

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



AUGUST 2011

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powered compressors running can be important in maintaining adequate pressure in gas transmission lines.

The task force suggests that a review of curtailment priorities be made, to consider whether gas production facilities should be treated as protected loads in the event of load shedding.

26. Transmission Operators should train operators in proper load shedding procedures and conduct periodic drills to maintain their load shedding skills.

The task force found that at least one Transmission Operator in WECC experienced a minor delay in initiating its load shedding sequence, due to problems notifying the concerned Distribution Provider. Another Transmission Operator experienced delay in executing its load shedding because the individual operators had never shed load before and had not had recent drills. These incidents underscore the necessity of adequate training in load shedding procedures.

B. The Natural Gas Industry

Key Findings -- Natural Gas

- Extreme low temperatures and winter storm conditions resulted in widespread wellhead, gathering system, and processing plant freeze-offs and hampered repair and restoration efforts, reducing the flow of gas in production basins in Texas and New Mexico by between 4 Bcf and 5 Bcf per day, or approximately 20 percent, a much greater extent than has occurred in the past.
- The prolonged cold caused production shortfalls in the San Juan and Permian Basins, the main supply areas for the LDCs that eventually curtailed service to customers in New Mexico, Arizona, and Texas.
- Wellhead freeze-offs normally occur several times a winter in the San Juan Basin but are not common in the Permian Basin, which is the supply source that LDCs in the Southwest region typically rely upon when cold weather threatens production in the San Juan Basin.
- Electrical outages contributed to the cold weather problems faced by gas producers, processors, and storage facilities in the Permian and Fort Worth Basins, with producers being more significantly affected by the blackouts; however, based on information obtained from a sampling of producers and

processing plants in the region, the task force concluded that the effect of electric blackouts on supply shortages was less important than the effect of freezing temperatures.

- Although producers in the New Mexico and Texas production areas implemented some winterization measures such as methanol injection, production was nevertheless severely affected by the unusually cold weather and icy road conditions, which prevented crews from responding to wells and equipment that were shut in.
- The extreme cold weather also created an unprecedented demand for gas, which further strained the ability of the LDCs and pipelines to maintain sufficient operating pressure.
- The combination of dramatically reduced supply and unprecedented high demand was the cause of most of the gas outages and shortages that occurred in the region.
- Low delivery pressures from the El Paso Natural Gas interstate pipeline, caused by supply shortages, contributed to gas outages in Arizona and southern New Mexico.
- Some local distribution systems were unable to deliver the unprecedented volume of gas demanded by residential customers.
- No evidence was found that interstate or intrastate pipeline design constraints, system limitations, or equipment failures contributed significantly to the gas outages.
- The pipeline network, both interstate and intrastate, showed good flexibility in adjusting flows to meet demand and compensate for supply shortfalls.
- Additional gas storage capacity in Arizona and New Mexico could have prevented many of the outages that occurred by making additional supply available during the periods of peak demand. Natural gas storage is a key component of the natural gas grid that helps maintain reliability of gas supplies during periods of high demand. Storage can help LDCs maintain adequate supply during periods of heavy demand by supplementing pipeline capacity, and can serve as backup supply in case of interruptions in wellhead production. Additional gas storage capacity in the downstream market areas closer to demand centers in Arizona and New Mexico could

have prevented most of the outages that occurred by making additional supply available in a more timely manner during peak demand periods.

Recommendations – Natural Gas

1. Lawmakers in Texas and New Mexico, working with their state regulators and all sectors of the natural gas industry, should determine whether production shortages during extreme cold weather events can be effectively and economically mitigated through the adoption of minimum, uniform standards for the winterization of natural gas production and processing facilities.

The Texas and New Mexico production basins experienced unusually sharp declines due to the prolonged freezing weather of early February 2011. Although these areas typically experience occasional freeze-offs during periods of sub-freezing weather, and although natural gas producers and processors in those regions employ some winterization techniques, to a significant degree those measures were inadequate to meet consumer demand during this event. Production difficulties were compounded by icy road conditions, which disrupted routine maintenance and delayed repairs.

Some industry representatives stated that producers and processors already have strong economic incentives to keep gas flowing at all times, and that increased winterization would not have prevented many of the shortfalls that occurred in the Southwest production basins in early February 2011. Others stated that the levels of winterization typically employed in these areas are designed to deal with less severe, more typical winter weather conditions, and that additional winterization could protect the system from the effects of unusually harsh weather. Many expressed the view that along with increased reliance upon natural gas for energy, steps should be taken to improve the reliability of gas supply during extreme cold weather events.

