



REPORT ON
OUTAGES AND CURTAILMENTS
DURING THE SOUTHWEST
COLD WEATHER EVENT
OF FEBRUARY 1-5, 2011

Causes and Recommendations

Prepared by the Staffs of the
Federal Energy Regulatory Commission
and the
North American Electric
Reliability Corporation



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Report on Outages and Curtailments During the Southwest Cold
Weather Event of February 1-5, 2011

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C. Preparations for the Storm: Natural Gas

Varying levels of preparation for the February cold front were employed by the producers, processing plants, interstate pipelines, intrastate pipelines, and LDCs that together make up the natural gas delivery chain. Depending on the type of facility, preparations included at least one, if not several of the following items: monitoring the weather, increasing staffing, methanol injection, pigging, insulation, tarps, heat tracing, building line pack¹⁰⁹ in pipelines by injecting more gas, over-purchasing gas supplies and enhancing winterization equipment. For the most part, facilities began their preparations by either Sunday, January 30 or Monday, January 31.

This section describes the preparations taken by individual companies in west Texas, the Texas panhandle, north Texas and New Mexico and by the LDCs in Arizona and New Mexico.

Producers

As discussed in detail in the section of this report entitled “Causes of the Outages and Supply Disruptions,” the difficulties encountered by LDCs in trying to meet customer demand stemmed principally from supply declines in the basins, and secondarily from problems encountered at processing plants. The preparations for the cold weather event taken by producers is therefore of special interest.

Of the 15 producers who provided information to the task force on this issue, all reported that they had used winterization techniques of one sort or another. The following table shows by basin the numbers of producers that used one of or more of the listed methods.

¹⁰⁹ Line pack refers to the volume of gas in the system at any given point in time.

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	PERMIAN	SAN JUAN	FORT WORTH	EAST TEXAS	TEXAS GULF
Methanol Injection or Drip	✓✓✓✓✓✓✓✓	✓✓✓	✓✓✓✓✓✓	✓✓✓✓✓✓✓✓	✓✓✓✓✓✓✓✓
Increased Pigging or Clearing of Liquids	✓✓✓	✓	✓✓	✓	✓
Tarps or Cold Weather Barriers	✓	✓✓		✓✓	✓✓
Increased Hauling of Fluid	✓✓	✓	✓✓✓	✓✓✓	✓✓
Heated Anti-Freeze		✓			
Heat Trace	✓	✓✓	✓	✓✓✓✓	✓
Hot Oil Trucks	✓				
Insulation	✓✓✓	✓	✓✓	✓✓	
Burial of Lines	✓				
Heat Lamps or heaters	✓✓	✓			✓

A short description of some of these techniques gives a fuller picture of the actions the producers reported having taken:

- Methanol (an anti-freeze type solution) injection or drip is a common practice for freeze protection of wellbores and pipelines. The methanol is injected into the gas stream by chemical injection pumps or enters the pipeline by methanol drips and effectively lowers the freeze point of the gas. Also, separators (used to separate liquids such as oil from the natural gas) may be filled with heated antifreeze to prevent freezing.

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- Pigging refers to the practice of using pipeline inspection gauges or “pigs” inside a pipeline to perform various operations without stopping the flow of gas. Pigging operations are conducted on a year-round basis as needed to keep pipelines in working flow conditions. During cold weather their deployment can be increased to remove liquids that might be prone to freezing.
- Cold weather barriers are a relatively simple weather precaution involving the erection of wind walls around certain compressors to block cold winds that exacerbate freezing conditions. Wrapping and insulating surface equipment, injection lines, supply valves, water lines and other locations may also help prevent freezing and the stoppage of fluid flow.
- Hauling oil and produced water from storage tanks is a necessary part of the production process, since tanks that are not emptied can trigger fail safe shut-in devices that will automatically shut down the well. Prior to cold weather, and in anticipation of trucks not being able to reach the facilities, the tanks may be emptied to reduce the likelihood of automatic shut-off.
- Heat can prevent freezing problems; if the gas is never allowed to reach freezing temperatures, ice cannot form. However, heat application involves expensive equipment and requires additional fuel. Heat is also a potential hazard as it can provide an ignition point for the gas. Nonetheless, heat systems can be very effective for a localized freezing problem, and include heating blankets, catalytic heaters, fuel line heaters, or steam systems. Coupling heat systems with insulation is a common technique for protecting flow lines in northern climates.
- Hot oil trucks may be utilized to thaw out flow lines. Typically the hot oil truck will be filled with water, which is then heated and directly sprayed onto lines at risk of freezing.

