protective coordination study, lightning protection, tree trimming, or installation of sectionalizing devices.

Daily Activities – In addition to the specific programs mentioned above, field personnel, in the course of their normal daily activities, observe the condition of the facilities and report any issues

that would affect the reliability of the electric system. Crews have the latitude to stop and correct issues if they think failure is imminent. In addition, during outages, response equipment that does not work properly is reported to the dispatch group and captured in the Abnormal Equipment Database.

(7) Plans and procedures to enhance the reliability of overhead and underground transmission and distribution facilities through the use of transmission and distribution automation;

Distribution Response:

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Because SCADA communication was first introduced to Company substations, automation was initially added to the transmission system. This has been accomplished via automated sectionalizing switches, which are usually located in a line section between two

substations with over-current/reclosing devices. These switches are strategically placed to maintain service to as many customers as possible.

As noted in the Company's response to (e)(3), the communication system that is used for automated meter reading is now being used to implement automation on the distribution system in a manner that still provides the safety the Company requires for their employees. AEP Texas is involved in a multi-year project to purchase and install switching products that allow for further automation of the distribution system. AEP Texas began this project using simple loop automation schemes that utilize both reclosers and switches. In recent years, automation controls have become more sophisticated by using programming and communications between devices to determine the best reconfiguration solution based on the current voltage and current readings at each device. The most common line device in use at AEP Texas is the S&C Intellirupter switch that is equipped with pulse closing technology. These switches coordinate with each other and substation breakers to restore power to unfaulted sections of the system, speed location of faults and protect equipment from excessive fault operations. In addition to using this communication system to monitor and control advanced automated switches, AEP Texas is also investigating the viability of using this network to provide feedback from the fault indicating devices which are located at the manually operated switches mentioned above. This will speed up the decision making process because the dispatcher will have access to this information before the arrival of field personnel. These Smart Grid applications aid in limiting the effects of localized extreme weather events and accelerate the repair and service restoration activities.

Transmission Response:

AEP Texas currently designs its transmission system for SCADA. SCADA allows display of real time status such as voltage and currents and allows control to operationally important transmission switches and transmission breakers by dispatchers. SCADA provides for improved response to problems on the transmission system.

AEP Texas also currently designs its transmission system with microprocessor relays, which provide protection to the power system. Other features provided by these microprocessor relays are control, monitoring, fault location and fault recording. Modern microprocessor relays and a few Digital fault recorders (DFRs) are also available in many locations throughout the system to record faults. Data is available following the event through these relays and DFRs to

help with event analysis and to enhance reliability. Phasor Monitor Unit data may also be available in some locations.

(8) Plans and procedures to comply with the most recent National Electric Safety Code (NESC) wind loading standards in hurricane prone areas for new construction and rebuilds of the transmission and distribution system;

Distribution Response:

Although the current version of the NESC exempts structures less than 60 feet above ground or water level from the extreme wind loading criteria, AEP Texas designs new and replacement facilities to the NESC extreme wind loading criteria. Currently, the following distribution line designs are used for Grade C distribution and joint use construction on structures and attachments under 60 feet in height. Where the NESC Extreme Wind Loading criteria are from 130 MPH to 140 MPH, AEP Texas uses a distribution line design that meets a wind loading of 150 MPH. Where the NESC Extreme Wind Loading criteria are from 120 MPH to 130 MPH, AEP Texas uses a distribution line design that meets a wind loading of 130 MPH. For all other Extreme Wind Loading designations, AEP Texas uses a distribution line design of 88 MPH wind loading requirements. AEP has established a minimum of 88 MPH as a corporate standard. This exceeds the 60 MPH standard for distribution facilities less than 60 feet in height.

