Monday, July 23, 2018

Engineering Systems

DPU FDR 2.1 Attachment – Analysis Summary

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Requested By: Al Zadeh, Division of Public Utilities

Purpose

The analysis presented in this summary report demonstrates the effectiveness of the proposed liquefied natural gas (LNG) plant in the context of responding to supply shortfalls on a cold January day.

Analysis

In order to compare normal operation to a shortfall scenario, Figures 1-3 are high pressure (HP) model results of a cold January day. The results assume all necessary gas supply reaches the city gates and there are no malfunctions or mechanical failures on the pipelines feeding the system.

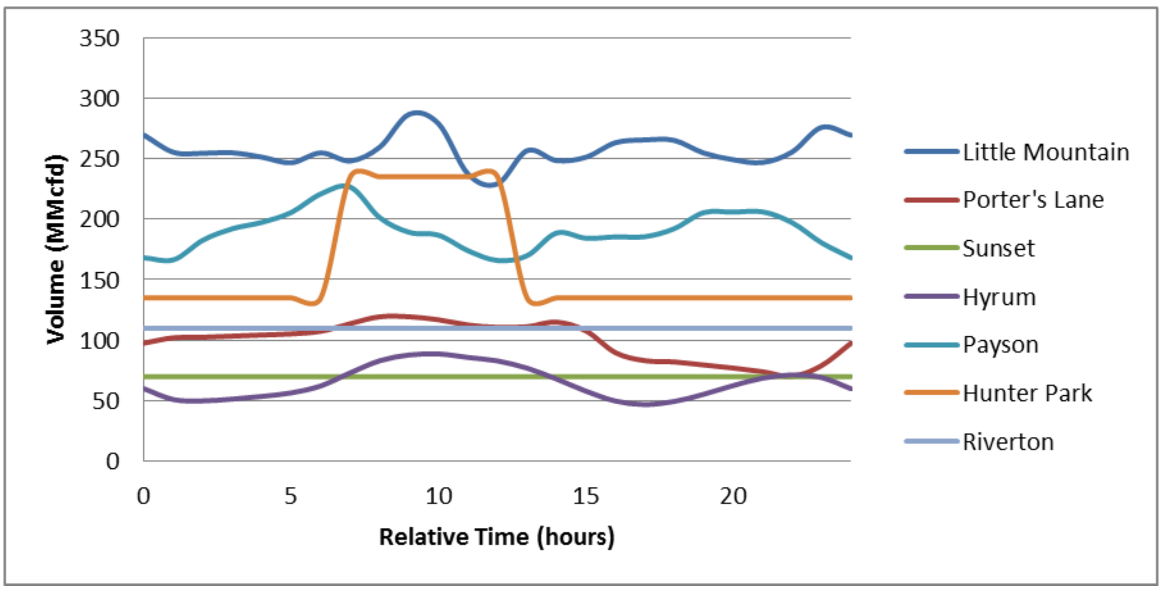

Figure 1: Gate Station Flow Rates – Normal Operating Conditions

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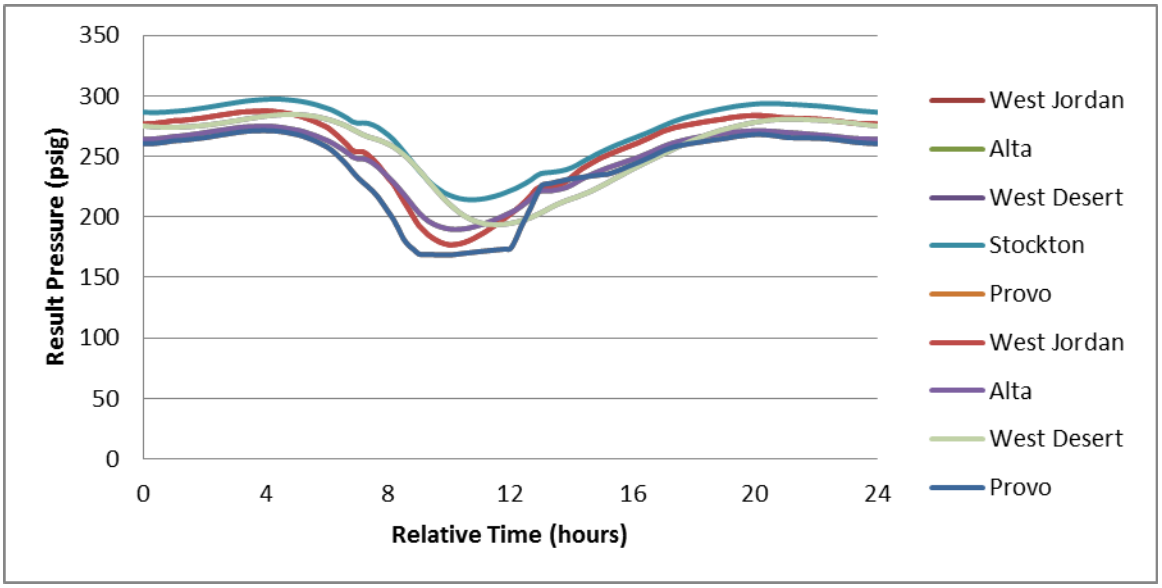

Figure 2: Central HP System Results – Normal Operating Conditions

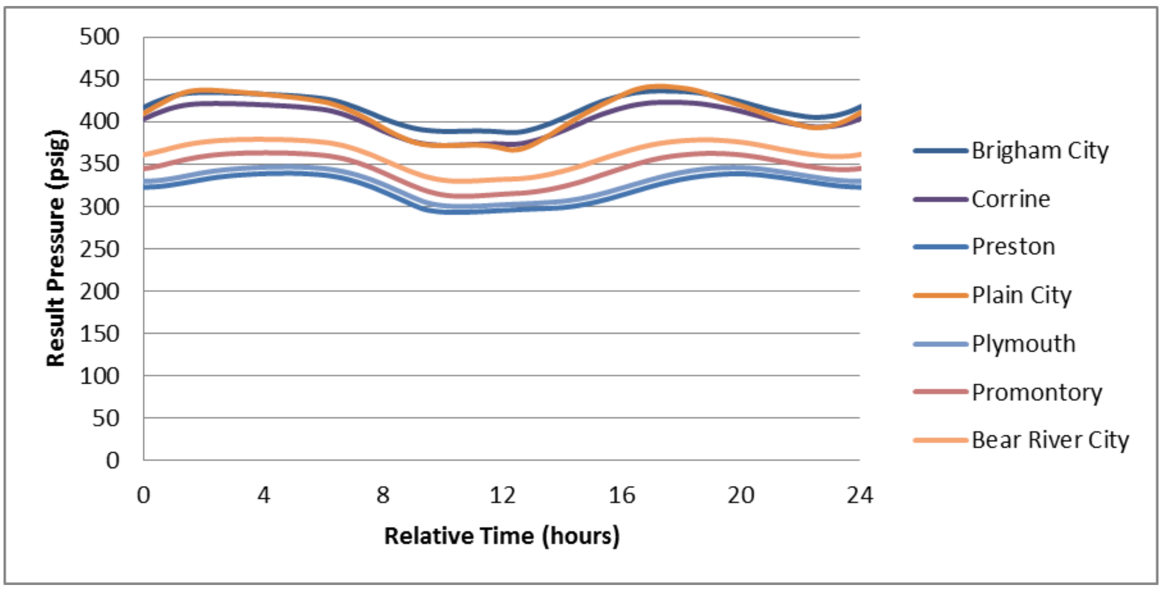

Figure 3: Northern HP System Results – Normal Operating Conditions

The first supply shortfall scenario considered is caused by a disruption of all flow through the Hunter Park gate station. Figure 4 shows the resulting LNG plant flow rate under these conditions. Figures 5-7 contain the model results similar to Figures 1-3 for comparison. All system pressures remain above operational minimums.

