

El Paso Electric Company

Report on Weather Event: February 2-4, 2011

February 14, 2011

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I. Introduction

El Paso Electric Company (EPE) provides the following report on the weather event of February 2-4. It is a description of the Company's actions during the severe weather event of February 2-4, 2011, in response to specific questions from Staff of the Public Utility Commission of Texas (PUCT). Separate and apart from the response to specific questions, the PUCT Staff has also requested a summary of events on the EPE system during the event that includes a diagnosis of the power plant failures and whether gas supply issues played any role. Accordingly, this report will respond to the PUCT Staff's request for a summary of events, noting in the summary where the description of actions and events responds to the specific questions and providing additional information where required. All times indicated in this report are Mountain Standard Times and all degrees are Fahrenheit.

II. Summary of Report

During the final weekend of January 2011, EPE was monitoring the actual weather and the forecast as is always done. The weather forecast was indicating significantly colder weather, but not as severe as ultimately occurred. Every year, EPE winterizes its generating plants prior to the beginning of winter weather. This winterization encompassed verifying that heat tracing and heat strips were properly functioning as well as making sure insulation was properly installed at its local generation facilities. Similarly, prior to winter weather, EPE verifies that equipment in its

substations, the part of the transmission and distribution system most susceptible to cold temperature extremes, can withstand frigid temperatures. In addition, on January 31, 2011, prior to this severe weather event, EPE initiated its severe weather preparations, which included verifying winterization of generation and transmission and distribution (T&D) facilities; reviewing system operations plans; contacting the operator of Palo Verde to make sure the units were not experiencing any issues and to stress the need for power from the plant; reviewing availability of fuel; preparing for potential pipeline constraints; and putting employees on call as needed during the weather event. The System Operations group requested EPE's Power Marketing and Fuels group to keep additional generation on-line, and, in response, Power Marketing made arrangements to leave on Rio Grande Unit 6, continue with the start-up of Newman Units GT-3 and GT-4, and verified the ability of Newman Unit 3 to operate on fuel oil.

During the afternoon and evening of February 1st, the weather deteriorated significantly with temperatures dropping from 31 degrees at 4 p.m. to 18 degrees at 10 p.m. Temperatures remained below 18 degrees for the next 60 hours with a low temperature of 1 degree. Not only did the temperature drop to record levels and much lower than forecasted on January 31, but the wind was blowing at average speeds of 10 to 20 mph creating very low wind chills. The severe wind chills rapidly dissipated heat around key power plant components and accelerated the temperature drop of the components. As the temperature rapidly fell to subfreezing levels, the Company began experiencing freezing equipment at our generation facilities. Not only did critical water lines freeze but instrumentation which controls the generation froze as well. Due to these events, EPE lost most of its local generation over a period of 7 hours early

Wednesday, which reduced its load-serving capability. EPE did have approximately 55 MW of local generation from its combustion turbine, Copper Unit 1, running during the entire time and even during the worst portion of the weather. This generation combined with purchases from nearby generation resources provided dynamic reactive voltage support that made it possible for the Company to import power, including the remote generation owned by EPE at Palo Verde in Arizona and Four Corners in New Mexico, and to maintain the system. During the next three days, February 2nd, 3rd and part of the 4th EPE struggled against Mother Nature to return more local generation to service, with limited success. Fortunately, with the exception of a short period of interruption on its non-firm HVDC interconnection with the Southwest Power Pool and an outage due to a damaged conductor on its line to Dell City, we had no transmission outages or failures.

As a result of the advance planning of the various EPE departments, and the effort and support of EPE employees and contractors as well as the cooperation of public and private organizations, businesses and individuals, EPE was able to maintain the system through a variety of purchases and by bringing in EPE's own remotely located generation using our transmission lines. The Company received tremendous cooperation from all of our neighbors including, but not limited to Public Service Company of New Mexico (PNM), Southwestern Public Service Company (SPS), Arizona Public Service Company (APS), Tri-State Generation & Transmission, and Tucson Electric Power Company (TEP). In addition to these parties, the Western Electricity Coordinating Council, the States of New Mexico and Texas, the appropriate counties and all of our cities quickly mobilized when requested to assist EPE and our

customers. Working through the various emergency management systems and the media, we were able to communicate with the various constituencies. When it became apparent that the Company's local generation would not be quickly returned to service, we first curtailed our interruptible customers. In addition, between the peak load hours of 7 a.m. to 12 p.m. and 6 p.m. to 9 p.m. on February 2nd, 5:30 p.m. to 10:30 p.m. on February 3rd, and 6:30 a.m. to 12 p.m. on February 4th, the Company executed controlled load shedding to help protect the health and safety of our customers by preserving the integrity of the system and avoiding the very real risk of an entire system collapse. This load shedding was done on a non-discriminatory basis across the entire system in both New Mexico and Texas with the exception of those circuits containing critical customers (e.g., hospitals, 911, etc.).

On the day of February 4th, EPE was able to return 300 MWs of generation to service and eliminate any load shedding. On February 5th, the Company was able to allow interruptible customers to return to the system, and all interruptible customers were allowed to return to their normal operations by February 6.

Based upon the information known at this time, the phenomenally cold weather (60 hours below 18 degrees Fahrenheit in El Paso) and severe wind chills negatively impacted a generation fleet that is primarily designed to withstand excruciating summer temperatures, and not near zero degree Fahrenheit during the winter. It appears this weather event was the worst in at least 45 years and maybe longer. EPE's neighbor to the south, the Comisión Federal de Electricidad (CFE) experienced similar difficulties with its generation in both Juarez and Chihuahua City.

III. Event Description

A. Weather Forecast and Actual Weather

During the final days of January 2011, EPE was monitoring the actual weather and the forecast as is always done. The weather forecast on February 1, 2011 indicated significantly colder weather than historical, but not as severe as ultimately occurred. For Tuesday, February 2, the actual high temperature was 15 degrees compared to a forecasted high of 37 degrees, and the actual low temperature was 6 degrees compared to a forecasted low of 14 degrees. Similarly, the weather forecast on February 2 for Wednesday, February 3, indicated a high of 30 degrees compared to an actual high of 18 degrees and a forecasted low of 14 degrees compared to an actual low of 1 degree. The weather forecast on February 3 for Friday, February 4, the last day of the freeze event, indicated a high of 43 degrees compared to an actual high of 37 degrees, and a forecasted low of 21 degrees compared to an actual low of 3 degrees.

While the forecasted temperatures did not accurately warn of the extreme and persistent nature of the arctic storm, it is difficult to blame forecasters for failing to predict the coming storm conditions. The duration of the harsh and freezing weather, the strong wind gusts and related very low chill factors, the record low temperatures and the record-low maximum temperatures, were all extremely unusual and, in many respects, unprecedented for the El Paso area. All contributed to the harsh and force majeure nature of the weather event and were the root cause of the outages and the difficulties in restoring local generation to service.

The duration of freezing temperatures is significant, because water pipes and sensory and monitoring equipment, once frozen, often incur damage hindering the ability to make the unit operational until repairs are made as appropriate. During the weather event, temperatures remained below freezing for at least 77 hours and 24 minutes, from approximately 8:51 a.m. on February 1, 2011 through approximately 2:15 p.m. on February 4, 2011. By comparison, the length of this freeze was last exceeded only by a weather event that occurred 49 years ago, in January 1962 (93 hours).

The following day-by-day summary of weather in the El Paso area February 1-4 documents the extreme and severe nature of the arctic cold front.

February 1, 2011

On February 1, 2011, an arctic air mass filtered in across the area and caused extremely cold air to move over the El Paso, Texas area. Air temperatures were in the low 40s between midnight and 4:00 a.m. on February 1, 2011 but these values plummeted as the wind changed direction and allowed frigid, arctic air to move in. The air temperature dropped below freezing at approximately 8:51 a.m. and then plummeted into the middle teens by the late evening hours. On February 1, 2011, the maximum air temperature was 43 degrees and the minimum air temperature was 14 degrees.

As the colder air moved in, some gusty winds occurred during the late evening. Wind gusts up to 26 mph were measured at the El Paso International Airport and this, combined with air temperatures in the middle teens, produced wind chill values below zero. For Instance, at 10:27 p.m. on February 1, 2011, the air temperature was 16 degrees and the winds were gusting up to 26 mph. This combined to produce wind

chill values of -3 degrees Fahrenheit. The peak wind speed that was reached on February 1, 2011 was 43 mph and this occurred shortly after 12:00 a.m.

February 2, 2011

The air temperature continued to drop during the morning of February 2, 2011 with values falling from 13 degrees at 1:00 a.m. down to 8 degrees by 8:00 a.m. A very slow and minimal moderation in air temperature occurred during the afternoon as the air temperature struggled to reach 15 degrees. On February 2, 2011, the maximum air temperature was 15 degrees and the minimum air temperature was 6. The “normal” maximum air temperature for February 2nd is 60 degrees and the “normal” minimum air temperature is 35 degrees. Based on these values, the maximum air temperature of 15 degrees on February 2, 2011 was 45 degrees below normal. The minimum air temperature of 6 degrees on February 2, 2011 was 29 degrees below normal.

The maximum air temperature of only 15 degrees on February 2, 2011 was the coldest maximum (high) temperature ever recorded in El Paso, Texas. This is referred to as the “Record Low Maximum.” There has never been a day in the history of record keeping where the temperature stayed so cold for the entire day.

A few wind gusts up to 24-26 mph occurred around mid-day on February 2, 2011. At 11:51 a.m. on February 2, 2011, the air temperature was 11 degrees Fahrenheit and a few wind gusts up to 24-26 mph occurred. This combined with frigid air temperatures to produce wind chill values of -9 to -10 degrees Fahrenheit (9 to 10 degrees below zero). The peak wind speed that was reached on February 2, 2011 was 26 mph.

February 3, 2011

The coldest air of this arctic air mass moved over the El Paso, Texas area during the morning of February 3, 2011. Air temperatures remained in the single digits from midnight through 10:00 a.m. The air temperature slowly climbed into the teens during the late morning and reached a maximum of 18 degrees at 2:51 p.m. On February 3, 2011, the maximum air temperature was 18 degrees and the minimum air temperature was 1 degree. The “normal” maximum air temperature for February 3rd is 61 degrees and the “normal” minimum air temperature is 35 degrees. Based on these values, the maximum air temperature of 18 degrees on February 3, 2011 was 43 degrees below normal. The minimum air temperature of 1 degree on February 3, 2011 was 34 degrees below normal. The peak wind speed that was reached on February 3, 2011 was 20 mph.

The low temperature of +1 degree that occurred at 5:49 a.m. on February 3, 2011 was the 5th lowest temperature ever recorded in 131 years of minimum temperature record-keeping.

February 4, 2011

On February 4, 2011, El Paso, Texas was still under the influence of this arctic air mass. Clear skies and calm winds allowed for perfect radiational cooling to occur and the air temperatures plummeted as low as 3 degrees during the early morning hours of February 4, 2011. By late in the morning, the air temperatures started to rapidly moderate and temperature readings were in the middle 20s by 12:00 p.m. The air temperature continued to warm during the afternoon and the maximum air

temperature for the day reached 37 degrees. The winds were generally light and variable in direction under 10 mph.

