Wednesday, July 11, 2018

Engineering Systems

LNG Shortfall Scenario Effectiveness

System Analysis: Mike Platt, Manager of Engineering Systems
Requested By: Kelly Mendenhall, Director of Regulatory Affairs

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 Design-Peak Day.

Analysis

In order to compare normal operation to a shortfall scenario, Figures 1-3 are high pressure (HP) model results of the current Joint Operations Agreement (JOA). Unless otherwise stated herein, 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.

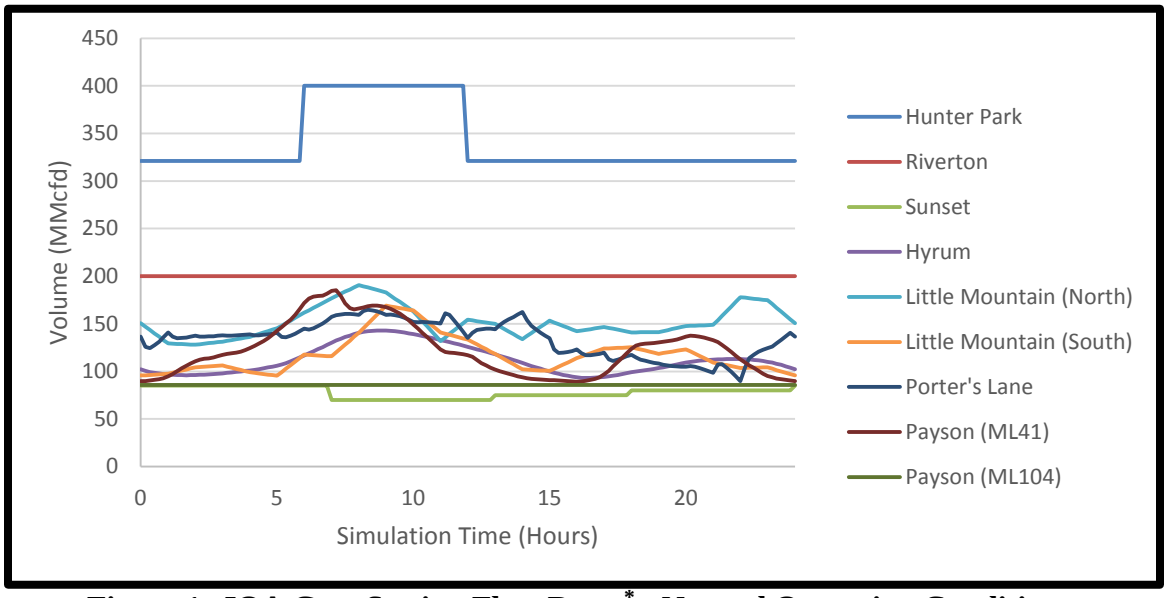

Figure 1: JOA Gate Station Flow Rates* - Normal Operating Conditions

* The Little Mountain and Payson Gates have two source nodes each in order to simplify the model. Flows are shown in millions of cubic feet per day (MMcfd).