As it turned out, the various measures producers described as having employed to prepare for the projected cold weather proved inadequate; a substantial number of wells in the affected basins suffered freeze-offs, which had a significant effect on production during the February cold weather event.

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Processing Plants

Individual processing plants reported making anywhere from minimal to extensive preparations. Their winterization included:

- Making equipment checks;
- Adding 24-hour staff and adding to nighttime crews;
- Installing insulation;
- Confirming that heat trace equipment was operational;
- Placing tarps as wind breaks and to capture heat;
- Draining water from cooling systems and fluids from piping low points;
- Coordinating with upstream gathering;
- Reviewing past winter events; and
- Installing hot oil heaters.

A representative sampling of processing plant preparations follows.

The Crosstex Energy-affiliated Silver Creek natural gas processing plant in Weatherford, Texas processes Barnett Shale production from the Fort Worth Basin. In preparation for the weather event, operating personnel reportedly performed checks on all equipment, confirmed that all heat trace equipment was turned on prior to the storm, installed tarps on critical equipment, and drained all air supply low points. (Despite these precautions, the plant did experience a shut down of a steam boiler due to a freezing amine/water mixture.)

Enbridge Energy Company, Inc. operates processing plants in east Texas and in north Texas. Generally speaking, operations in both the east Texas and north Texas plants continued in a routine manner prior to the storm.

Energy Transfer Corporation (Energy Transfer) owns and operates the La Grange processing plant in east Texas and the Godley processing plant in north Texas. As part of its general preparation for cold weather at the La Grange plant, Energy Transfer wrapped air regulators and hung tarps around vessels. In late January, an extra operator was placed on duty. With regard to the Godley plant, Energy Transfer had previously installed louvers on all amine still overhead condensers¹¹⁰ to assist in cold weather operations. A hot oil heater had also been installed in a still condenser to prevent freezing. In addition, prior to the February weather event, Energy Transfer insulated condenser piping at two plants.

¹¹⁰ The term “amine still overhead condensers” refers to a piece of equipment used to remove the acid gases from the natural gas stream.

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MarkWest Energy Partners has two processing plants in Texas. The company reported that both processing facilities are equipped to run during extreme cold weather and that no additional maintenance, insulation or heat tracing was performed prior to the February cold weather event.

Williams Midstream has four processing facilities, the Markham Cryogenic processing plant in Matagorda County, Texas; the Milagro treating plant in San Juan County, New Mexico; the William FS Kutz (Kutz) processing plant in San Juan County, New Mexico; and the Lybrook processing plant in Rio Arriba County, New Mexico. The company reported that the Milagro plant and related facilities are designed to operate in cold weather. Nevertheless, it is standard practice at the plant to check heat tracing controls and piping insulation in the fall months. For the February event, preparations consisted of round-the-clock staffing for certain facilities and adding staffing for the night crew. Standard winter preparation at the Kutz plant reportedly includes coordination with upstream gathering, draining of water cooling systems, placing catalytic heaters into service, installation of wind barriers and group review of past events. In January and February 2011, additional contractor personnel were provided for night operations and additional heat wagons were placed based on needs. The Lybrook plant had also addressed winter preparation prior to 2011 by upgrading and inspecting piping, tracing, and insulation, and by making repairs to hot oil pumps.