On February 4, 2011, the maximum air temperature was 37 degrees and the minimum air temperature was 3 degrees. The “normal” maximum air temperature for February 4th is 61 degrees and the “normal” minimum air temperature is 35 degrees. Based on these values, the maximum air temperature of 37 degrees on February 4, 2011 was 24 degrees below normal. The minimum air temperature of 3 degrees on February 4, 2011 was 32 degrees below normal.

To summarize the foregoing, the “record low” and “record-low maximum” temperatures during February 2-4 presented an operational environment never before experienced in the El Paso area:

- Records were set on February 2, 3 and 4. The low temperature each of those days **was the lowest temperature ever recorded on that particular day in El Paso history.**
- The maximum air temperature of only 15 degrees on February 2 was **the coldest (high) maximum temperature ever recorded** in El Paso history. There has never been a day in the history of record keeping where the temperature stayed so cold for the entire day. This beat the previous record low maximum by 1 degree.
- The maximum high temperature on February 3 of 18 degrees was the **lowest high temperature ever recorded** on that date.
- The El Paso area had almost **78 consecutive hours BELOW 32** degrees.

- The El Paso area has been at +1 degree or below only 7 times (total) since weather statistics have been kept. The low temperature recorded on February 2-4 **reached or came close to reaching this mark each day**; the low on February 3 was 1 degree, and the low temperatures recorded on February 2nd and 4th were 3 degrees and 6 degrees, respectively.

EPE's employees heroically worked around the clock during the entire event, facing wind chills as low as minus 10 degrees, and battling single digit temperatures and wind to thaw and repair equipment and bring the plants back on-line. The success of thawing one piece of equipment was met with the freezing of yet another component. Backhoes needed to dig out broken pipes would not operate due to hydraulics freezing. These record low temperatures caused water pipes, natural gas flow transmitters, instrumentation, sensing lines to auxiliary equipment and boiler tubes to freeze at both the Rio Grande Power Plant and Newman Power Plant, causing the loss of most local generation, as more fully discussed in the next section below.

B. Generating Plants

1. Capabilities and Status Prior to Emergency Event

Late Monday night and early Tuesday morning, prior to the arrival of extreme freezing conditions in the El Paso area and the declaration of an emergency, EPE's system was stable with sufficient generation on-line to cover EPE's projected loads and reserve requirements. EPE had extra generation on-line in anticipation of possible problems related to the cold front moving into the area. In particular, the Power Marketing Group had made arrangements to leave on Rio Grande Unit 6, continue with

the start-up of Newman Units GT-3 and GT-4, and verified the ability of Newman Unit 3 to operate on fuel oil. All of the Company's remote generation units (Palo Verde [PV] in Arizona and Four Corners in New Mexico), for a total of approximately 730 MWs, were available and operating. Some of the Company's available local units were not being dispatched. (A description of the capacity and fuel type of all of EPE's remote and local generation is attached as Exhibit A.)

Newman Unit 2, with a capacity rating of 85 MW, was unavailable because it was on a control valve overhaul forced outage. Of the two local units that were available, but not being dispatched, two local units, Newman Unit 1 and Rio Grande Unit 7, were on reserve shutdown, but according to design specifications could be brought on-line and available in 8 hours. Copper Unit 1 was also available but not being dispatched. All other local units were operating and being dispatched, but two of those units, Newman Unit 3 GT and Newman Unit 4 GT, were operating at 5 MW.

The Company's newest generation unit, Newman Unit 5, was designed to operate to an ambient temperature (extreme dry bulb condition) of 14 degrees based upon the recommendation of the design engineer of the plant, Zachry Engineering, and after consideration of annual daily extreme weather data collected by ASHRAE (American Society of Heating, Refrigeration and Air Conditioning Engineers) and published in the 1997 ASHRAE Handbook—Fundamentals.

The design temperature ranges for local generation other than Newman Unit 5 are still under investigation. It is, however, significant that the Company's local generation has historically operated with no operational problems with temperature lows in the high teens. The Company also knows from experience that its weatherization

plan, including heat tracing measures discussed below, has been adequate for weather conditions in the high teens. It is also noteworthy that the Company has not previously experienced the magnitude of local generation outages due to extreme cold weather events like the events of last week.

2. Actions to Weatherize Plants

EPE maintains an extensive weatherization checklist for each of its local units. Prior to the beginning of the winter weather season, around September and October, the Company goes through its weatherization checklist and confirms that items on the checklist have been completed. For example, the Company verifies that all heat trace circuits, heat lamps, and heat strips are functioning, and that all enclosures are tight and sealed. The Company also ensures that all insulation is properly installed. In the 48 hours before the cold front arrived in El Paso, the Company, as a precaution, confirmed that all items on the checklist were in place and properly functioning. A Freeze Protection Checklist for the Newman units is attached as Exhibit B.

Among the more important items on the checklist are ensuring that heat tracing circuits, heat lamps and space heaters are on and operating. A heat tracing circuit is cable that spirals around boiler instrument sensing lines, water pipes, key sensor equipment and other instruments, which produces heat that, along with insulation, keeps the boiler sensing lines, water pipes, sensor equipment and other instrumentation from freezing. All heat tracing circuits were in place and operational before the extreme weather arrived. Among numerous other items on the checklist, critical drains are cracked (i.e., slightly opened to keep water running and thus minimize the possibility of freezing) and fans for the cooling towers are turned off as needed to heat up the

circulating water to prevent ice build-up on the cooling tower. These items on the checklist and all others were completed as well in the 48 hours before the arctic storm hit El Paso.

During the emergency, EPE employees and contractors, operating in extremely harsh weather conditions, and working throughout the day and night, sought to protect critical equipment and sensors from freezing; and after critical equipment and sensors had frozen, worked throughout the emergency to thaw out and repair the frozen equipment and sensors. For example, employees and contractors, standing on different levels 10 to 15 feet apart from each other and working with blow torches, sought to warm sensing lines that run 50 to 80 feet long from the steam drum (the water/steam reservoir at the top of the boiler) down to the level transmitter.

3. Impact of Weather on Generating Units

For a complete description of the chronology of events and the impact of weather on generating units, please see Exhibit C, which is titled “System Operations Appendix A – Chronology of Events.”

On Tuesday night prior to the extreme freeze in the El Paso area, EPE’s system was stable with sufficient generation on-line to cover EPE’s projected loads and reserve requirements. EPE had extra generation on in anticipation of possible problems related to the cold front moving into the area. Tuesday night, EPE lost Newman Unit 3 and called for the startup of the Copper gas turbine. During early Wednesday morning, EPE experienced loss of all its local generators that were on-line except for the Copper Unit 1, the gas-fired peaking unit located on EPE’s 115 kV system, and a part of the Newman 4 generator (one GT and the attached steam generator (ST)). While EPE’s

system remained stable with sufficient voltage following the loss of this generation, EPE had lost the bulk of its dynamic reactive support that is provided by its local generation.

During the morning hours of Wednesday (7:12 a.m. through 7:16 a.m.), the freezing temperatures caused the loss of the Newman 4 GT and ST. At this time, EPE's dynamic reactive support was further reduced such that voltage instability was possible. As a result, EPE initiated load shedding of firm customer load. This stabilized the EPE system. At approximately 7:50 a.m. that morning, the Luna Energy Facility (LEF) located in Deming, NM, and jointly owned by PNM, TEP and Freeport-McMoRan, tripped two of its three generators, further reducing dynamic reactive support. As a result, EPE again initiated load shedding of its firm load. EPE called PNM to request that its one-on-one combined-cycle Afton generation be put on-line. The Afton combustion turbine was placed on-line at approximately 10 a.m., but PNM could not place the steam generator on-line. LEF generation returned to operation at approximately 10:50 a.m. This assisted in maintaining system voltage support. EPE then restored the previous load that had been shed.

During Wednesday afternoon, EPE's load decreased in its natural pattern, but by late afternoon/early evening the load was increasing coincident with its normal evening peak. As the load began to increase in the late afternoon of Wednesday, the Eddy County HVDC tie tripped. This strained the transmission system from the west with additional flow. As a result, EPE again initiated load shedding of firm load to relieve that stress on the system caused by that reduction. EPE maintained the load shed until the evening peak load ended. Also, by approximately midnight the Eddy County HVDC Terminal was returned to service.

During Wednesday and Thursday, EPE worked to return local generation to stable service, but was not able to do so because of the continuous single-digit freezing temperatures. PNM's Afton unit, which gave support to the EPE system, tripped in mid-afternoon on Thursday but was returned to service within an hour. However, this instability in the local generation due to weather conditions reinforced EPE's concern regarding generation system stability with higher load levels.

During Thursday night and early Friday morning, EPE remained in a state of little dynamic reactive support and minimal generation support. LEF tripped its steam generator and reduced its power output but slowly returned. Generators that EPE was able to put on-line tripped soon after returning. As a result, on Friday morning, EPE had not returned any generators to stable operation. Load studies showed that with the expected Friday morning load, EPE would again exceed its load serving capability. EPE thus initiated controlled load shedding on Friday morning to maintain its load at or below the level required for reliability during the morning peak period.

By Friday afternoon, EPE had returned to service three additional local generators. These generators increased the local dynamic reactive support, and studies determined that with this level of support, the system was sufficiently reliable that additional controlled load shedding was not required. Therefore, EPE did not initiate any further controlled load shedding.

Staff Question 2-1. Please provide a list of generating units that were available at the start of the emergency with size (MW), and type of fuel. Please indicate which ones were operating.

RESPONSE: The start of the emergency (EEA, Level I) is defined as 1:53 a.m. on 2-Feb-2011. At that time, the remote generation units at Palo Verde (622 MW) and Four Corners (108 MW) were operating. The following local units were available:

Newman Power Plant:

- GT-1, 73 MW, natural gas
- GT-2, 73 MW, natural gas
- ST-1, 64 MW, natural gas

Copper Unit 1:

- 63 MW, natural gas

Staff Question 2-2. Please provide a list of generating units that were not available at the start of the emergency with size (MW) and type of fuel. Please explain why these units were not available to generate power.

RESPONSE: The start of the emergency (EEA, Level I) is defined as 1:53 a.m. on 2-Feb-2011. At that time, the following units were not available:

Newman Power Plant:

- NM-1, 78 MW
 - Fuel type: natural gas
 - Not available due to unit equipment freezing during start up
- NM-2, 80 MW
 - Fuel type: natural gas
 - Not available due to unit on forced outage for admission valve repair
- NM-3, 102 MW
 - Fuel type: natural gas
 - Not initially available due to unit loss of throttle pressure; operator trip. Subsequent start-up failed due to unit equipment freezing at start-up.
- NM GT-3, 70 MW
 - Fuel type: natural gas
 - Unit not available as of start of emergency due to equipment freezing
- NM GT-4, 70 MW
 - Fuel type: natural gas
 - Unit not available as of start of emergency due to equipment freezing

Rio Grande Power Plant:

- RG-6, 50 MW
 - Fuel type: natural gas

- Unit not available due to false indication of low gas pressure resulting from frozen sensing lines on the transmitters
- RG-7, 50 MW
 - Fuel type: natural gas
 - Unit not available due to unit equipment freezing during start-up
- RG-8, 150 MW
 - Fuel type: natural gas
 - Unit not available due to false indication of low gas pressure resulting from frozen sensing lines on the transmitters

Staff Question 2-3. Please name the generating units and size that became available during the emergency.