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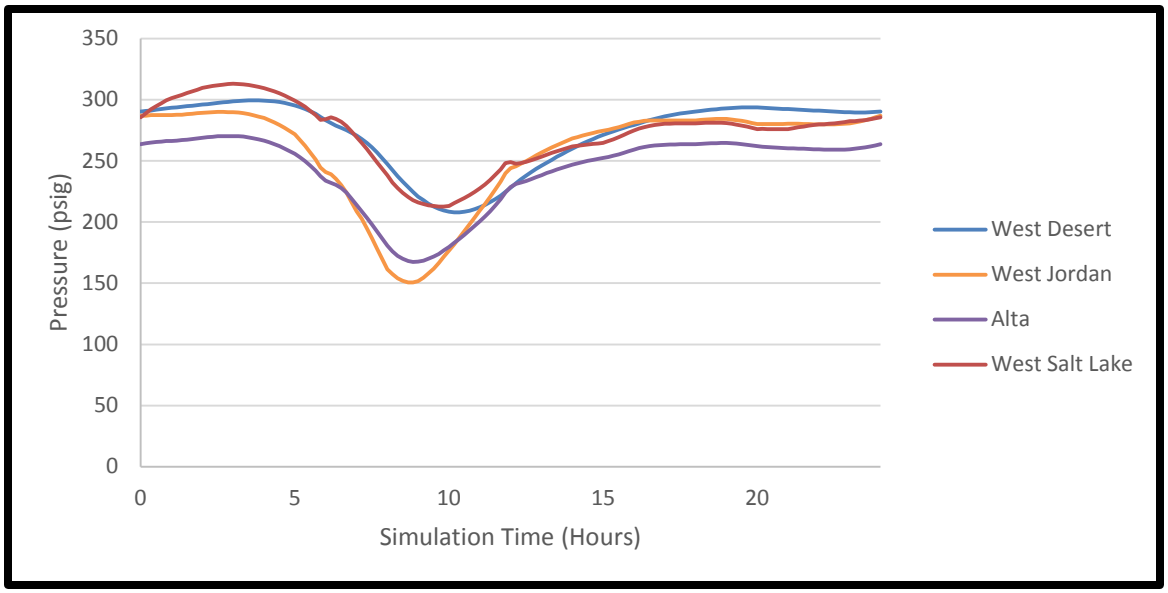

Figure 2: JOA Central HP System Results - Normal Operating Conditions

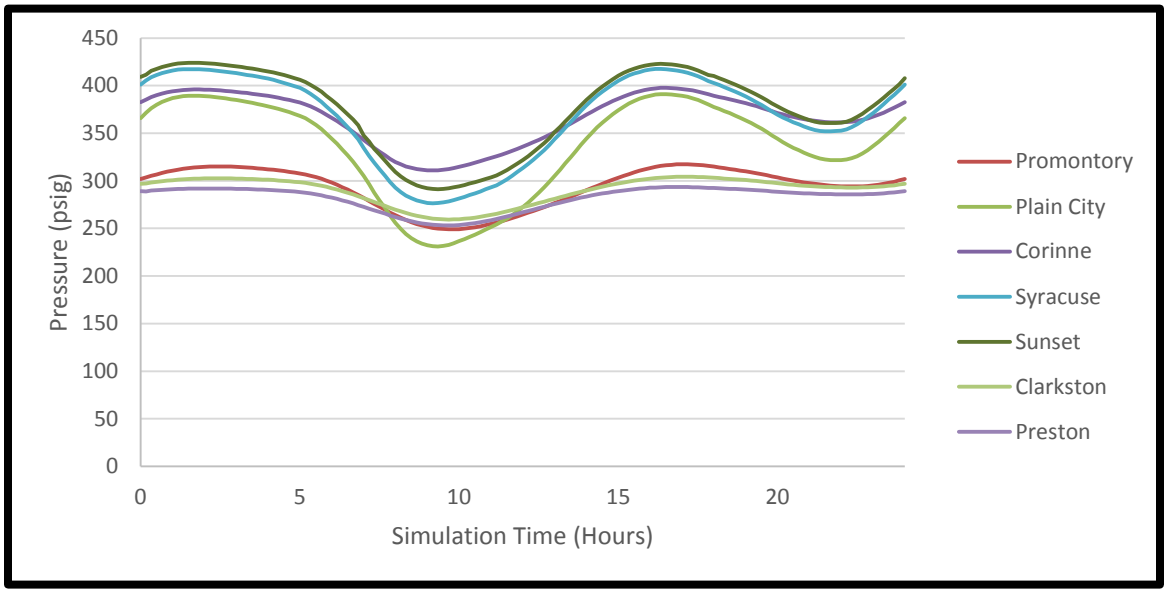

Figure 3: JOA Northern HP System Results - Normal Operating Conditions

The first supply shortfall scenario considered is caused by well freeze-offs in Wyoming upstream of Dominion Energy Questar Pipeline (DEQP) system. In the modeled scenario, the volume at the Little Mountain Gate Station (north and south feeding) is reduced by 150 MMcfd. 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 are above operational minimums.