Transmission Response:

AEP Texas currently designs its transmission facilities to meet or exceed the loadings in the current National Electric Safety Code (NESC: ANSI C2) and the American Society of Civil Engineers Manual No. 74: Guidelines for Electrical Transmission Line Structural Loading. These standards combine physical risk parameters with historical weather data, such as wind speed, ice loading, and temperature, to provide maps that geographically identify the appropriate weather loading used to insure the safe, reliable operation of the electric system. Thus, for the AEP Texas transmission system, the design wind loading ranges from 90 mph on the inland portion of the system increasing with potential exposure to hurricane force winds up to 130 mph nearest the coast.

(9) Plans and procedures to review new construction and rebuilds to the distribution system to determine whether they should be built to NESC Grade B (or equivalent) standards;

AEP Texas adheres to Grade B Construction standards according to the NESC guidelines, such as when lines cross over another overhead utility, railroad track, highways, navigable waterways, or other geographic features for which a failure of the overhead line has special consequences. Additionally, AEP Texas' distribution engineering designers are trained to use Grade B Construction standards when lines are built in inaccessible areas or specific structures are required for long span lengths.

10) Plans and procedures to develop a damage/outage prediction model for the transmission and distribution system;

Distribution Response:

Damage prediction models are useful for preparations to respond to predictable weather events. Hurricanes and ice storms can usually be predicted with some accuracy with enough lead time to prepare. Other weather events such as thunderstorms, wild fires and tornados, while somewhat predictable, typically occur without lead time to prepare a specific response.

1. Thunderstorms, Tornados, and Wild Fires – The procedures at AEP Texas for short notice weather events is centered on ensuring availability of response personnel. These personnel include employees from supply chain, service, line, and engineering. Each group of employees is familiar with the type of tasks that might be required of them and are on-call for service after notification of an eminent weather event.
2. Hurricanes and Ice Storms - AEP Texas has developed a model that attempts to predict the amount of damage to the distribution system given a storm's size and wind speed. Historical damage percentages are used for each storm wind category. Actual distribution line data is imported from an electronic mapping system. The user inputs the wind speed for each area, and the model predicts the number of downed poles, feet of damaged primary and secondary and the total estimated man-hours of repair time. These numbers are used to predict the number of needed personnel by work area, estimated

material needed, and the number of days to complete the restoration. The model is used extensively for storm preparation drill, and for actual pre-storm planning.

(11) Plans and procedures for use of structures owned by other entities in the provision of distribution service, such as poles owned by telecommunications utilities; and

Distribution Response:

AEP Texas currently utilizes poles owned by other entities, such as telephone companies, in the provision of distribution service. The electric distribution systems and telecommunications networks deliver power and telecommunications services along thousands of miles of lines attached to distribution poles owned by either electric utilities or incumbent local exchange carriers (ILECs) or local telecommunications operating companies. These poles are traditionally subject to a joint use arrangement between the local electric company and ILEC in which both parties are able to limit duplicate investments and maintenance costs associated with poles for service to neighborhoods, businesses and consumers by agreeing to install a proportionate share of the pole plant. AEP Texas maintains its facilities on poles owned by ILECs when possible. The tendency of ILEC's to not extend new pole lines in recent years has resulted in AEP Texas owning a majority of the poles used to provide electric delivery service.

(12) Plans and procedures for restoration of service to priority loads and for consideration of targeted storm hardening of infrastructure used to serve priority loads.

Restoration of service to priority loads is outlined in the Emergency Response Plan (ERP) for AEP. The AEP ERP is a component of the AEP Emergency Operations Plan. The ERP details guidelines recommended assisting in setting restoration priorities. The order of restoration may vary, depending on the specific needs for the outage situation at hand. The three guidelines are (1) safety, (2) essential services, and (3) circuits (number of customers involved). Removing unsafe conditions is the highest priority in the restoration of service process. It is very important to make a high-level damage assessment early in the restoration process after a major event. Pursuant to 16 TAC § 25.53(e)(B)(ii), further information concerning priorities for restoration can be found in the AEP Confidential ERP, which is a component of the AEP

Emergency Operations Plan and is available for review by the Commission and Commission Staff at the Austin Offices of AEP Texas.