RESPONSE: The remote units at Palo Verde were always available. The status of the Four Corners remote generation was as follows:

Four Corners Unit 4:

- 54 MW base load unit
- Tripped (at 03:20 February 2) tripped due to hydraulic control valve
- Started (at 19:04 February 3)
- Tripped (at 20:10 February 3) due to low steam temperature
- Started (at 12:48 February 4)
- Tripped (at 16:08 February 4) due to low oxygen steam

As local generating units tripped off-line during the cold weather, an Energy Emergency was declared at 01:53 February 2. The Emergency ended at 08:06 February 6, 2011. For reference below, Newman 4 is a combined-cycle unit with two gas turbines (GT1 and GT2) and also a steam turbine. Newman 5 is also designed to be a combined-cycle unit, but currently has two simple-cycle gas turbines (GT3 and GT4) and is in the process of being converted to a combined-cycle facility.

The following are the units that became available during the emergency. Copper was available at the start of the emergency and was never lost. All the others units were or had been unavailable but became available, as described below:

Copper Unit 1:–

- 63 MW peaking unit
- Started (at 23:45 February 1) approximately two hours before the Energy Emergency was declared
- Ran consistently throughout the duration of the emergency

Newman GT1 73 MW capacity

- Unit tripped at 3:17 a.m. on February 2

- Unit came back on-line at 18:52 on February 3 but tripped again at 19:20
- Unit came back on-line at 21:32 on February 3 but tripped again at 02:04 on February 4

Newman 4 Steam Turbine 64 MW capacity:

- An HRSG powered from GT1 and GT2
- Tripped at 07:12 February 2

Newman GT2 73 MW capacity:

- Unit tripped at 07:16 a.m. on February 2
- Unit came back on-line at 22:30 on February 3 but tripped again at 02:02 on February 4
- Unit came back on-line at 06:49 on February 4 with 5 MW and stayed on-line until the Energy Emergency ended

Newman GT3 70 MW capacity:

- Unit came on-line in simple-cycle mode on February 5, at 16:07, with 50 MW and stayed on-line until the Energy Emergency ended
- Unit had been unavailable before February 4 (except for testing quantities, which at the time of the emergency was 5 MW) because it was being commissioned as part of the conversion of Newman Unit 5 from simple-cycle to combined cycle

Newman GT4 70 MW capacity:

- Unit came on-line in simple-cycle mode on February 4, at 15:57, with 50 MW and stayed on-line until the Energy Emergency ended
- Unit had been unavailable before February 4 (except for testing quantities which at the time of the emergency was 5 MW) because it was being commissioned as part of the conversion of Newman Unit 5 from simple-cycle to combined cycle

Rio Grande 8, 150 MW capacity:

- Conventional steam turbine came on-line on February 4, at 17:12, with 50 MW and stayed on-line until the Energy Emergency ended.

Staff Question2-4. Please provide detailed information on loss of generating capacity due to weather, fuel, or other causes. For each cause, include MW lost, time of loss, duration of loss, and activities performed to contain the loss of the generation.

RESPONSE: Please see Exhibit C for detailed information concerning the MW lost, duration of loss, and time of loss. Please see Section III.B.2 above for a description of weatherization and activities performed to contain the loss of generation.

Note: Staff Questions 2-5 and 2-6 are addressed in the discussion of Transmission and Distribution.

Staff Question 2-7. Please provide any issues with regards to importing the power via DC tie during the time that local generation was tripping. Please indicate all corrective actions taken to ensure that DC tie stay operational.

RESPONSE: The DC converter station is rated for 200 MW. It was put in service February 2, at 02:02. In the afternoon on February 2, the DC tie was loaded to approximately 200 MW. During the event, some thyristors failed and the DC converter station tripped off-line at 18:04 on February 2.

After replacing the thyristors, the DC converter station was placed back in service at 23:04 p.m., on February 2. However, the amount of power flowing through the converter was kept at or below 170 MW for the remainder of the Energy Emergency. This was done as a precautionary measure to maintain reliability of the converter.

Staff Question 2-8 An email dated Feb 3, 8:39 a.m., indicated that you purchased spinning reserves; however this power could not be brought to El Paso due to Path 47's System Operating Limit (SOL). Why was this power purchased when it could not be delivered to the EPE system?

RESPONSE: NERC Standard BAL-002-0 Requirement 3.1 requires balancing authorities (such as EPE) to carry enough reserves to cover their Most Severe Single Contingency (MSSC). In EPE's case, this would be approximately 211 MW—its share of one Palo Verde unit. The standard also allows balancing authorities to form reserve sharing groups that allow them to pool reserves. EPE is a member of the Southwest Reserve Sharing Group (SRSG)—currently with 14 other members located in Arizona, California, Colorado, Nevada, and New Mexico. This allows EPE to typically carry less than half the reserves required if it were not a member of the sharing group. The SRSG requires that utilities carry reserves even when they are in a declared Energy Emergency Alert. To fulfill its obligation, EPE purchased spinning reserves from other utilities in the WECC. Due to transmission limitations, EPE could not import any more power into the El Paso region through Path 47; however, if an SRSG member needed assistance with contingency reserves, EPE could still deliver the assistance at a point away from its service territory – such as in Arizona. Therefore, EPE met its obligation as an SRSG member.

Staff Question 2-9. In the email dated February 3, 2:12 p.m. (maybe it is similar to question 3 above), you mentioned bursting pipes-including those in the municipal water system. Does the municipal water system provide water to the El Paso generation? If so, please describe how any shortages of water impacted the EPE generation.

RESPONSE: Yes, the municipal water system does provide EPE generation its water supply. EPE also maintains a supply of stored water at the plants. However, water supply was not a problem during this emergency.

Staff Question 2-10. Does EPE have the capability of burning fuel oil at any of its local power plants (Newman, Rio Grande, and Copper)? If so, describe for each plant the fuel oil inventory system, amount of fuel oil on hand at the time of the emergency, the amount of time required to switch from natural gas to fuel oil, amount of fuel oil burned during the emergency, capacity of each unit on fuel oil, and any air emission restrictions on the units that would limit their operation.

RESPONSE: Yes. The Newman Power Plant is capable of burning fuel oil. Inventory on hand at the Newman Power Plant is 42,787.48 BBLS. Storage capacity at the Newman Power Plant is 210,196.57 BBLS. Because natural gas supply was not the cause of the generation outage, it was not necessary or useful to use fuel oil as a fuel source during this event, so none was used. There are no air emissions restrictions that would have limited operation.

C. Transmission and Distribution

Prior to the loss of EPE local generation on February 2, 2011, EPE's transmission and distribution systems were in a normal operating state. All 345-kV lines were in service. EPE had sufficient generation on-line to maintain dynamic reactive support in the system, and the line loading and voltages were normal. In its underlying transmission system, one 115-kV line (Global Reach-Vista) and one 69-kV line (Rio Grande-Sunset) were out of service for line work and currently remain out of service. In addition, the radial 115-kV transmission line from EPE's Coyote Substation serving the Rio Grande Electric Cooperative's Dell City load (approximately 4 to 6 MW) was out of service due to a damaged conductor. The outage of this line was unrelated to the weather. It was caused when a conductor broke, which EPE believes was the result of damage incurred from someone shooting the conductor. This line was restored at 6:28 a.m. on February 2.

EPE's transmission system experienced only one transmission outage during the cold-weather event. On Wednesday morning, February 2, EPE lost the Newman to Butterfield 115-kV transmission line when Newman 4 Steam Turbine tripped. This was due to on-going breaker work at the Newman 115-kV switchyard that left that line on a common breaker with the steam turbine. The loss of this line, however, did not result in any transmission system impact since by that time there was no generation at the Newman Plant to be delivered to EPE load.

Other than that outage, EPE's transmission system experienced no other cold-weather related outages and remained fully operational. However, because of the loss of local generation and the dynamic reactive support that local generation provides, EPE was limited in the amount of load it could serve on its transmission system.

During the emergency, EPE's distribution system remained operational, and the weather had only minimal impact on its operation.

Staff Question 2-5. Please provide (schematic may be better) capacity and constraints of all transmission lines and/or DC ties that El Paso Electric has in place to import power into its system.

RESPONSE: Please see the attached map in Exhibit D outlining the transmission lines/paths EPE utilizes to import power into its system, as well as EPE's limits on Path 47 and through the Eddy County DC Tie.

Staff Question 2-6. Please provide the issues faced with regards to importing the power via Path 47 during the time that local generation was tripping. Please indicate all corrective actions taken to ensure that Path 47 stayed operational.

RESPONSE: EPE utilizes Path 47 to import power from Palo Verde and Four Corners. The capability of this Path is limited by voltage and is determined through real-time nomograms using data on EPE's system. One of the primary nomogram parameters is EPE's local on-line generating units. With all EPE local generating units off-line except for its Copper unit, the nomograms could not calculate capability information. As a result, EPE performed studies during the emergency that determined the EPE load serving capability under various generation (both internal and external) configurations.

These studies showed how much load EPE could serve reliably given the lack of local generation or given various configurations of on-line generation. To maintain these capability levels, EPE reduced load in its service area by manual load reduction.

D. System Operations

EPE's System Operations Department is responsible for the safe and reliable operation of EPE's electric system. This includes the coordination of EPE's activities in power generation, transmission, purchased power and fuels. This section of the report describes how System Operations prepared for the extreme weather-related events and then responded to them. This section also supplies (with indicative subheadings) all the information requested by David Featherston of the PUCT Staff in the first set of questions sent to Joe Nevarez on February 2, 2011 at 3:02 p.m. (CST). Exhibit C chronicles what occurred on the generation and resources side (in part 1) and how this affected system operations (in part 2) from February 1 through February 4, 2011.

1. Activities to Prepare for the Event

System Operations prepared for the events in two senses. First, it lined up resources to serve projected load and to be prepared to respond to the forecasted harsh weather conditions. On Monday January 31, the Manager of System Control met with management from other departments to prepare for the forecasted cold weather. Power Marketing (whose activities are described below in subsection 2.c) was requested to keep additional local units on-line in the event the anticipated extreme weather conditions resulted in units dropping off-line. On Tuesday evening (February 1), prior to the emergency conditions, the status of EPE's local generation was as shown below. Note that this snapshot of unit availability as of Tuesday evening at the

time of the declaration of an emergency is before the time of unit availability/non-availability described above and prior to the declaration of an emergency.