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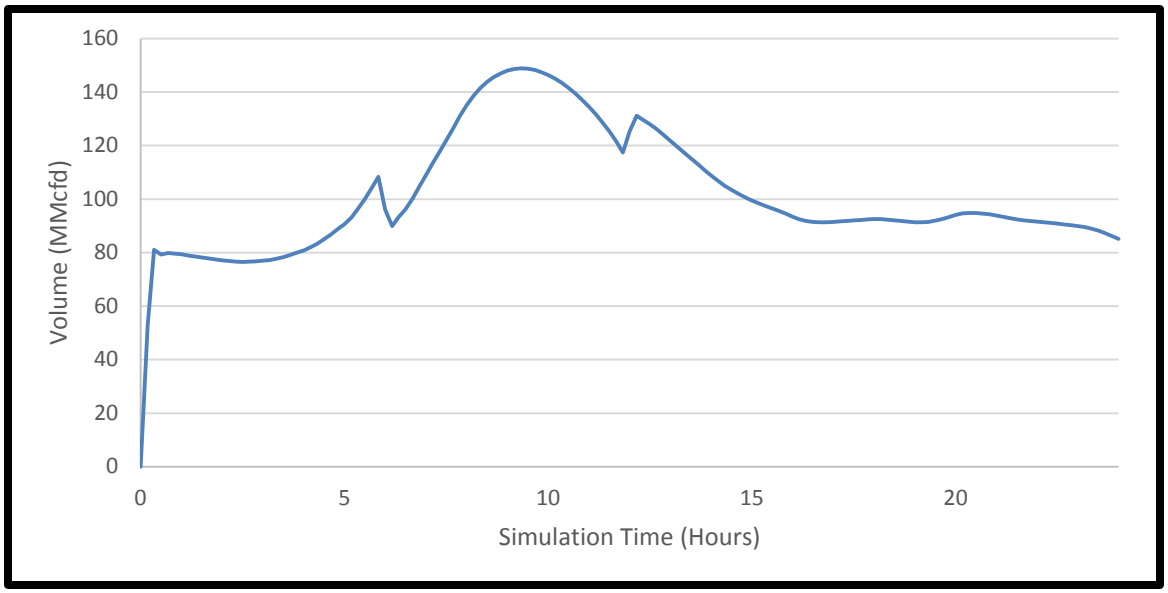