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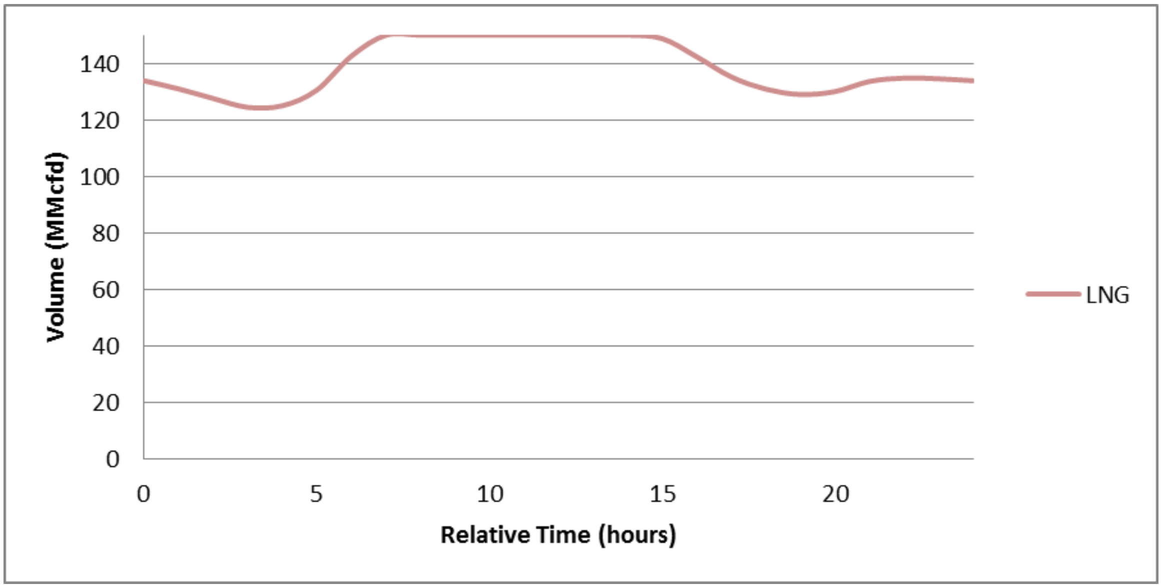