Newman:

- Newman 1, 78 MW – Available, natural Gas
- Newman 2, 80 MW — Unavailable, natural Gas
- Newman 3, 102 MW – On-Line, natural Gas
- Newman 4 (combined cycle) GT1, 73 MW; GT2, 73 MW; and Steam turbine, 64 MW – On-Line, natural Gas
- Newman 5 (two gas turbines) GT3, 70 MW and GT4, 70 MW – On-Line, natural Gas [Note – GT3 and 4 were in testing and as a result were limited to approximately 10 MW]

Copper:

- Peaking unit, 63 MW, available, natural gas

Rio Grande:

- RGD 6, 50 MW, On-Line, natural Gas
- RGD 7, 50 MW, Available, natural Gas
- RGD 8, 150 MW, On-Line, natural Gas

In addition, EPE had approximately 730 MW of remote generation from its Palo Verde and Four Corners Generating Stations.

As the second part of its preparations, System Operations management had personnel on call in case extra help was needed at the System Operations Control Center. The Supervisor of Distribution Dispatching was asked to have crews available

for any storm trouble, and the Superintendent of Distribution Systems was to be available should problems arise.

EPE's System Operations also had in place its Emergency Operations Plan (EOP), which could be implemented once emergency conditions occur. The EOP has provisions that explicitly address the conditions in which EPE undergoes a capacity shortage, including how load is to be curtailed, as summarized next.

2. Actions During The Event

a. Interruption of Customers

Staff Question 1-1. How did EPE determine what load was curtailed?

EPE determined what load to curtail by following the procedures and criteria in its EOP, as applied to the unique situation and imperatives of the events in question. The EOP helps determine what load is curtailed and in what order. Under the EOP, non-firm wholesale load is curtailed first, followed by interruptible load, and then firm load, if necessary. Within the category of firm load, critical load customers have highest priority—they are shed only as a last resort.

EPE's manual load shedding is (and was during this emergency) performed through its Energy Management System (EMS). In the EMS, distribution feeders and transmission customers are grouped and pre-populated into 35 different load-shed blocks representing approximately 50 MW each, during the summer peak. These blocks are prioritized, based on type of customer load, and represent customers dispersed throughout EPE's service territory (i.e., any one load-shed block covers several areas of the service territory, not just one area). The load shed blocks are rotated, the time and rotation of which are a function of the amount of load that is

required to be dropped. Through the EMS, load-shed blocks can be manually de-energized and energized through Supervisory Control and Data Acquisition (SCADA). Confidential Exhibit E is the Manual Load Shedding Procedure section (EPM-012) of EOPE's EOP. It shows, in addition to other things, the 35 load-shed blocks that EPE already had in place if conditions necessitated a curtailment of firm load.

Staff Question 1-2. Is there a hierarchy or priority, such as industrial and commercial customers first, residential customers last, and so on?

There is a hierarchy or priority of customer loads. Interruptible customers are interrupted first, and then firm customers are interrupted, if necessary. For firm load shedding, EPE prioritizes critical load customers into five categories. Customers of the highest priority (most critical customers) are the last to be de-energized and will not be de-energized unless deemed absolutely necessary. The firm load customer priorities are:

1. Highest - Hospitals and Dialysis Centers
2. Government Agencies & EPE's System Operations Control Center (SOCC)
3. Broadcast Stations
4. Water Pump Lift Stations
5. Lowest - No priority given (this category is the non-critical load firm customers)

Government agencies include emergency responders such as police, fire, and 911 call centers. Generally, residential, commercial, and industrial customers have the lowest priority. Occasionally, EPE will give an industrial customer higher priority if its

internal processes pose an extraordinary safety risk if de-energized abruptly without notice.

Confidential Exhibit F is the Critical Feeders and Loads section (EPM-007) of EPE's EOP. It identifies the critical loads by category (e.g., hospitals, dialysis centers, radio and television stations), so that EPE already had this information in hand if curtailments became necessary.

Staff Question 1-3. Who establishes those priorities?

The EOP, which outlines the priorities of service during interruptions, has been developed over the years through collective efforts in EPE. Multiple departments within EPE, such as Distribution Systems, EMS Support, and System Operations, work together to develop the load-shed blocks.

In summary, EPE kept local generation resources on-line prior to the freezing temperatures hitting the El Paso area, had additional personnel on call in case they were needed, and had in place the EOP, if it needed to be implemented. In addition, a detailed chronology of events is provided in Exhibit C. A summary narrative of what actions EPE took to preserve the system during the emergency and the reasons for those actions is provided below.

b. Actions by System Operations

On the evening of Tuesday, February 1, 2011, prior to the extreme freeze in the El Paso area, EPE's system was stable with sufficient generation on-line to cover EPE's projected loads and reserve requirements. EPE had extra generation on-line in anticipation of possible problems related to cold front moving into the area.

At 20:07, Newman Unit 3 tripped due to frozen equipment. At 22:15, Rio Grande Unit 6 tripped, also due to frozen equipment. At that time, the System Controller instructed that Newman Unit 1 be placed on-line. This instruction, however, was unsuccessful due to the weather conditions. The System Controller also contacted the Supervisor of Load Research, the group in EPE that is responsible for implementing the interruptible load program, and directed that the interruptible loads be curtailed. These interruptible customers remained off-line for the duration of the event. This load was the first that EPE interrupted or curtailed during the emergency.

During the early hours of Wednesday morning, EPE suffered additional loss of local generation and lost Newman Unit 4 at 7:16 a.m. Copper, with a capacity of about 62 MW, was the only local generating unit on-line. With the loss of local generation, EPE's dynamic reactive support was further reduced such that voltage instability was possible. As a result, EPE initiated load shedding of firm customer load to stabilize EPE's system. At approximately 7:50 a.m. that morning, the LEF (which is managed by PNM and located in Deming, New Mexico), tripped two of its three generators, further reducing dynamic reactive support. As a result, EPE again initiated load shedding of its firm load. EPE called PNM to request that its one-on-one combined-cycle Afton generation be put on-line. The Afton combustion turbine was placed on-line at approximately 10 a.m.; however, PNM could not place the steam generator on-line. LEF generation returned to operation at approximately 10:50 a.m. This assisted in maintaining system voltage support, and EPE then restored the previous load that had been shed.

During Wednesday afternoon, EPE's load decreased in its natural pattern, but by late afternoon/early evening, the load was increasing to its normal evening peak. As the load began to increase in the late afternoon of Wednesday, the Eddy County HVDC Tie tripped and EPE lost approximately 170 MW of imports over the tie. This strained the transmission system from the west with additional flow. As a result, EPE again initiated load shedding of firm load to relieve that stress. EPE continued engaging in controlled load shedding until the evening peak ended. Also, by approximately midnight, the Eddy County HVDC Terminal was returned to service.

During Wednesday and Thursday, EPE worked to return local generation to stable service. However, EPE was not able to do so because of the continuously freezing temperatures. PNM's Afton unit, which gave support to the EPE system, tripped in mid-afternoon on Thursday but was soon returned to service. However, this instability in the local generation, combined with the LEF and Afton trips, reinforced EPE's concern regarding system stability with higher load levels.

The nomograms that define the transmission capability of Path 47 (EPE's import path for Palo Verde and Four Corners) were designed to work with at least two generators on at the Newman Generating Station, as this generation is considered the minimum required for transmission system dynamic reactive support. As a result of the loss of generation at Newman, the nomograms were outside their parameters. EPE thus performed system studies that were completed on Thursday to determine the amount of load serving capability in the EPE system following a transmission contingency, taking into account the limited amount of local generation on-line. The results of these studies showed that, if EPE had not returned any generators to

operation, the Thursday evening peak load would exceed EPE's load serving capability with a single transmission contingency. As a result, System Operations began controlled load shedding early Thursday evening to maintain system reliability as the load began to increase to the evening peak. The controlled load shedding continued until the natural load level decreased to a level that could be served without jeopardizing the system.

If EPE had not initiated controlled shedding of load and experienced the loss of a major transmission line, the available dynamic reactive support would not have been sufficient to maintain system stability and EPE may have undergone a system collapse. If this had occurred, system restoration would have been very long and difficult. Severe damage to customer facilities may have occurred since, without any local generation, load would have been required to be used for voltage control as the system was rebuilt. This would have exposed that load to extreme high and low voltage swings.

During Thursday night and early Friday morning, EPE remained in a state of little dynamic reactive support with minimal local generation. Generators that EPE was able to return to service tripped soon after returning. In addition, one of the units at the LEF tripped as well. As a result, on Friday morning, EPE had not returned any generators to stable operation. EPE thus initiated controlled load shedding on Friday morning to maintain its load at or below the level required for system reliability during the morning peak period.

By Friday afternoon, EPE had returned to service three additional local generators. These generators increased the local dynamic reactive support, and

studies determined that with this level of support, the system was sufficiently reliable to serve the normal load and additional load shedding was not required.

c. Fuel and Purchased Power Events

EPE's Power Marketing Department is tasked with ensuring adequate fuel for EPE's generation and optimizing EPE's generation resources in the wholesale power market. Before and during the emergency, Power Marketing worked closely with EPE's System Operations Department, which provided crucial real-time information on the state of EPE's system. With this information, Power Marketing could procure necessary resources depending on the system configuration and work to maintain a reliable natural gas supply. The following is a chronological narrative of the information Power Marketing had and what it did based upon that information.

i. Cold Weather Preparation

On the morning of Monday, January 31, 2011, the Rio Grande Plant notified EPE's Real-Time Marketing desk (which is part of Power Marketing) that Rio Grande Unit 6 was going to be released back as available after showing no performance issues since being brought back from maintenance on Friday night, January 28. At this time, EPE's Prescheduling desk created a Unit Commitment plan for Wednesday, February 2, to determine if Rio Grande Unit 6 would be required as a result of the expected cold front. This Unit Commitment assumed a peak load of 1,126 MW based on weather forecasts of a high of 29 degrees and a low of 9 degrees. The Unit Commitment showed that EPE could meet load requirements without Rio Grande Unit 6 if EPE relied on purchased power transactions or the use of EPE's Copper Unit. In addition, Power Marketing was notified that Newman Unit 5 GT3 and GT4 would be brought on-line

Tuesday morning prior to the cold weather for continued testing through the week. As a precaution, EPE's System Operations determined that Rio Grande Unit 6 would remain on-line until the forecasted cold front moved out and normal temperatures returned to the area.

Power Marketing communicated with the Newman Plant regarding preparation for the cold weather and was informed that Newman Unit 3 would be available to burn fuel oil with four hours notification in the event of natural gas disturbance. In the course of the conversation, Newman Plant personnel indicated they were making preparations at the Plant to prevent operations impacts due to freezing temperatures. Rio Grande Plant personnel also indicated that cold weather preparation work was being performed on the units. Power Marketing conducted phone calls with El Paso Natural Gas (EPNG) pipeline and the intrastate WestTex pipeline personnel regarding cold weather preparations. El Paso Natural Gas indicated it was "powering up" its pipeline to make sure it had sufficient line pack to maintain pressure. WestTex verified good pressure in its pipeline and that the weather was being monitored.