Figure 4: LNG Plant Flow Rate - Wyoming Freeze-Offs Scenario

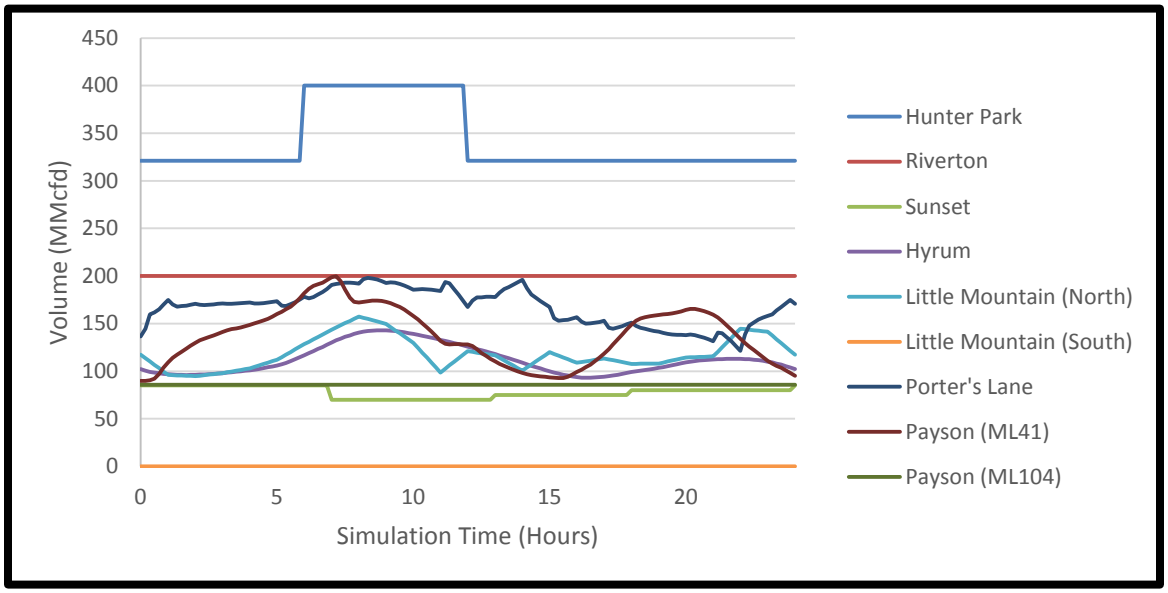

Figure 5: Gate Station Flow Rates - Wyoming Freeze-Offs Scenario

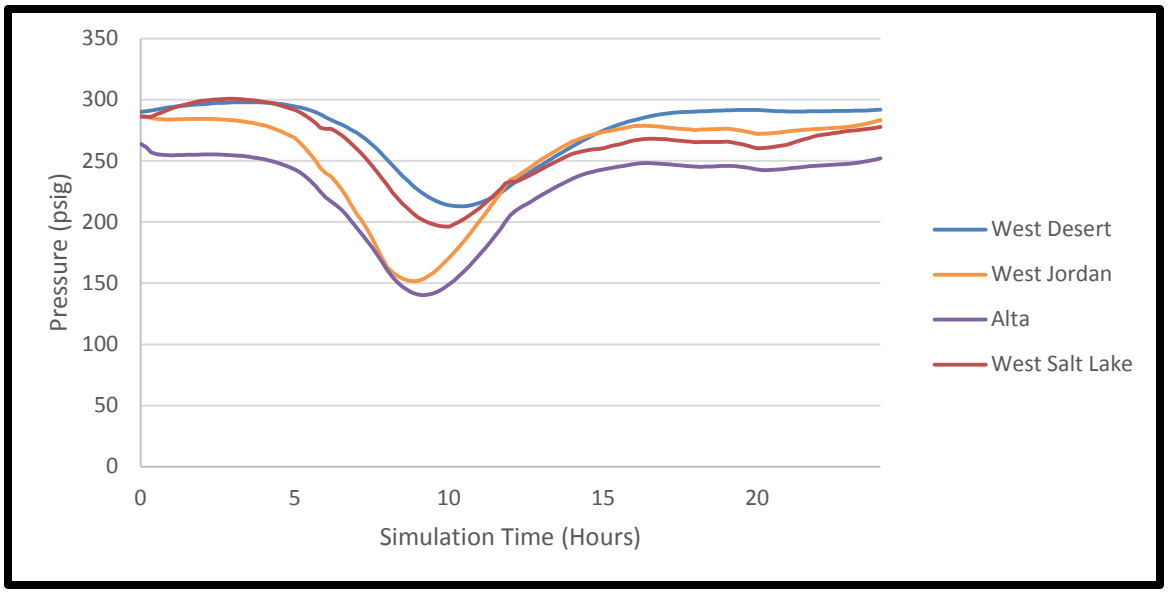

Figure 6: JOA Central HP System Results - Wyoming Freeze-Offs Scenario

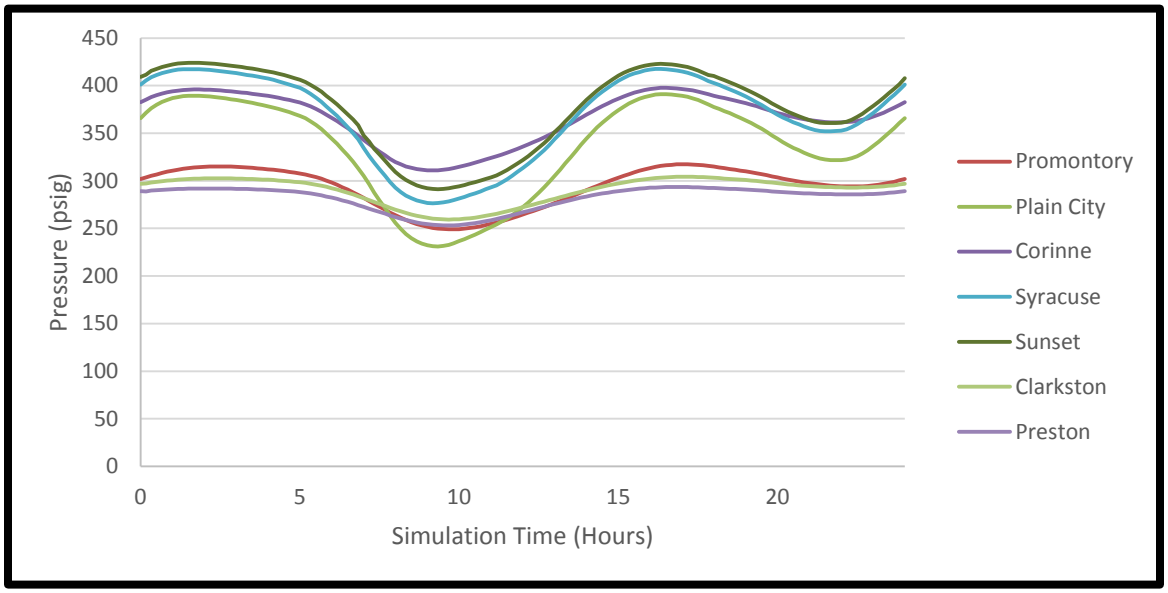

Figure 7: JOA Northern HP System Results - Wyoming Freeze-Offs Scenario