Figure 4: LNG Plant Flow Rate – Hunter Park Scenario

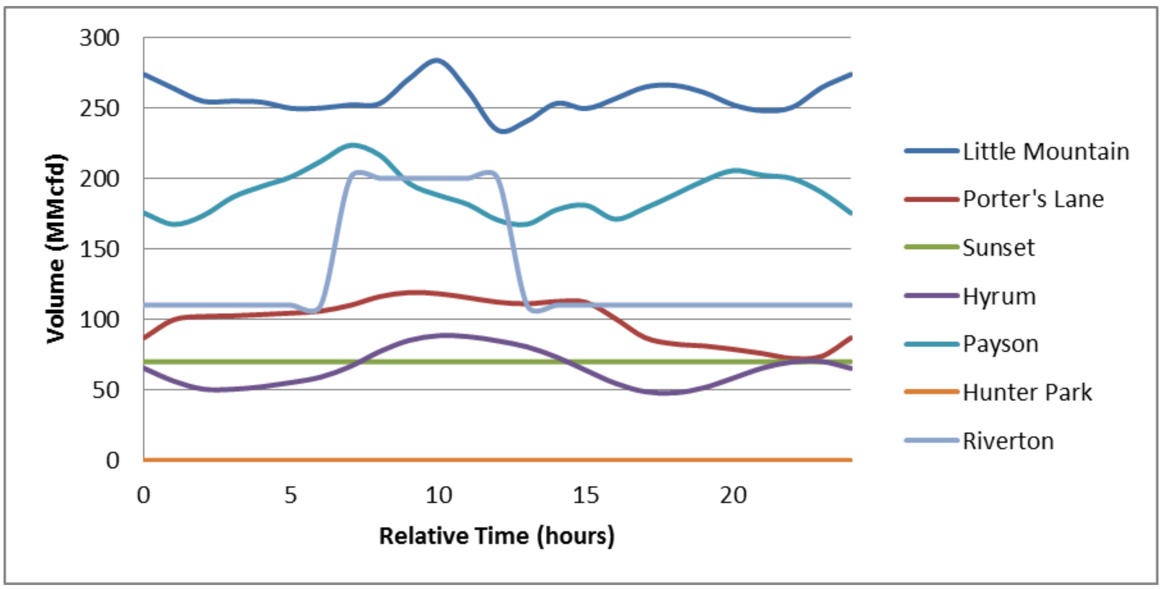

Figure 5: Gate Station Flow Rates – Hunter Park Scenario

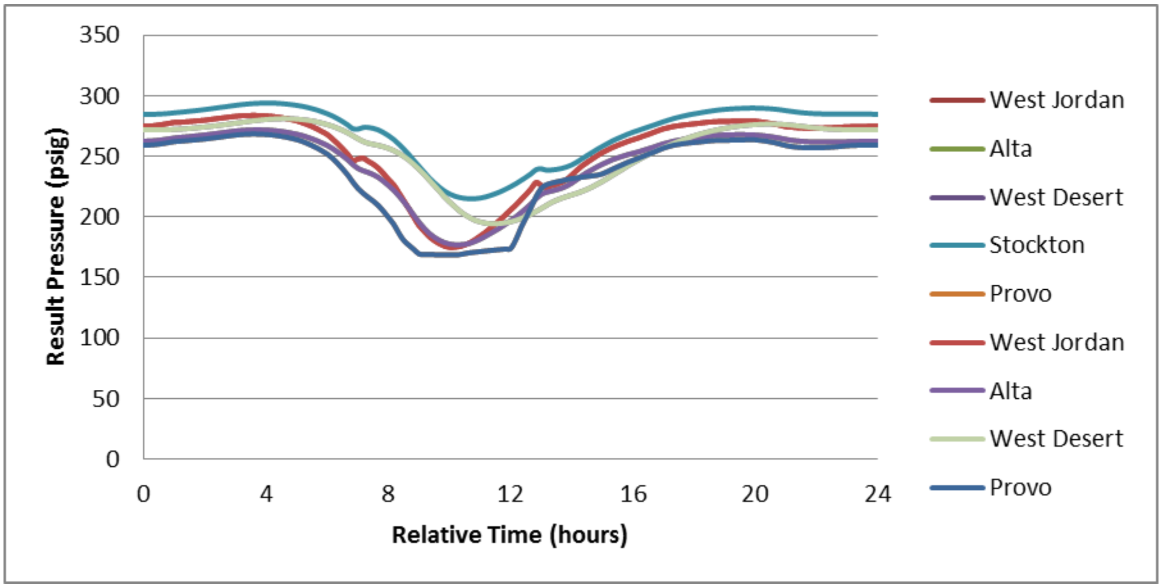

Figure 6: Central HP System Results – Hunter Park Scenario

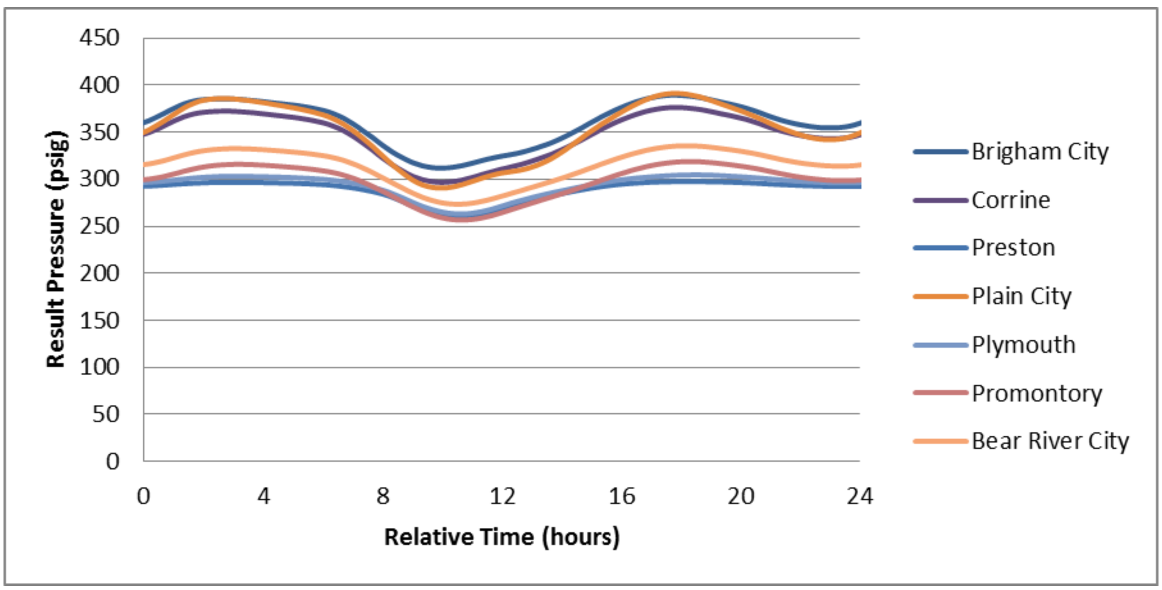

Figure 7: Northern HP System Results – Hunter Park Scenario

The next supply shortfall scenario considered is caused by a complete disruption of flows through the Sunset gate station. Figure 8 shows the resulting LNG plant flow rate under these conditions. Figures 9-11 contain the model results similar to Figures 1-3 for comparison. All system pressures are above operational minimums.