EPE's natural gas Prescheduler procured spot natural gas purchases from the Keystone and Waha basins located in mid-Texas and, therefore, reduced reliance on the San Juan Basin supply in northern New Mexico to reduce the impact of potential natural gas well-head freezing that could potentially occur at San Juan. Additional intrastate pipeline supply was increased from 10,000 to 20,000 MMBtu to maintain natural gas pressure to Newman in the event of EPNG pipeline contingencies.

ii. System Events and Purchased Power/Gas Acquisition Responses

Contingencies on EPE's system began to occur on Tuesday evening, February 2. The events described below, which center on the purchased power EPE obtained, are based on initial information communicated to EPE's Real-Time Marketing desk. Within the events are the power purchases that EPE made.

- On Tuesday night February 2, at approximately 10:10 p.m., Rio Grande Unit 6 tripped due to a frozen gas transmitter.
- Shortly after midnight on Wednesday morning, GT3 and GT4 were lost due to frozen drum level sensing lines, at which time System Operations put EPE's Copper Unit on-line.
- Newman Unit 4 was de-rated to 121 MW at approximately 1:00 a.m. due to trouble with water transmitters.
- Rio Grande Unit 8 tripped at 1:52 a.m.
- Power was procured over the Eddy County DC tie at 2:00 a.m.
- Power was purchased out of Tri-State's Pyramid Unit beginning at 3:00 a.m.
- Newman Unit GT1 tripped at approximately 3:15 a.m.
- Four Corners Unit 4 tripped in scheduling Hour Ending 5 ("HE5", after 4:00 a.m., before 5:00 a.m.).
- Newman Unit 4 steam turbine tripped in HE 8, and shortly after Newman Unit GT2 tripped, leaving Copper as EPE's only on-line local generation.
- EPE purchased 50 MW from PNM's Afton Unit from HE 13 through HE 18.
- EPE purchased power throughout the day over the Eddy DC tie, up to 197 MW, until the DC interconnection tripped at approximately 6:00 p.m.

- EPE made purchases from various interconnection points throughout the day, and total purchases averaged around 400 MW per hour.
- EPE purchased 75 MW of spinning reserves beginning HE 12. Purchase continued through Saturday, February 5.
- System Operations directed that Afton and LEF remain on-line through Thursday. Power Marketing arranged for the purchase from the Afton Unit and TEP continued exchanging power from LEF.
- On Thursday, February 4, System Operations advised that Afton, LEF, and the Eddy Tie be scheduled through Monday due to generation uncertainty.
- On Sunday, February 6, System Operations stated that Afton and the Eddy Tie supplies were no longer needed for system stability. The Eddy Tie schedule from Westar was booked for the duration of the transaction. Afton was to remain on-line to help EPNG's Strained Operating Condition (SOC) due to line pack.

EPE's natural gas supply was adequate for its projected generation requirements. EPE had other natural gas supply options available in the event of supply disruption including natural gas in storage in the Keystone basin, and additional supply available on the intrastate pipeline from the Waha basin. In addition to the contingencies from EPE's local generation, EPNG began to experience reliability issues on its interstate pipeline. Tuesday morning, February 1, EPNG issued notice that there was a low probability that it would need to declare a Strained Operating Condition ("SOC")/Critical Operating Condition ("COC") due to low line-pack. As EPE experienced

loss of generation and began to rely on purchased power from owners of regional natural gas generation, Power Marketing began to deal with natural gas issues, even though EPE's own use of natural gas was only for Copper on the intrastate pipeline.

The following points detail natural gas supply issues that impacted EPE.

- On Tuesday, February 2, at 7:24 a.m., EPNG issued a warning of an SOC Draft.
- At 7:30 a.m., EPNG declared a high probability for an SOC/COC draft due to low line-pack.
- At 10:20 a.m., EPNG declared an SOC, requiring natural gas shippers to be within 10% of their scheduled gas nominations. (Note: EPE, although out of the 10% balancing requirements, was actually keeping gas in the pipeline due to the lack of generation resources. EPE frequently communicated with EPNG and will not be penalized as EPE issues were proactive and a benefit to EPNG).
- At 11:51, EPNG declared an emergency COC, requiring shippers to be within 3% of their nominations.
- At 12:16 p.m., EPNG asked for Shipper assistance. EPE was uncertain as to what its natural gas usage would be for the day as there were thoughts that local generation could begin to be restored, and therefore communicated to EPNG that even though EPNG could not formally schedule gas to the pipeline, the gas would be there if EPE did not have generation return to service.

- On Thursday, February 3, at approximately 9:00 a.m., the local gas distribution utility, Texas Gas Service (TGS), requested 10,000 MMBtu of natural gas from EPE. EPE worked with outside and internal legal counsel to draft an emergency supply agreement to provide gas to TGS.
- At 3:15 p.m., EPE contacted EPNG and received word that EPE's supply had been restored (82,000 MMBtu total)
- At 3:12 p.m., Conoco sent notice of force majeure affecting its supply from the EPNG Blanco, Bondad, Keystone, and Waha pools.
- At 3:30 p.m., TGS notified EPE that it had procured additional gas supply and no longer needed assistance. TGS indicated that assistance might be needed for Friday.
- At 9:51 p.m., EPNG declared force majeure
- On Friday, February 4, at approximately 8:30 a.m., EPE received word that it received only 39,000 MMBtu for the previous gas day (from 82,000 as mentioned above). Any scheduled gas to TGS likely would have experienced cuts.
- At 2:30 p.m., EPNG estimated that EPE might receive only 41,000 MMBtu of its scheduled 91,000 MMBtu for the day. EPE continued to monitor.
- At approximately 3:00 p.m., EPE scheduled 10,000 MMBtu to burn at PNM's Afton generating station after receiving notification that PNM would have insufficient supply to remain in compliance with the pipeline COC. Natural gas was supplied to PNM through a sale as requested by PNM.

- On Saturday, February 5, at 11:02 a.m., EPNG terminated the emergency COC draft alert that began on February 2.
- At 11:34 a.m., EPNG terminated the pipeline force majeure that began on February 3.
- At 9:30 p.m. and 11:04 p.m., EPNG issued a high probability of declaring an SOC/COC for high line-pack.
- On Sunday, February 6, at 3:30 a.m. and 9:30 a.m., EPNG issued a high probability of declaring SOC/COC for high line-pack.
- At 9:31 a.m., EPNG declared an SOC alert to maintain nominations within 4% for high line-pack for gas day February 6.
- At approximately 5:00 p.m., PNM asked if EPE could take more generation from Afton to balance PNM's gas nominations at Afton that were procured to assure generation per EPE's request. EPE could not receive additional power into its system and therefore considered diverting its gas from Luna generation to accommodate PNM's gas supply at the plant instead.
- At approximately 6:00 p.m., EPE diverted its gas supply from Luna to local generation to allow PNM to burn more gas at Luna to avoid pipeline penalties.
- On Monday, February 7, Conoco and EDF agreed to take back 10,000 MMBtu and 5,000 MMBtu from EPE to avoid an SOC penalty. The value of the gas will be credited back to EPE's invoice.

- On Tuesday, February 8, at 1:05 p.m., EPNG cancelled its SOC alert that began on February 6.
- At approximately 3:00 p.m., a confirmation of the natural gas sale to PNM was completed and sent to PNM. The confirmation was based on a pending NAESB agreement.

Additionally, on February 3, the Manager of EPE's Real-Time Marketing desk received word from CFE that assistance was needed as CFE had lost all generation within the City of Juarez and the City of Chihuahua. CFE's remaining generators were off-line with issues related to the freezing conditions. CFE was conducting controlled load shedding. EPE's Manager of Real-Time Marketing contacted his counterpart at CFE on February 4 and learned that CFE's situation had gotten worse as CFE was experiencing transmission and autotransformer problems. CFE was hoping to start its Samalayuca combined-cycle unit but was running into the same issues EPE was experiencing with its generation. It was communicated that when EPE's situation was stable, EPE would contact CFE to see if assistance would still be needed. EPE continued to meet load requirements through maintaining natural gas supply, purchased power, and balancing the system through off-system sales. This continued as local generation returned to service and load interruptions ceased.

iii. Power Marketing & Fuels Proactive Role Before and During the Event

Within the Power Marketing department, personnel took proactive steps in preparation for the winter storm, just as they did when contingencies began to impact EPE's system. These steps are addressed to some degree above.

- Produced unit commitment for expected loads for Wednesday, February 2. (January 31)
- Contacted pipeline personnel (EPNG and Westex) for status update of line-pack preparation for cold weather. (Monday)
- Contacted Newman Plant to prepare for possible fuel oil burning if natural gas supply interrupted. (Monday)
- Increased natural gas supply on Westex pipeline to ensure sufficient supply and pipeline pressure in the event of EPNG pipeline curtailments. (Monday)
- Developed plan to procure daily natural gas requirements from Keystone and Waha basins to avert potential curtailments due to wellhead freezes at San Juan.
- Advised day-ahead trading and scheduling personnel to work remotely on Wednesday in the event that travel would become hazardous due to weather conditions which could result in EPE not balancing power requirements through the day-ahead market. (Tuesday)
- Diverted a portion of EPE's natural gas supply to Tri-State's Pyramid generating station to replace Tri-State's fuel oil supply being used to provide EPE energy. (Wednesday)
- Once System Operations declared an emergency, the real-time desk could work with System Operations to coordinate supply options in a dynamic system environment. (Beginning Wednesday and until situation stabilized)
- Communicated with PNM and TEP to update EPE situation to ensure resource supply from Afton and Luna stations. (Wednesday and Thursday)

- Ensured natural gas supply would be available during pipeline critical operating conditions in the event EPE local generation returned to service. (Throughout)
- Communicated with TGS and developed draft transaction agreement in the event EPE needed to supply natural gas TGS. (Thursday)
- Worked with PNM towards implementing a natural gas NAESB agreement in the event natural gas would need to be diverted to Afton or Luna generating stations in the event of system contingencies. (Thursday)

d. Length and Reconnect Issues

As described above, during the events in questions, EPE initiated controlled load shedding under established procedures and recognizing critical load status. Due to technical difficulties (e.g., a circuit breaker that would not close remotely) outages occurred in some instances that lasted longer than 30 to 45 minutes. EPE endeavored, however, to keep the rolling outages to one hour or less. As load blocks were manually restored, System Operators confirmed that load had been properly restored through its SCADA system. On several occasions, operators noticed that some distribution feeder breakers did not close properly upon receiving multiple close commands. Therefore, these customers experienced lengthier outages as substation technicians were dispatched to manually close the breakers and repair them in the field.

e. Interruptions of Water and Gas Utilities

Staff Question 1-4. What about gas distribution compressing stations or similar entities? Were they curtailed and how?

Natural gas distribution compressing stations or similar gas entities are not given critical load status. There are four such stations in the greater El Paso area that were referenced by El Paso Natural Gas Co. (EPNG) representatives. Of these four, two of

the stations were reported by EPNG personnel to be affected by the controlled load shedding. One of the stations was said to be located near the Newman Power Plant. The other location is called the Hueco pumping station (addresses to these plants could not be provided by the EPNG representative).