Whether the adoption of uniform winterization standards for natural gas facilities is the right way to meet the goal of increased reliability is a complex question. Among the issues that need to be resolved are the following:

- Determining the costs of increased winterization and balancing those costs against the need for increased reliability,
- Determining who should ultimately bear the costs of additional winterization, and whether ratemakers would be willing to pass the costs of increased reliability along to consumers,
- Determining whether it is practical to design for very low temperatures, which may not recur for years or even decades,

- Ensuring that standards are uniformly applied, and determining whether state commissions would have adequate resources or authority to promulgate and enforce those standards, and
- Identifying possible incentives for industry that could improve the reliability of winter supply without government regulation.

Because the Commission does not have jurisdictional authority over this sector of the natural gas industry for these purposes, we recommend that state lawmakers and regulators in Texas and New Mexico investigate whether minimum standards for the winterization of gas production and processing facilities should be adopted, by way of legislation, regulation, or the adoption of voluntary industry practices, and whether such standards would be likely to effectively and reliably improve supply during extreme weather events.

2. The gas and electric sectors should work with state regulatory authorities to determine whether critical natural gas facilities can be exempted from rolling blackouts.

The natural gas industry depends in many instances on electric utilities for the power that helps move gas from the production fields to end users. Electric-powered instrumentation, compression, pumps, and processing equipment are essential links in that process, and in some instances, even the brief, temporary loss of electric power can put a gas production, processing, compression, or storage facility out of service for long periods of time, especially where weather conditions delay access to those facilities. The resulting gas outages can contribute to electricity shortages by cutting off or reducing fuel supply to gas-fired generating plants.

Gas producers, processors, pipelines, storage providers, and LDCs should identify portions of their systems that are essential to the ongoing delivery of significant volumes of gas, and which are dependent upon purchased power to function reliably under emergency conditions. State regulatory authorities should work with the gas industry and electric transmission operators, balancing authorities and reliability coordinators to determine whether such facilities can be shielded from the effects of future rolling blackouts.

3. State utility commissions should work with LDCs to ensure that voluntary curtailment plans can reduce demand on the system as quickly and efficiently as possible when gas supplies are disrupted.

One tool available to LDCs faced with supply disruptions during periods of high consumer demand is the implementation of voluntary curtailment plans, which seek reductions or curtailment from large commercial users. State

regulators, who review and approve the voluntary curtailment plans of LDCs, should assess whether they are designed and implemented in a way that maximizes their potential effect in emergency situations.

Voluntary curtailment plans should include multiple points of contact for large customers and up to date, 24-hour contact information. Where appropriate, the plans should provide for pre-event planning, training, and customer education. Large customers should be contacted prior to emergencies and efforts should be made to explain the circumstances under which reductions or curtailments would be sought and to obtain advance commitments for possible reductions, giving LDCs a clearer idea of the amount of demand that can be reduced in an emergency. While voluntary curtailment does nothing to increase supply, in light of the importance of reducing demand when distribution systems are near collapse, regulators and the LDCs should ensure that planning for voluntary curtailments is as thorough and well-thought out as possible.

4. State utility commissions should work with balancing authorities, electrical generators, and LDCs to determine whether and under what circumstances residential gas customers should receive priority over electrical generating plants during a gas supply emergency.

Gas-fired generation provides much needed electrical power during a weather emergency, but also consumes large amounts of natural gas. Although restoring residential electricity service after a rolling blackout is a fairly simple process, restoring gas service after an outage is both labor-intensive and time-consuming.

State utility commissions should work with LDCs to identify situations where consumption by gas-fired generators could contribute to residential gas customer outages, and should consult with those generators and the relevant Balancing Authority to determine whether alternative power suppliers or fuel supplies could be used in emergency situations. The state commissions should also evaluate the relative importance, for human needs customers, of gas-fired generation and residential use, and should assess the relative impacts of curtailing generating plants versus gas supply to residences.

5. State utility commissions and LDCs should review the events of early February 2011 and determine whether distribution systems can be improved to increase flows during periods of high demand.

In some instances during the winter storm event, LDC distribution systems were unable to flow scheduled volumes, suggesting that downstream parties may not have had sufficient capacity or facilities to handle historically high demand.

Accordingly, state commissions and distribution companies should determine whether system enhancements can be made to improve volume handling capacity, such as additional distribution valving, looping, more compression, or reconfigured compression. Although such system improvements would probably not compensate for the level of supply shortfalls that occurred in early February 2011, they might allow LDCs to take higher volumes for longer periods of time.

6. State utility commissions should work with LDCs to determine whether the LDC distribution systems can be improved so that curtailments can be implemented, when necessary, in a way that improves the speed and efficiency of the restoration process.

The events of early February 2011 demonstrated that once operational pressures and line pack begin to fall beyond normal tolerances, little time may be available to evaluate, locate, and shut off portions of the pipeline systems of the LDCs to avoid system collapse. Regulators should work with LDCs, as part of the annual system review process, to determine whether the systems under their regulatory authority should be further sectionalized to provide more options when involuntary curtailments are necessary.