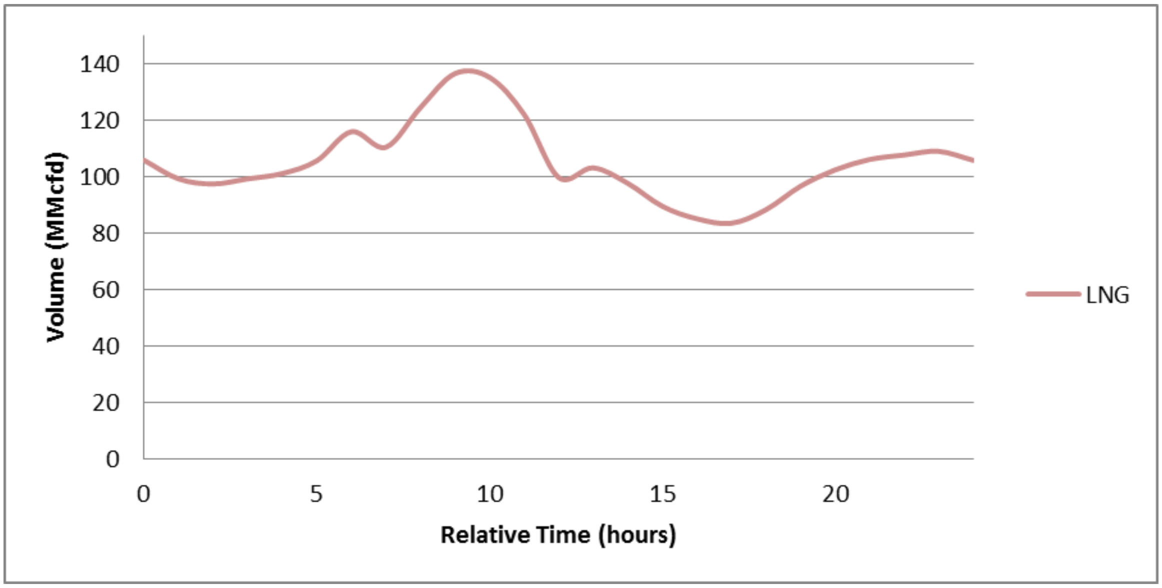

Figure 8: LNG Plant Flow Rate – Sunset Scenario

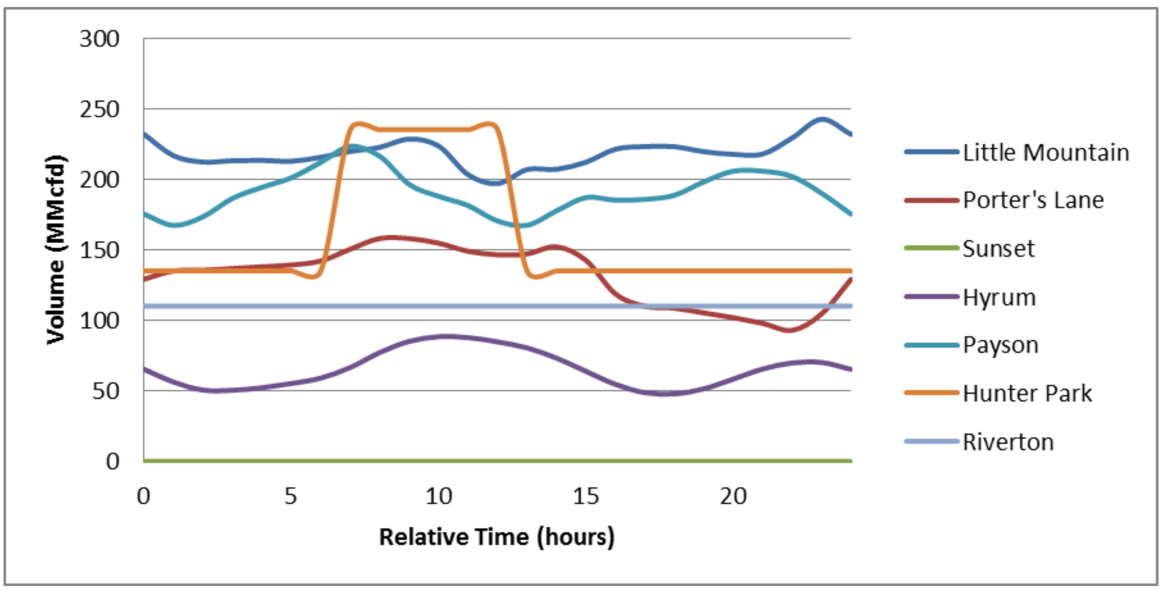

Figure 9: Gate Station Flow Rates – Sunset Scenario

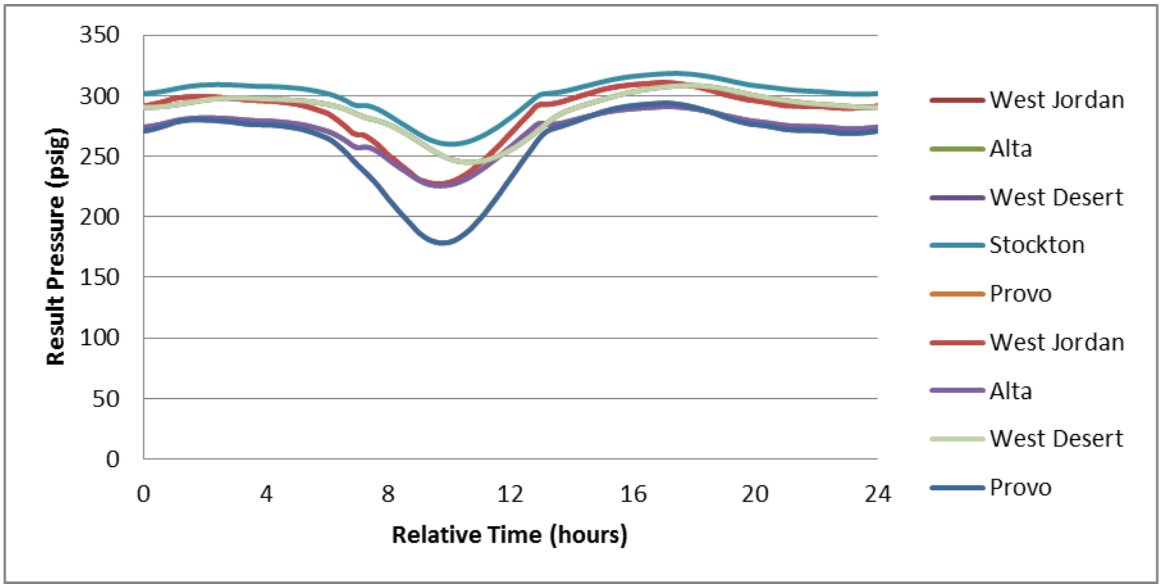

Figure 10: Central HP System Results – Sunset Scenario

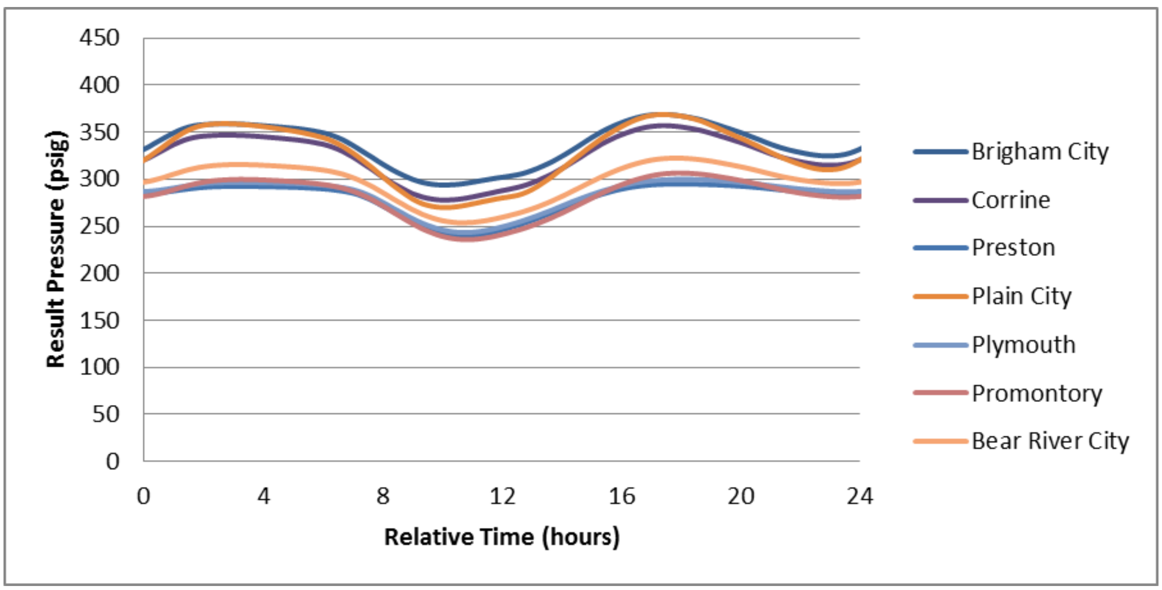

Figure 11: Northern HP System Results – Sunset Scenario

The next supply shortfall scenario considered is caused by a complete disruption of flows through the Hyrum gate* station. Figure 12 shows the resulting LNG plant flow rate under these conditions. Figures 13-15 contain the model results similar to Figures 1-3 for comparison. All system pressures are above operational minimums.

* This scenario requires planned feeder line replacements through 2022 to be completed.

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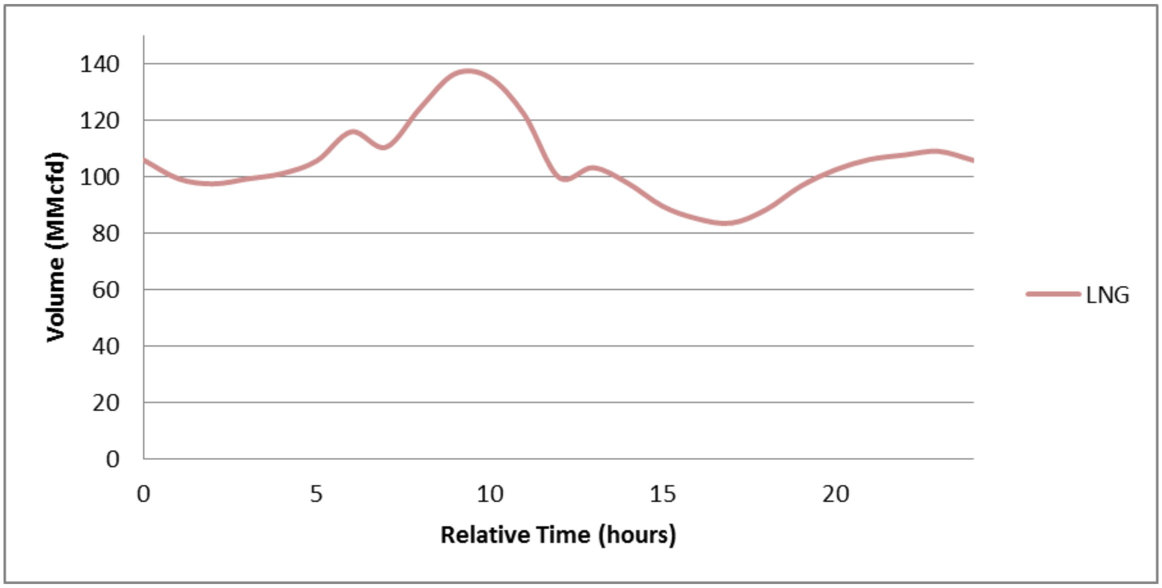