The compressor station near the Newman Power Plant is fed from EPE distribution feeder Chaparral-11. The Hueco plant is fed from distribution feeder Horizon-10. Chaparral-11 is in load shed block 8, and Horizon-10 is in load shed block 15. The following table lists the outage durations for each of these feeders throughout the event:

Feeder ID	Load Dropped (MW)	Date & Time De-energized	Date Time Restored	Outage Duration
CHA-11	3.7	02/02/2011 11:13:17	02/02/2011 12:01:54	48m 37s
CHA-11	4.5	02/02/2011 18:36:21	02/02/2011 18:51:58	15m 37s
CHA-11	4.4	02/03/2011 18:11:04	02/03/2011 18:59:43	48m 39s
CHA-11	4.3	02/03/2011 19:50:04	02/03/2011 20:34:20	44m 16s
CHA-11	3.4	02/04/2011 7:19:49	02/04/2011 8:01:50	42m 1s
CHA-11	3.4	02/04/2011 11:18:44	02/04/2011 11:53:07	34m 23s
			Cumulative Minutes Out =	3hr 53m 33s
HOR-10	3.8	02/02/2011 8:03:40	02/02/2011 9:34:24	1h 31m 44s
HOR-10	5.0	02/02/2011 18:50:50	02/02/2011 19:07:22	16m 32s
HOR-10	4.8	02/02/2011 20:49:29	02/02/2011 20:54:28	4m 59s
HOR-10	4.2	02/03/2011 17:31:48	02/03/2011 18:05:14	33m 26s
HOR-10	4.6	02/03/2011 18:59:08	02/03/2011 19:54:29	55m 21s
HOR-10	4.1	02/04/2011 8:44:42	02/04/2011 9:31:05	46m 23s
			Cumulative Time Out =	4hr 7m 25s

EPE is unaware how the controlled load shedding may have affected either of these compressor stations or the natural gas pipeline as a whole.

Water station pumping and similar loads are considered critical load customers. During the system emergency, EPE did interrupt some of the El Paso Water Utilities (EPWU) load, but worked closely with EPWU representatives to get their approval prior to adding their load to the controlled load shedding list. EPE was evaluating whether to add other loads to the load shed list in order to reduce the burden to the 17 blocks that had been rotated multiple times. EPWU loads were concentrated in load shed groups or blocks 18 through 22. EPE contacted EPWU on Thursday, February 3, to see if any of those EPWU loads could be added to the controlled load shedding list. An EPWU representative reviewed the list of possible candidates and told EPE that all but certain areas could be shed on the controlled load shedding list. EPE added the loads to the available load shed list, but excluded those loads that EPWU felt were critical to its operations. Early on Friday, February 4, EPWU representatives called EPE and asked that some additional loads, which had previously been approved for inclusion in the controlled load shedding be excluded from any more controlled load shedding. EPE immediately removed those loads from the load shed list to comply with EPWU's requests.

Staff Question 1-5. Please let us know in detail what, when, and how the curtailment steps were taken during this event.

This question is answered in sections D.2a and b above and in Exhibit C. In addition, as time permits in a capacity and energy emergency, several steps are taken to avoid shedding firm load. These include:

1. Maximizing generator output and capability
2. Requesting assistance from other utilities (including power purchases from nearby facilities).

3. Curtailing non-firm sales and/or transmission usage as applicable
4. Calling for assistance from generation/co-generation
5. Making public appeals for load conservation
6. Curtailing all interruptible customers
7. Initiating voltage reductions at specific substations

During the system emergency in issue, all these steps were taken, except for step 7. EPE did not initiate voltage reductions on its system due to the lack of dynamic reactive support with the loss of its local generation. It was EPE's aim to keep operational voltages at a normal to high level to maintain voltage stability rather than reducing voltages, which could result in voltage instability.

IV. Conclusion

During the days of February 2 to February 4, EPE was challenged by record-breaking cold temperatures. EPE had planned and prepared for the forecasted weather, and continued to do so as the arctic cold approached, but unfortunately EPE's system was simply not designed to withstand such extremely cold and sustained temperatures. When the emergency developed, EPE followed its Emergency Operations Plan and reasonably managed its available resources as best it could. EPE's employees put in many long hours, including those employees who were in the field working in the bitter cold throughout the period, in an effort to maintain and restore service. While the emergency event was not painless because many of EPE's customers experienced controlled outages, EPE was nevertheless successful through

the diligent efforts of its employees in managing its available resources and preventing a much worse situation from developing, such as a system blackout.

El Paso Electric Company
Electric Generating Units

Remote Generation	In-service Date	Fuel Type	Net Generating Capability
Palo Verde Unit 1	Feb-86	Nuclear	207
Palo Verde Unit 2	Sep-86	Nuclear	208
Palo Verde Unit 3	Jan-88	Nuclear	207
Four Corners Unit 4	Jun-69	Coal	54
Four Corners Unit 5	Jun-70	Coal	54
<u>Local Generation</u>			
Copper	Jul-80	Gas/Oil	63
Newman 1	Jun-75	Gas/Oil	78
Newman 2	Mar-66	Gas/Oil	80
Newman 3	Jun-69	Gas/Oil	102
Newman 4		Gas/Oil	
GT 1	Jun-75	Gas/Oil	73
GT 2	Jun-75	Gas/Oil	73
ST 1	Jun-75	Gas/Oil	64
Newman 5			
GT 3	May-09	Gas/Oil	70
GT 4	May-09	Gas/Oil	70
ST 2		NA Gas/Oil	142
Rio Grande Unit 6	Jun-57	Gas	50
Rio Grande Unit 7	Jun-58	Gas	50
Rio Grande Unit 8	Jul-72	Gas/Oil	150

Operations Freeze Protection General Check List

Operations Freeze Protection General Check List			
Item	Description	Notes	Complete
1.	Check all heat tracing circuits to be on.	Breakers on	Yes
2.	Check Boiler wash line drain valves open.		
3.	Check traps and drains on condensate reclaim from oil heaters.		
4.	Start some flow through condensate line to the lab.		
5.	Check lights on U1 - U2 - & U3 Fuel gas regulators.		
6.	All space heaters checked to see if operating properly.		
7.	Check heat tracing/freeze protection on all boiler level and pressure controls.		
8.	Heaters in Boiler chemical room burning.		
9.	Check for water in control air to regulators		
10.	Boiler economizer recirculating line open on U1		
11.	Check for fans off in U4 Skids		
12.	Heat lamp and heat tracing on auxiliary cooling water for U4 Unit.		
13.	Boiler blow down loop checked to see if it is free of water.		
14.	Cooling water to forced draft fan and air preheater oil coolers checked for flow.	1&2 ok U3 off outage	Yes
15.	Acid feeders cabinet heaters on		
16.	Fans off on U1,U2,U3 Boiler feed pump area and close all louvers on air inlets.		
17.	Vacuum gage line from condenser to control room should have small amount of air		
18.	Water to exciter air wash should be shut off and drain open to sewer.	Not used	N/A
19.	Drain valves instrument and service air receivers to be opened wide and closed as often as necessary to prevent accumulation of water, also put heat lamp under each receiver		
20.	U1,U2,U3 Emergency tower make up small amount of flow.		
21.	Have some flow through screen wash line into towers.		
22.	R.O. outside shower and valve for service roster out side on south side of R.O.building		
23.	Keep fuel oil circulating at temperature between 150° and 180°.		
24.	Check heat tracing on U 4 steam to throttle pressure control.		
25.	Rotate cooling tower fans to minimize forming of ice on tower.		

Operations Freeze Protection General Check List

26.	HRS1 and 2 heat tracing drum level and feedwater flow.		
27.	Have flow through any line that you are in doubt about freezing. -		
28.	Check lights on U 1 - U 2 - U 3 Instrument air receivers.	need bulbs	
29.	Water to O2 Analyzer should be checked and flow increased if needed.	New system	N/A
30.	Check heat lamp on U 2 deaerator regulator.		
31.	Air bleed valves on U 4 instrument air systems south and north end of Unit.	south plug north open	No
32.	Shut off and drain distilled water line between old plant and U 4 Unit.		
33.	HRS1 & 2 feedwater and condensate flow cabinets.		
34.			
35.			
36.			
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50.			

Operations U4 Freeze Protection Check List

Item	Description	Notes	Complete
1.	Turn on heat lamp on acid pump at #4 cooling tower.		
2.	Auxiliary cooling water transmitter heat lamp in box and heat tape outside of box.		
3.	Place a heat lamp on auxiliary water cooling regulator.		
4.	Turn on space heater and shut fans off in air skid, crack manual air bleed valves on air receiver tanks.		
5.	Place heat lamps on boiler feed water regulators on both GT's.		
6.	4B level transmitter heat tape.		
7.	Centrifuge heating element.		
8.	Place heat lamps on condensate regulator's on both GT's.		
9.	Small amount of water flow around fire pump low pressure switch.		
10.	Swap service water pump to "A".	B on	Yes
11.	Turn on heaters in skids.	Heaters on	Yes
12.	Winterize evaporative coolers.		
13.	Circulate water from 4B to 4A through gravity valve and run transfer pump from 4A to 4B below 32 degrees.		
14.	Heat lamps and space heaters for transmitters (hp drum, level 1p drum level, condensate flow, feed water flow) on both GT's.		
15.	Heat lamps 250# Gas regulators in cabinet.	On	Yes
16.	Turn on heat tracing panels on both GTs and the steamer.	Breakers on	Yes
17.	Rotate cooling fans to minimize freezing forming of ice on tower.		
18.	Block and drain park pumps and sprinkler system.	Vlv close no drain	Yes
19.			

Operations U5 Freeze Protection Check List

Item	Description	Notes	Complete
1.	Mee fog system lay-up. Open all valves on the inlet and the outlet side of pumps including at the pumps. Block main water supply valve before prefilter. Drain prefilter and pull the filter.	Filter will need to be replaced next spring.	yes
2.	Test all heat tracing panels. Lockout and tag breakers in the PDC.	Breakers 13, 15, 17 tripping upon testing. (fuel gas supply area for both GT's)	No
3.	Check space heaters in skids		

Space heater schedule			
No.	Location	Notes	Operating
1.	U1 Aux Floor North Wall	Gas	
2.	U1 Aux Floor @ Elevator	Gas	
3.	U1-2 Aux Floor	Gas	
4.	U1 Chem House	Gas	
5.	U2 Chem House	Gas	
6.	U3 Chem House	Gas	
7.	U4 Deluge Bldg	Electric	
8.	Shop	Gas	
9.	RO East	Electric	
10.	RO West	Electric	
11.	DI Bldg	Electric	
12.			
13.			
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20.			