Pipelines

Pipelines also prepared for the anticipated cold snap. Typical preparations for both interstate and most intrastate pipelines included:

- Maintaining higher than normal line pack;
- Optimizing compressor operations;
- Enhancing internal communication such as cold weather operational meetings;
- Increasing availability of personnel;
- Cancelling scheduled maintenance where possible; and
- Communicating with customers.

Interstate Pipelines

Individual interstate pipelines reportedly took the following preparations:

EL Paso prepared for the forecasted colder weather by maintaining higher than normal line pack throughout the weekend of January 29 and January 30. (El

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Paso considers line pack volumes between 7,200 MMcf and 7,800 MMcf at any given point in time to be in the normal range; at line pack quantities below 7,200 MMcf or above 7,900 MMcf, El Paso generally considers its system to be at or approaching stressed operational conditions.) On Monday afternoon, January 31, El Paso began gas withdrawals from its Washington Ranch Storage Facility, reaching the field's maximum withdrawal rate by the morning of February 1. This was done to compensate for gas supply underperformance in the San Juan and Permian Basins.

Natural Gas Pipeline Company of America (NGPL) uses its Texas facilities to receive gas in Texas and redeliver that gas to markets in the upper Midwest. For February 1 through February 3, NGPL put in place a severe weather operating procedure that provided for management of cold, high winds, ice and snow. This procedure included conferences and communications involving the managers of the gas control and commercial groups of impacted NGPL facilities. Additional actions reportedly taken by the gas control group included adjusting pipeline pressures to meet anticipated load increases, manning facilities on an around-the-clock basis, and carrying out operating procedures designed to keep facilities from freezing.

Transwestern began operating its compression stations to maximize pressures in New Mexico in advance of the cold weather event.

ANR Pipeline Company (ANR) has no facilities in New Mexico, Arizona or California, and only limited facilities in Texas, which are located in the northeast corner of the Texas panhandle (this is the southern-most part of ANR's Southwest Area). To prepare for and respond to operating concerns and ongoing and expected weather events, ANR conducted daily morning operations meetings. An additional "cold weather" operational meeting specifically addressed the week of February 1. ANR reported reduced horsepower at all its Southwest Mainline compressor stations to help flow gas south into the Texas area if scheduled supply decreased, with the aim of maintaining adequate line pack and constant pressures in Texas and Oklahoma.

Intrastate Pipelines

Intrastate pipelines in general employed many of the same preparations as did the interstate pipelines. Reported examples are provided below.

Atmos Pipeline –Texas began building line pack on January 31, and advised shippers to be in hourly and daily balance effective 9:00 AM on February 1. This action assisted with maintaining line pack. Electric generation customers

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were advised that deliveries would be limited to Tier 3¹¹¹ beginning at 9:00 AM on February 1. Third-party interruptible storage customers were advised that they would be limited to 50 percent withdrawals effective February 1 at 9:00 AM.

Energy Transfer Partners reported ensuring that critical stations were staffed, spare compressors were placed on standby, line pack was increased, and all scheduled maintenance was postponed.

Enterprise Products Partners reported closely monitoring nominations. Staffing coverage was extended in addition to employees' normal schedules. Operations were also reviewed for potential service adjustments that might be required, although none were anticipated.

The Kinder Morgan Texas Pipes' natural gas pipeline operations and gas control group initiated the Kinder Morgan Gas Pipelines' severe weather operating procedure, designed to manage facilities in the event of severe cold, high winds and frozen precipitation. The procedure prescribes conferences and communications among managers and the gas control and commercial groups, and these communications began several days prior to the cold weather event. The gas control group also adjusted pipeline pressures in anticipation of increased load. In the field, some facilities were reportedly staffed around-the-clock, and procedures were put in place to keep facilities from freezing.