Figure 12: LNG Plant Flow Rate – Hyrum Scenario

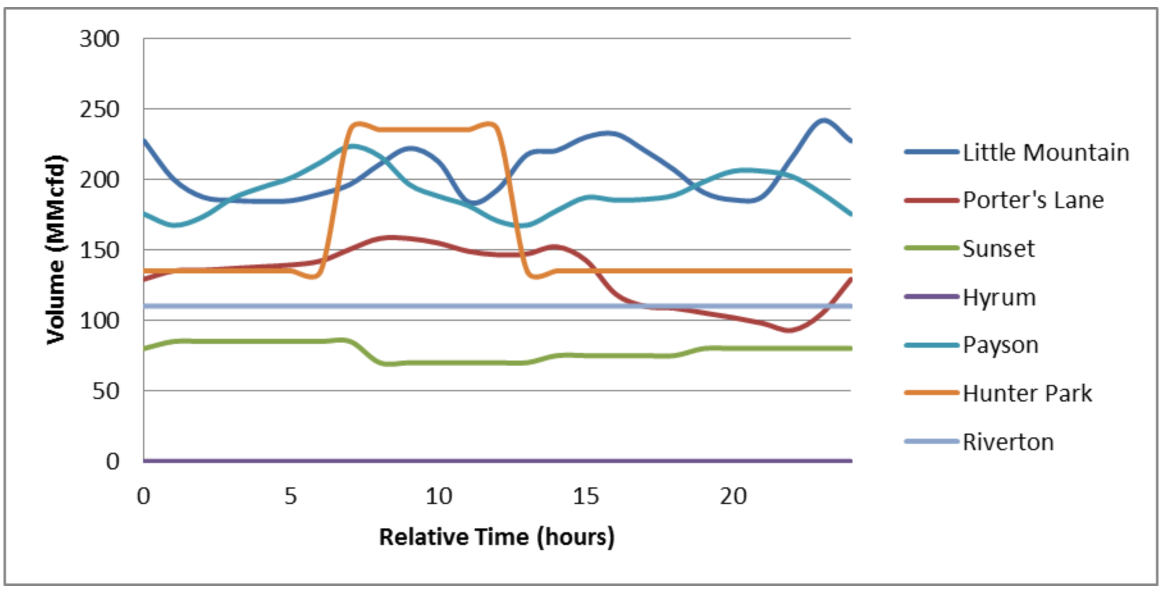

Figure 13: Gate Station Flow Rates – Hyrum Scenario

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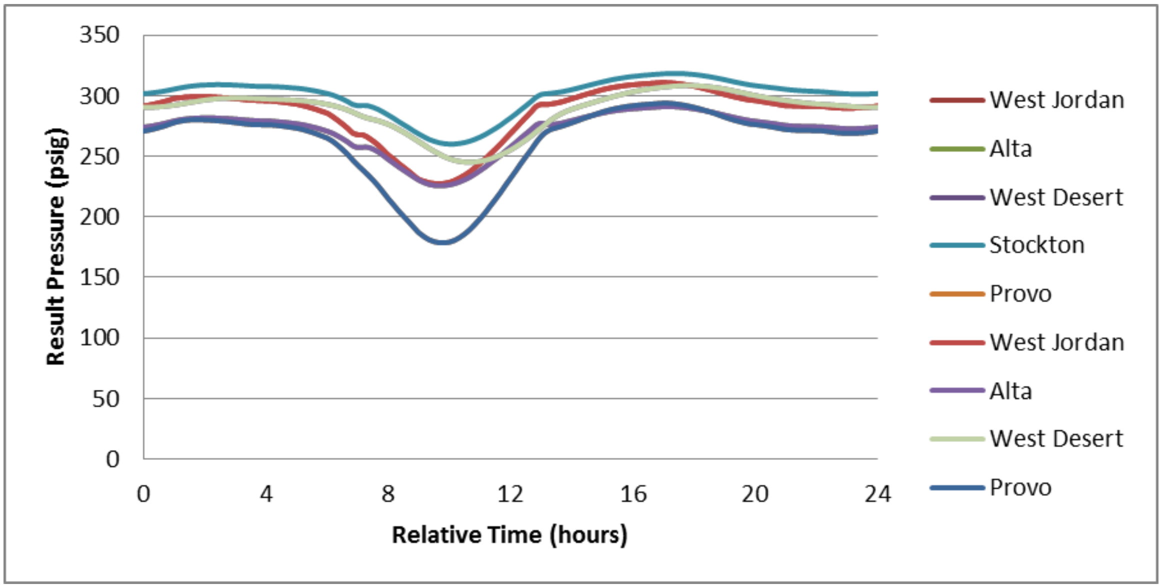