Instrumentation Freeze Protection Schedule

Item	U1	Notes	Operating
1	Boiler bi color gauge sensing lines. - 7th floor.		
2	Electromatic relief valve transmitter sensing line - 7th floor.		
3	Drum pressure transmitters a & b sensing line. - note: no heat tracing on sensing line. - 7th & 6th floor.		
4	Drum level, air flow, drum pressure transmitters cabinet, turn on heat element inside cabinet. - 6th floor.		
5	Dea pressure transmitters sensing line.		
6	Dea level transmitters level column.		
7	Condensate pumps a & b discharge pressure transmitters sensing lines. - 1st floor.		
8	Turn on heat lamp to #1 cooling tower acid day tank acid pump cabinet.		
9			
10			
11			
12			
Item	U2	Notes	Operating
1	Emergency steam regulator controller cabinet. - plug in extension cord to heat lamp inside cabinet. - 7th floor.		
2	Electromatic relief valve transmitter sensing line. - 7th floor.		
3	Drum pressure transmitter sensing line. - 7th & 6th floor.		
4	Drum level, air flow, drum pressure transmitters cabinet, turn on heat element inside cabinet. - 6th floor.		
5	Turn on heat lamp to #2 cooling tower acid day tank acid pump cabinet.		
6			
7			
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12			
Item	U3	Notes	Operating
1	Electromatic relief valve transmitter sensing line. - 7th floor		
2	Drum pressure transmitter cabinet's sensing lines underneath cabinet. - 7th floor.		
3	Dea level transmitters sensing lines outside of cabinet. - 5th floor.		
4	Turn on heat lamp to #3 cooling tower acid day tank acid pump cabinet.		
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6			
7			
8			

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12			
Item	HRSG2	Notes	Operating
1	High pressure circ. pump differential pressure transmitter sensing lines 1st floor.		
2	Main BFP discharge pressure transmitters sensing lines inside p.s. & g. cabinet at b.f.p. skid.		
3	Boiler transmitters cabinet. - sensing lines. - turn on heat lamp. - 1st floor.		
4	2" bypass regulator controller's sensing line. - install heat lamp. - 2nd floor.		
5	Condensate regulator & high pressure vent vlv instrument air supply line. - install heat lamp. - south 4th floor.		
6	Dea pressure transmitter a & b sensing line. - 3rd floor.		
7	Dea level sight glass cabinet. - install heat lamp. 2nd floor.		
8			
9			
10			
11			
12			
Item	HRSG1	Notes	Operating
1	High pressure circ. pump differential pressure transmitter sensing lines. - install heat lamp. - 1st floor.		
2	Main BFP discharge pressure transmitters sensing lines inside p.s. & g. cabinet at BFP.		
3	Boiler transmitter cabinet. - sensing lines. - turn on heat lamp. - 1st floor.		
4	2" bypass regulator controller's sensing line. - install heat lamp. - 2nd floor.		
5	Condensate regulator & high pressure vent vlv instrument air supply line. - install heat lamp. - south 4th floor.		
6	Dea pressure transmitters a & b sensing line. - 3rd floor.		
7	Dea level sight glass cabinet. - install heat lamp. - 2nd floor.		
8			
9			
10			
11			
12			
Item	U4ST	Notes	Operating
1	Main steam bypass vlv instrument air supply line. - install heat lamp. - top of condenser building.		
2	Turbine drain vlvs instrument air supply lines. - install heat lamp.		

3	Cooling tower acid day tank instrument air supply line. - install heat lamp at north west corner of cooling tower.		
4	Cooling tower turn on heat lamp to #4 cooling tower acid day tank pump cabinet.		
5	Distilled water tank transmitter sensing line. - note: sensing line is heat traced but not insulated.		
6	Effluent water tank transmitter sensing line. - note: it is not heat traced nor insulated, cabinet needs to have a heat element and		
7			
8			
9			
10			
11			
12			
Item	Plant General	Notes	Operating
1			
2			
3			
4			
5			
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12			
13			
14			
15			

U1 Heat Tracing Schedule			
Circuit No.	LOCATION	AMPS.	AMPS 2009
1.	J.B. 6th Fl. South Side Boiler		
1A.	Strip Heater Service Water Transmitter		
1B.	Strip Heater Drum Level Compensator		
2.	J.B. 6th Fl. North Side Boiler - Split 2 circuit 110		
3.	Chem. Pp Room to Boiler		
4.	Piping at Service Water Tank		
5.	J.B. 4th Fl. Auxiliary Steam		
6.	Piping at Oxygen Analyzer		
7.	Levels at Deaerator		
8.	Deaerator Level Gauge Encl.		
9.	J.B. 2nd Fl. Deaerator Dishcharge		
10.	Yarway Level		
11.	High Pressure Gauge		
12.	Boiler Fill Pump		
13.	Boiler Fill Piping		
14.	6" Condensate Makeup		
15.	3" Condensate Makeup		
16.	10" H2 Cooling East Side		
17.	10" H2 Cooling West Side		
18A.	Condenser South Valves & Gauges		
18B.	Strip Heaters 1A & 1B Distilled Water Tank Transmitters		
19.	Piping between Chem Pp Room & Aux. A		
20.	Piping between Chem Pp Room & Aux. A		
21A.	Air Sensing Lines 2A Instrument Air & Service Air		
21B.	1 1/2" N.B. Corner		
22.	Deaerator Pipe		
23.	Evap. Scale Cracking Line		
	Note: #22 & 23 are 110 volt Ckts. On Block #22		

U2 Heat Tracing Schedule			
Circuit No.	LOCATION	AMPS last	AMPS 2009
1.	Boiler Feed Recirc. Lines A & B (2A-3.28 Amps) (2B-3.29 Amps). Took amp.		
	Checks @ junction box located @ 5th fl. West side by lines.		
2.	Low Temp. Reheat Spray 5th Fl.	3.5	
3.	Reheat Attenuator Spray 4th Fl. N & South	4.5	
4.	Condensate Return & Trap Between Units 1 & 2	4.5	
5.	Blowdown Flash Tank & Gauge Blases on Deaerator	3.0	
6.	Boiler Drum Sample Line-South	4.3	
7.	Chemical Feed Lines	2.5	
8.	Dist. Water Tank 2B & Piping	5.0	
9.	Dist. Water Tank 2B & Piping	5.0	
10.	Spare		
11.	Steam Sample Lines	4.0	
12.	Deaerator Controls & Sample Line	4.0	
13.	Spare		
14.	Dist. Water Tank, Piping & Heat Lamp @ Gas Valve	6.8	
15.	Oxygen Analyzer Line	3.0	
16.	Boiler Drum Sample-North & Econ-Sample Lines	3.75	
17.	Inst. Line Yarway Drum Level	5.5	
18.	Inst. Line Yarway Drum Level	4.5	
19.*	Emergency Steam North East 7th Fl.. Powered by 120vac. Circuit from outlet and from heat tracing panel.	6	
20.*	Gland Seal Steam Reg. and Dea Pressure Transmitter	6	
	6th Fl. North Side.		
Note: * Identifies new heat trace that is not powered by Heat Tracing Panel.			

U3 Heat Tracing Schedule		
LOCATION	AMPS.	AMPS 2009
Boiler Feed Recir. Lines	3.0	
Low Temp. Reheat Spray S/H	3.5	
R/H Attenuator Spray	4.5	
Condensate Retrun & Trap between Units 1 & 2	4.5	
Blowdown Flash Tank & Gauge Glasses on Deaerator	3.0	
Boiler Drum Sample Line South	4.3	
Chemical Feed Lines	2.5	
Dist. Water Tank 2B & Piping	5.0	
Dist. Water Tank 2B & Piping	5.0	
Spare Steam		
Sample Line	4.0	
Deaerator Controls & Sample Line	4.0	
Spare		
Dist. Water Tank & Piping & Heat Lamp @ gas valve	6.8	
Oxygen Analyzer Line	3.0	
Boiler Drum Sample - North & Econ. Sample Lines	3.75	
Inst. Line Yarway 220v Drum Valve	5.5	
Inst. Line Yarway 220v Drum Level Drum Pressure Gage 3rd floor	0.5	

**UNIT 3-HEAT TRACING
FED FROM PANEL TRD**

U3 Heat Tracing fed from Panel TRD			
Circuit No.	LOCATION	AMPS.	AMPS 2009
1.	A-1 SUPER HTR. ATTEMP.-LOW TEMP ATTEMP.		
2.	A-2-BFP RCVR LINES.		
3.	3-A-3-BFP BALANCING LINES		
4.	A-4-CHEM FEED LILNES, AUX. STM. TO OIL BRNR, BLR. INST. PIPING		
5.	A-5-BLR INST. PIPING, CHEM FEED, BFP. DISCH & SUCT.		
6.	A-6 SAMPLE AND SAMPLE COOLING LINES.		
7.	A-7 INST. PIPING BLR. AREA.		
8.	A-8-FUEL GASLINES INST. PIPING TURBING AREA.		
9.	BLOWDOWN.		
10.	A-10 DEA & BLOWDOWN TANK STAND PIPE, EVAP STAND PIPE.		
	AIR REMOVAL-COND. VENT & OUTLET VENT.		
11.	A-11-COND. MAKEUP TO DISTILLED WATER TANK.		
12.	BOX 1-4 #12		
13.	BOX A-7.		
14.			
15.			
16.			
17.			
18.	BLR. DRUM LVL. HEAT LAMPS.		
19.			
20.			

U4 Heat Tracing Schedule		
Circuit No.	LOCATION	Protected Piping
	HRSG1	
ET1-1A LT755M10 H250K0550707	TA410, AM730,HRSG wall at water sample skid	common drain to blowdown tank

SYSTEM OPERATIONS APPENDIX A – CHRONOLOGY OF EVENTS

The following time line provides a chronology of events that occurred during emergency operations.

Definitions/Acronyms:

Afton – Generating facility owned and operated by Public Service of New Mexico (PNM)

EEA – Energy Emergency Alert

LEF – Luna Energy Facility (operated by PNM)

RC – WECC Reliability Coordinator

Date	Time (MST)	Event	Approximate MW involved	Capability
2/1/2011	15:39	Newman 5 GT3 and GT4 tripped	5 & 5	70 & 70
	15:43	Newman 5 GT3 back on-line	5	73
	16:14	Newman 5 GT4 back on-line	5	70
	20:07	Newman 3 Generator tripped	40	101
	22:15	Rio Grande 6 tripped -- RC called	50	50
	22:52	Supervisor of Load Research notified to interrupt interruptible customers		
	23:45	Copper Generator on-line	55	60
2/2/2011				
	0:10	Newman 5 GT3 taken off-line	5	70
	0:26	Newman 5,GT4 taken off-line	5	70
	1:21	Lost control of Newman4 -- still on-line with output constant		
	1:49	Rio Grande 8 tripped	60	145
	1:53	RC notified ; EPE issued EEA1 at 1:55		
	2:02	DC tie started and ramped to 100 MW	100	
	2:27	LEF generation requested by EPE		
	2:58	LEF on line	12	
	3:17	Newman 4 GT1 tripped	45	73
	3:20	Four Corners #4 tripped	50	54
	5:07	DC tie dropped from 100 MW to 48 MW		
	5:12	RC increased EEA to EEA 2		
	6:20	DC tie increased from 48 MW to 100 MW		
	7:11	DC tie increased from 100 MW to 127 MW		