Local Distribution Companies

Each of the four LDCs that curtailed customers during the February weather event reported making preparations. They monitored weather forecasts before the event and revised their load forecasts upward. They also increased their purchases of gas to accommodate increased demand and to compensate for freeze-offs, and communicated with suppliers and the pipelines about pending conditions. As conditions worsened, these communications became more frequent.

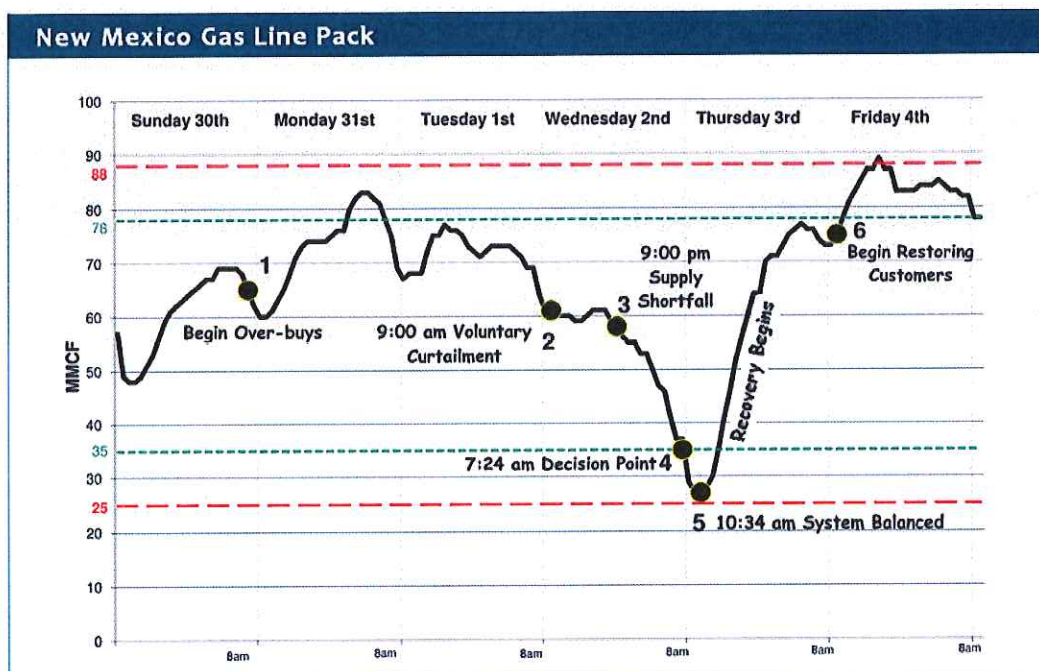
New Mexico Gas Company packed transmission lines with extra gas, and confirmed that the storage facility it accesses was positioned for withdrawals. Additional gas was purchased for the expected increased demand and in anticipation of freeze-offs. From February 1 through February 3, NMGC had, for each respective day, pre-purchased 36 percent, 55 percent, and 62 percent more gas than its forecasted need. NMGC issued an Alert to all transportation customers concerning the weather forecasts. Given the severity of the anticipated

¹¹¹ Tier 3 restrictions applying to electric generating units limit the amount of natural gas the units can take.

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storm, at 9:00 AM on February 2, NMGC began requesting that large industrial and commercial customers throughout the state voluntarily reduce or curtail their gas usage. In total, NMGC reported contacting 39 customers, asking for voluntary curtailment.

The following is a chart of NMGC's line pack, juxtaposed with its preparation events.



Source: New Mexico Gas Company

Southwest Gas monitored current weather forecasts on January 30 and January 31, which indicated colder temperatures were expected for southern Arizona. On February 1, a scheduled meeting of engineering and technical services personnel was expanded to include discussions concerning cold weather preparations and system monitoring.

Zia Natural Gas Company (Zia), after observing the dramatically dropping temperatures forecasted for February 1 through February 4 for the state of New Mexico, contacted its primary supplier on January 30 to discuss its supply and receipt options. On February 1, Zia discussed maximum volumes that could be nominated on its pipeline transportation contract.