Figure 14: Central HP System Results – Hyrum Scenario

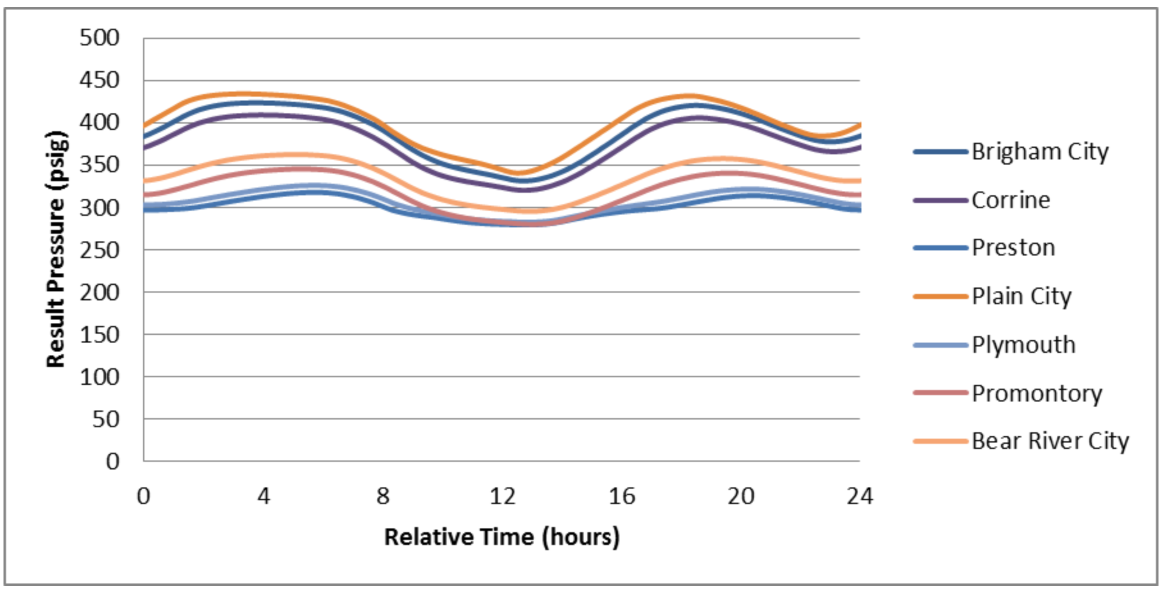

Figure 15: Northern HP System Results – Hyrum Scenario

The next supply shortfall scenario considered is caused by a disruption of approximately 150,000 Dth/day[†] through the Little Mountain gate station. Figure 16 shows the resulting LNG plant flow rate under these conditions. Figures 17-19 contain the model results similar to Figures 1-3 for comparison. All system pressures are above operational minimums.

[†] Little Mountain was reduced by 156 MMcfd which is about 163,000 Dth/day.