EXHIBIT C

	7:12	Newman 4 Steam Turbine tripped	25	64
	7:16	Newman 4 GT2 tripped	70	73
	7:22	Load shed started; load was at 982 MW		
	7:32	RC declared EPE to be in an EEA 3		
	7:35	Load dropped from 982 to 812 MW (170 MW in 13 minutes)	170	
	7:38	LEF at peak output	425	
	7:45	Load Research group notified to keep interruptible customers off line		
	7:55	Luna Energy Facility lost approximately 100 to 132 MW		
	8:00	Load at 813 MW and more shedding started		
	8:05	Load shed down to 710 MW (103 MW shed)		
	8:16	LEF ramped up	235	
	9:51	Afton on line		
	12:17	Load shed ends load increases to 977 MW		
	12:19	RC declares EPE decreased to EEA 2		
	18:04	Eddy DC tie trips	173	
	18:11	Load shed starts for evening peak loads		
	18:15	RC declares EPE at EEA 3		
	20:58	Load shed ceases, RC declares EPE decreased to EEA 2		
	23:04	Eddy DC tie on-line		
2/3/2011				
	15:45	Afton trips	80	
	16:23	Afton back on-line		
	17:00	RC declares EPE increased to EEA 3		
	17:30	Load shed of 100 MW started.		
	18:52	Newman GT-1 on-line		
	19:20	Newman GT-1 trips off-line		
	21:32	Newman GT-1 on-line		
	22:30	Newman GT-2 on-line		
	22:40	RC declares EPE decreased to EEA 2		

EXHIBIT C

2/4/2011	2:02	Newman GT2 trips due to stator high temp alarm		
	2:04	Newman GT1 trips due to stator high temp alarm		
	3:17	Luna steam turbine tripped	25	
	3:23	A Luna GT drops from 90 MW to 30 MW to 11 MW per PI		
	3:51	Luna steam turbine back on line and slowly ramps upper PI		
	6:30	RC declares EPE increased to EEA 3		
	6:30	Load shed begins (rolling blackouts) -- to 850 MW (100 MW dropped)		
	6:49	Newman GT2 comes on-line		
	12:05	Load shed ends		
	12:12	RC declares EPE decreased to EEA 2		
	15:57	Newman 5 GT-4 on-line -- stable at 50 MW	50	
	17:12	Rio Grande 8 on-line -- stable at 50 MW	50	
2/5/2011	16:07	Newman GT3 on-line		
	16:30	RC declares EPE decreased to EEA-1 -- due to additional generation		
2/6/2011	9:46	RC declares EPE decreased to EEA-0 All interruptible are allowed to resume normal energy usage		
	11:00	DC tie off-line		

The System Operations Department took precautionary steps to prepare for the approaching winter storm. On Monday, January 31, the Manager of System Controllers met with management from other departments to coordinate actions between System Operations, Generation, Marketing, and Transmission and Distribution. Power Marketing was requested to keep all local units on line or available in the event that load demand increased or generation contingencies occurred during the storm. The Assistant Vice President of System Operations and the Manager of Energy Analysis were asked to have personnel on call if extra help was needed at the System Operations Control Center. The Supervisor of Distribution Dispatching was asked to have crews available for any storm trouble, and the Superintendent of Distribution Systems was to be available should problems arise.

The System Operations Department maintained its round-the-clock operation and called in extra personnel (6 employees) to help man the transmission, generation, and scheduling desks. System Operations

managers (4) worked 15-hour days during the emergency, while other departments (T&D and EMS Support) kept an available contact 24/7 at the Control Center.

The following is an explanation of the events that occurred.

Tuesday, February 1, 2011

- On Tuesday, February 1, record-low temperatures occurred within El Paso Electric's (EPE) service territory. At approximately 8:00 p.m. that evening, the first of EPE's gas-fired generators tripped off-line due to frozen equipment. Newman No. 3 was producing 40 MW of its 101 MW capability at the time of the trip.
- Two hours later, Rio Grande No. 6 also tripped as a result of a frozen gas transmitter. Rio Grande No. 6 was producing its full capability of 50 MW. System Controllers contacted the Western Electricity Reliability Council's (WECC) Reliability Coordinator and advised him of the loss of local generation.
- At 10:52 p.m. System Controllers requested that interruptible customers be curtailed due to the extreme weather conditions, anticipated load increase, and the loss of local generation. The Copper Generator was brought on-line at 11:45 p.m.

Wednesday, February 2, 2011

- On Wednesday, February 2, twenty minutes past midnight, the Newman gas turbines GT3 and GT4 also tripped due to frozen equipment. One-hour later, automatic generation control (AGC) on Newman Generating Unit No. 4 was lost, but the unit remained on-line.
- Rio Grande No. 8 tripped at 1:49 a.m. causing the additional loss of 145 MW of generation capability. Rio Grande No. 8 is an essential unit in the operation of the system because of the dynamic reactive support it provides. System Controllers contacted the Reliability Coordinator, and the Coordinator initiated an Energy Emergency Alert (EEA) Level 1. Under Alert 1, EPE anticipated conditions where all available resources would be committed to meet firm load and sustaining required Operating Reserves may be a problem.
- At 2:00 a.m., a power purchase was made from Southwest Public Service (SPS) and the Eddy DC tie was started and ramped to 100 MW. During that hour, EPE requested generation from the Luna Energy Facility (LEF) in Deming, New Mexico.
- Newman Generator No. 4 tripped at 3:17 a.m. and 73 MW of capability was lost. Shortly thereafter, Four Corners Unit No. 4 tripped, causing EPE to lose 54 MW of its allocated 104 MW.
- System Controllers contacted the WECC Reliability Coordinator (RC), and at 5:12 a.m. the EEA was raised to a Level 2 Alert. This Alert advised other utilities that EPE was placing its load management procedures in effect due to its energy deficient condition. Procedures under this Alert included public appeals to reduce demand as well as other demand-side management procedures. Management officials contacted the NEWS media later that morning and urged customers to conserve power by asking them to cut back on unnecessary power use.
- At 7:12 a.m., the Newman No. 4 steam turbine tripped, and a few minutes later its associated GT2 unit tripped for a total loss of 137 MW of generation capability. With this generation trip, Copper was the only local unit remaining on-line, producing 55 MW of power. It was also the only local unit that could supply the system with dynamic reactive support.
- At this time, System Controllers initiated controlled load shedding in order to balance load with generation and maintain voltage stability. Area load was at 982 MW, and approximately 170 MW

of firm load was shed within 13 minutes. The Reliability Coordinator was immediately contacted, and EPE's EEA status was increased to a Level 3 Alert. A Level 3 Alert advised other utilities that EPE had implemented firm load interruptions. System Operations personnel met with T&D employees to ensure that transmission facilities were available for transmitting all available power into the El Paso service area. Power import capability into the El Paso area, however, was limited due to a short supply of reactive power support.

- At approximately 8:00 a.m., System Operations was notified that the Luna Energy Facility (LEF) lost approximately 130 MW of generation. Load shedding continued, and another 103 MW was shed until load stabilized at 710 MW. System Operations prepared report filings on its disturbances and provided them to the various regulatory agencies.
- At approximately 10 a.m., PNM's Afton generator was placed on-line and arrangements were made by the EPE's Power Marketing group to obtain power from that unit on an hourly basis. Power Marketing arranged purchases throughout the day; those purchases averaged about 400 MW. In addition, Marketing purchased 75 MW of spinning reserve in order to maintain EPE's spinning reserve obligation.
- Controlled load shed ended at 12:17 p.m. with load remaining at 977 MW. The Reliability Coordinator was contacted, and EPE's EEA alert level was decreased to a Level 2.
- The Eddy DC tie tripped at 18:04, and 173 MW of power was lost. Several minutes later, controlled load shedding resumed because of this loss of resource. The Reliability Coordinator was notified, and EPE was placed under an EEA Level 3 status. Controlled load shedding stopped at 9 p.m., and EPE's EEA alert level changed back to a Level 2. The Eddy DC tie resumed power transmittal at 11 p.m.

Thursday, February 3, 2011

- On Thursday, February 3, at approximately 3 a.m., Four Corners Unit 5 was curtailed by 25 MW and then returned to full capacity at 4:23 a.m. An hour and half later, Unit 5 was curtailed again by 48 MW and then increased by 25 MW at 8:33 a.m. APS was able to put Four Corners Unit #4 back in service at 12:48 p.m.
- During this period, the System Planning group performed power flow analyses of the current system conditions. Their results showed that certain EPE load levels could be maintained safely for minimum Southern New Mexico generation scenarios. According to their studies, in order to maintain system stability, EPE had to keep loads at or below certain levels depending on the status of the Afton, LEF, Eddy HVDC tie and local generating units. The power flow studies were based on N-1 criteria and determined that only a load level of 850 MW could be maintained until more local generation could be placed on-line.
- At 15:45 p.m., PNM's Afton generator tripped causing EPE to lose 80 MW of purchased power. A little over half an hour later, PNM was able to put Afton back on-line.
- The Reliability Coordinator was contacted, and EPE's EEA status was increased to Level 3 Alert. At 17:30 p.m., the controlled load shedding resumed and approximately 100 MW of load was dropped in order to maintain an 850 MW load level, which was revised to a 930 MW load level when GT1, then GT2 were brought on-line during the controlled load shedding as stated below.
- Newman GT1 was brought on-line at 18:52 but tripped at 19:20. An hour later, it was brought back on-line and slowly ramped up to 10 MW. Newman GT2 was brought on-line at 22:30 and stabilized at 9 MW.
- The controlled load shedding ended at 22:37. The RC decreased EPE to EEA level 2 at 22:40.

Friday, February 4, 2011

- On Friday, February 4, at 2:00 a.m., both Newman GT1 and GT2, which had been running at minimum power output but did provide dynamic reactive support to the system, tripped due to a stator high temperature alarm. At approximately 3:00 a.m., the LEF steam turbine tripped and one of its gas turbines dropped from 90 MW to 11 MW. The steam turbine was brought back on-line at 3:51 a.m. and slowly ramped up.
- At 6:30 a.m., with Copper again as the only local unit on-line, the controlled load shedding resumed and approximately 100 MW of load was dropped in order to maintain an 850 MW load level. The Reliability Coordinator issued an EEA Level 3 for EPE.
- Newman GT2 was brought on-line at 6:49 a.m., and the maximum EPE load level was increased to 930 MW. The controlled load shedding ended at 12:05 p.m. EPE's EEA status was changed to a Level 2.
- At 4:00 p.m., the Newman GT4 unit was brought on-line and remained stable at a 50 MW output. An hour later, the Rio Grande No. 8 unit was on line and was stable at 50 MW. No controlled load shedding was required for the Friday night peak-load period.

Saturday, February 5, 2011

- On Saturday, February 5, at 4:50 p.m., the Reliability Coordinator modified EPE's EEA status to a Level 1 due to additional generation.

Sunday, February 6, 2011

- The Reliability Coordinator decreased EPE's EEA to a Level 0 on Sunday, February 6, at 9:46 a.m.

EL PASO ELECTRIC TRANSMISSION LIMITS AND OWNERSHIP

(345 KV AND ABOVE)



- GENERATION
- SUBSTATION
- 100% INDICATES EPEC OWNERSHIP (PERCENT NOTED)