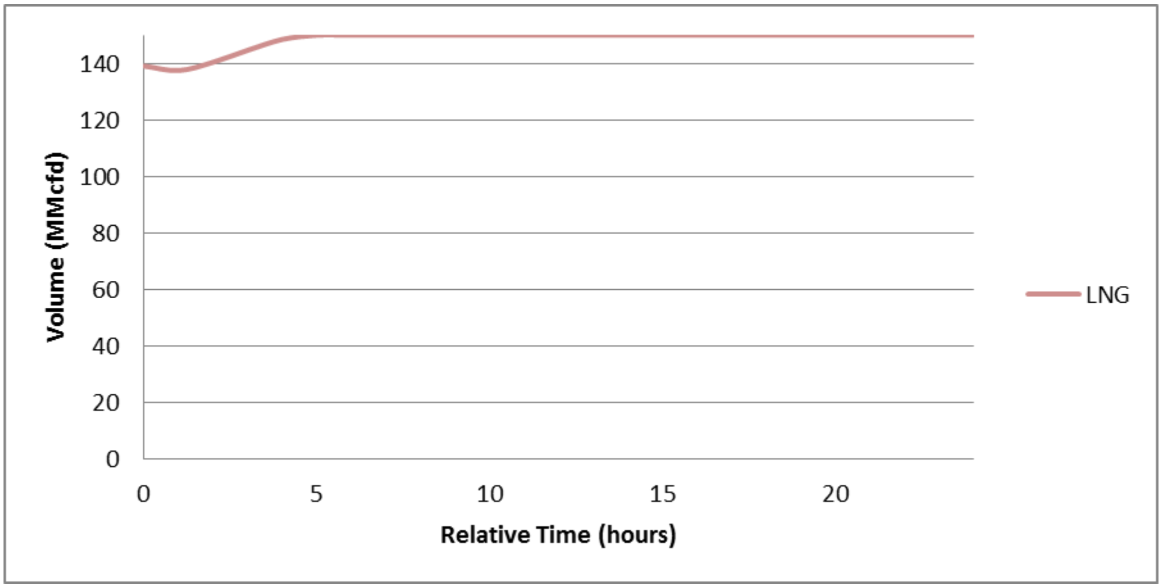

Figure 16: LNG Plant Flow Rate – Little Mountain Scenario

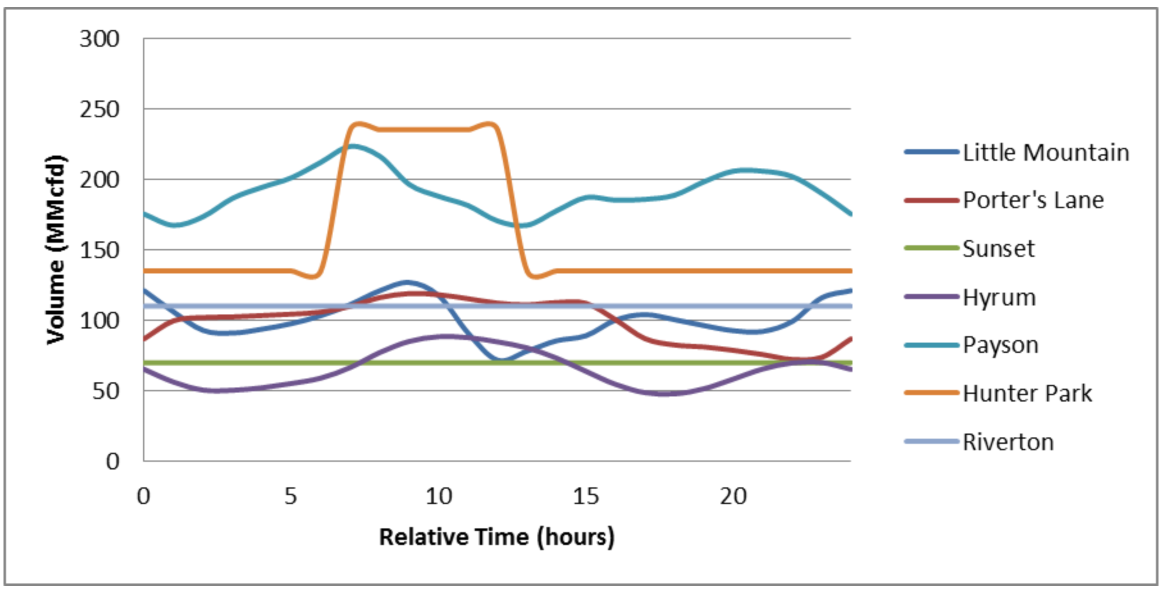

Figure 17: Gate Station Flow Rates – Little Mountain Scenario

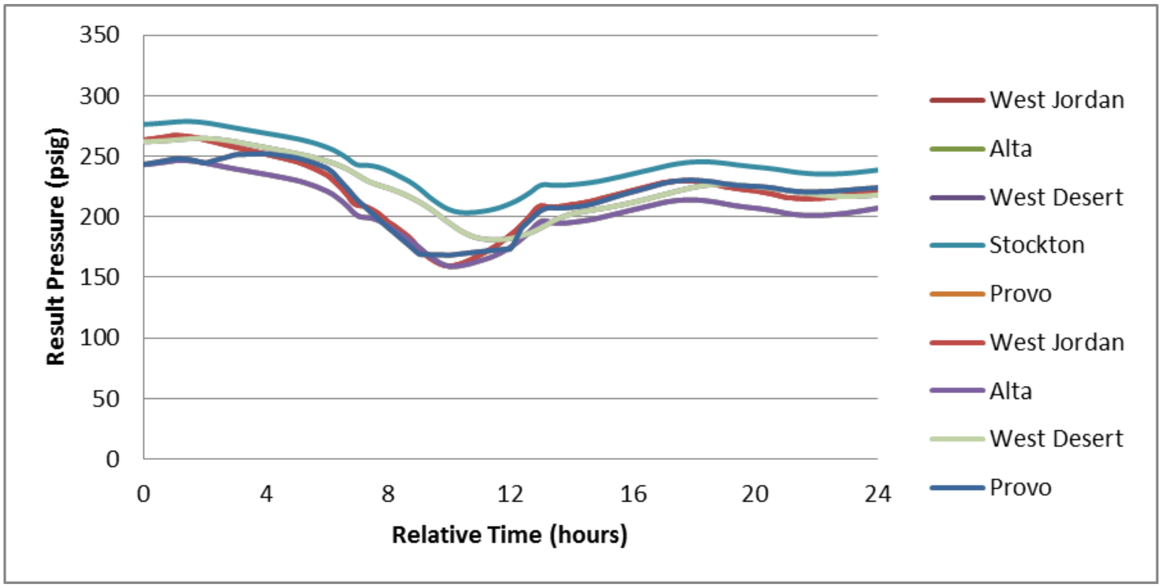

Figure 18: Central HP System Results – Little Mountain Scenario

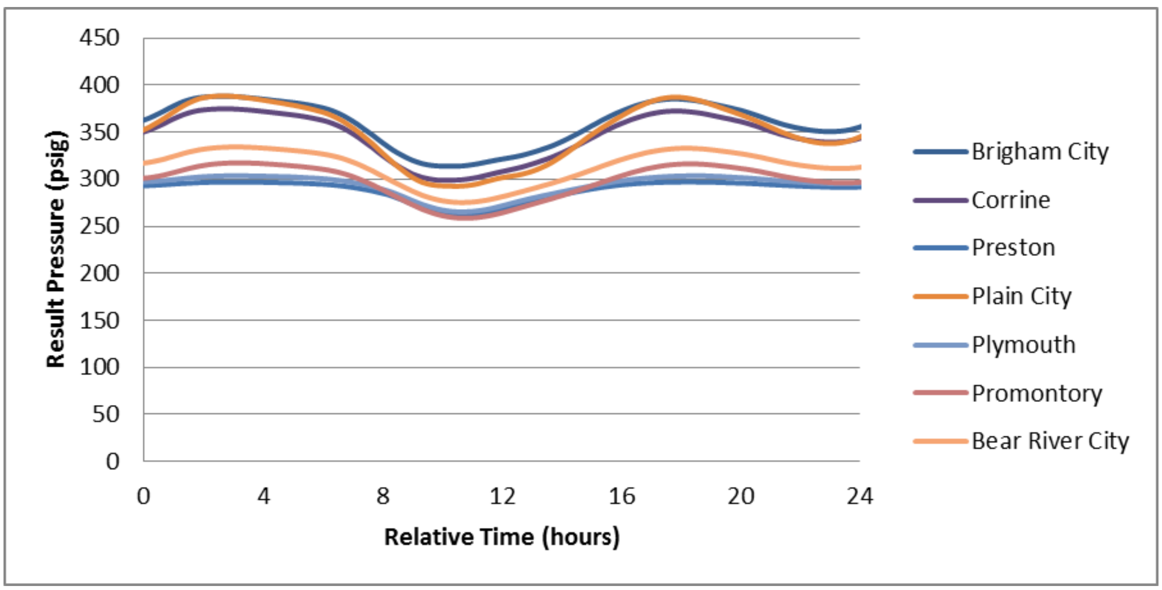

Figure 19: Northern HP System Results – Little Mountain Scenario

The next supply shortfall scenario considered is caused by a tear out on Feeder Line 26 (FL26) just downstream of the Payson gate station. Figure 20 shows the resulting LNG plant flow rate under these conditions. Figures 21-23 contain the model results similar to Figures 1-3 for comparison. All system pressures are above operational minimums.

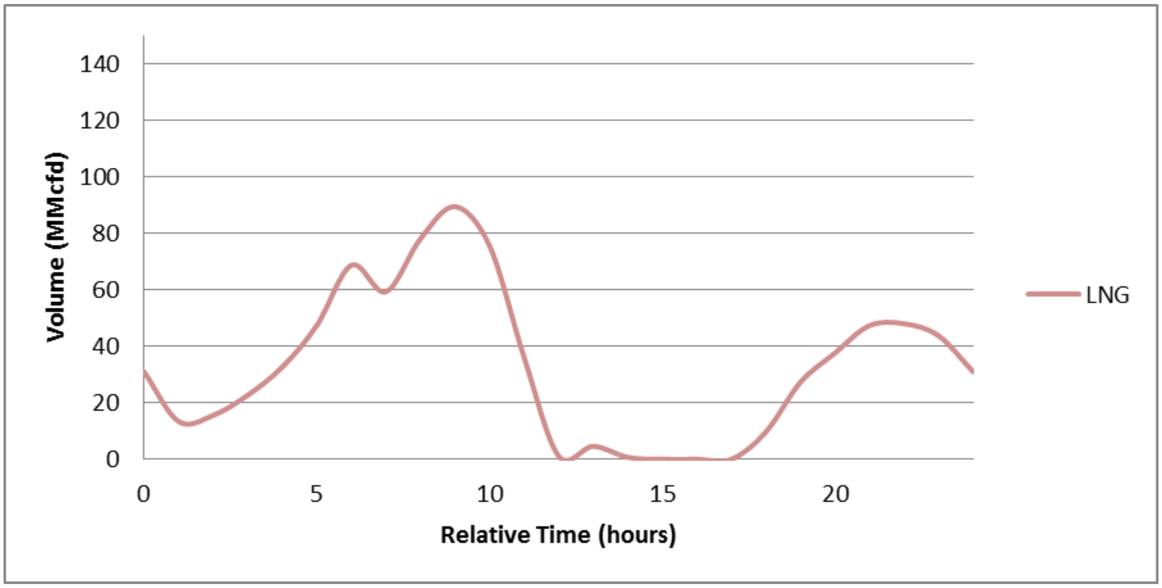

Figure 20: LNG Plant Flow Rate – FL26 Scenario

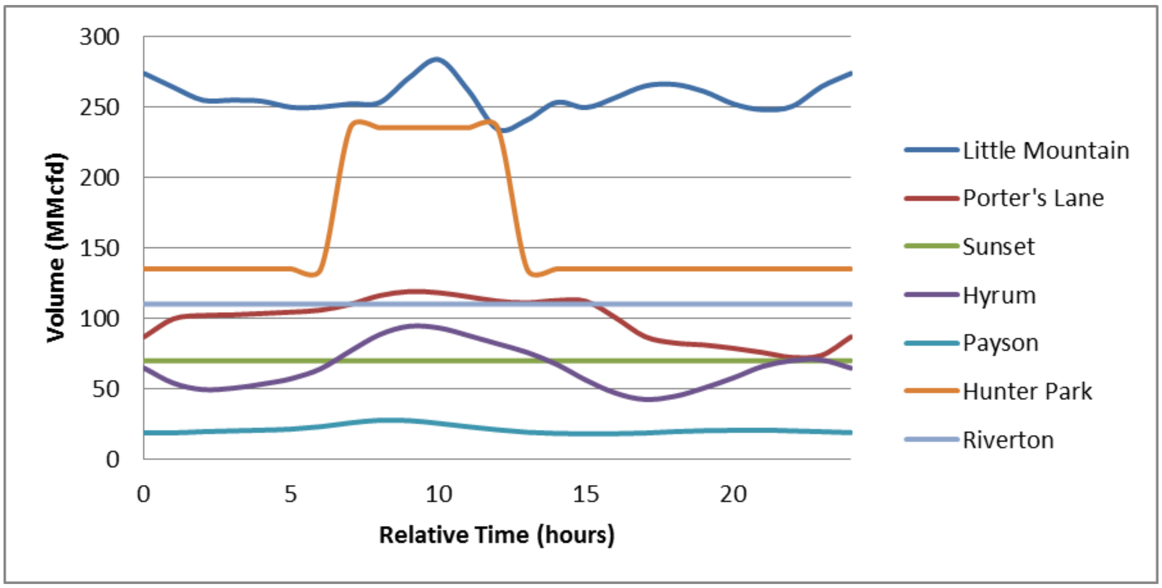

Figure 21: Gate Station Flow Rates – FL26 Scenario

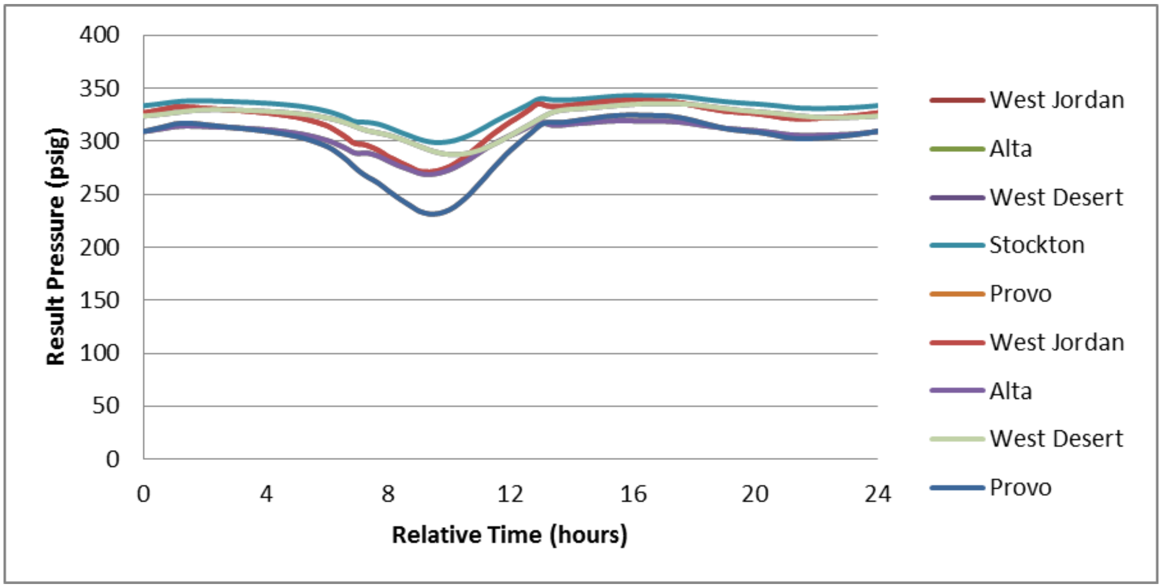

Figure 22: Central HP System Results – FL26 Scenario

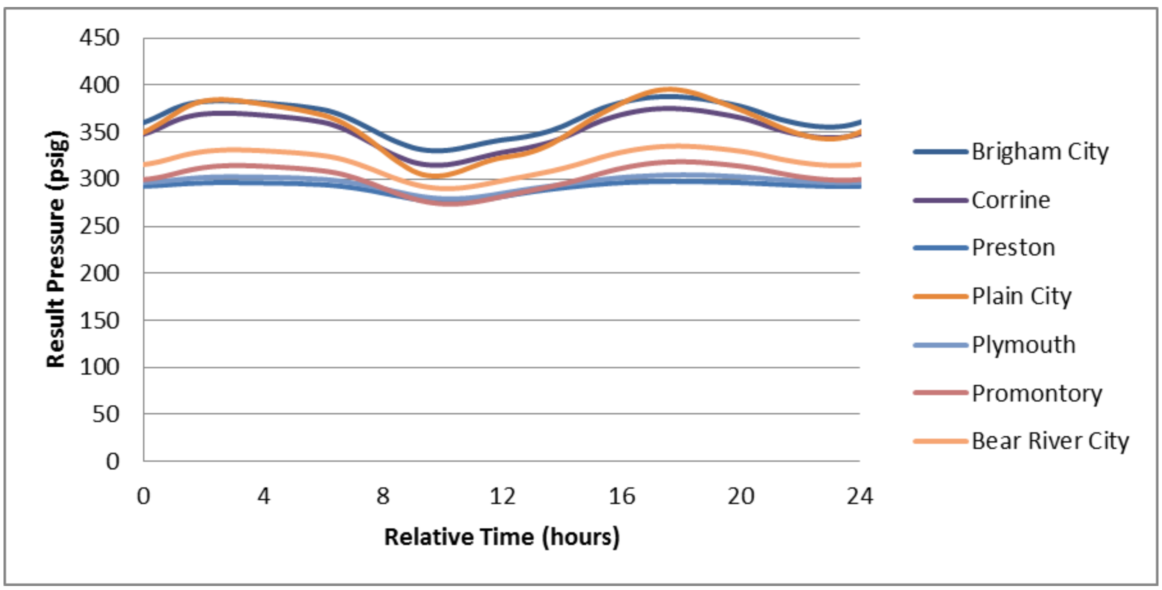

Figure 23: Northern HP System Results – FL26 Scenario

In the event that Jurisdictional Line 32 (JL 32) is severed by a landslide, there will be no impact on the Dominion Energy Utah, Wyoming, and Idaho (DEUWI) system. There is no planned production coming from Pineview and no transportation capacity held on JL 32. If a landslide severed the line, Dominion Energy Questar Pipeline (DEQP) has an automated shutoff valve (ASV) that will prevent the rupture from causing problems on the attached main lines.

If there is a processing plant freeze-off, similar to the shortfall that occurred during the 2015-2016 heating season, the resulting situation would be similar to the Little Mountain scenario at a lower volume. System pressures, in this scenario, would be higher than the Little Mountain scenario presented earlier. If the shortfall were spread across more than one station, the system would be even better situated than if the entire shortfall was through one gate station.

The scenarios presented in these analyses were processed in cold January temperatures. Average temperatures in January, for the Salt Lake Airport, are 30°F. The standard deviation is 8.6°F. These models were created assuming two standard deviations colder than average, or 13°F (52 heating degree days).

Conclusion

The proposed LNG facility will allow the Company to maintain operational pressures during the most likely supply shortfall scenarios on a cold January day.