The next supply shortfall scenario considered is caused by malfunctions at OPAL upstream of the Kern River Pipeline system. In the modeled scenario, the volume at the Hunter Park Gate Station (north and south feeding) is reduced by 150 MMcfd. 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.

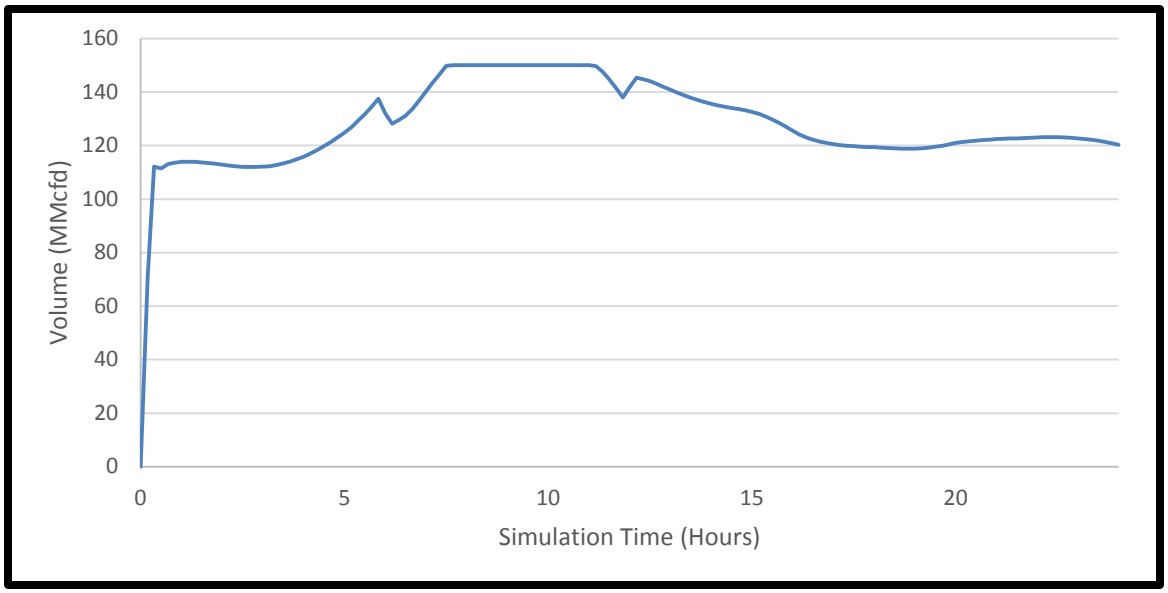

Figure 8: LNG Plant Flow Rate - OPAL Malfunction Scenario

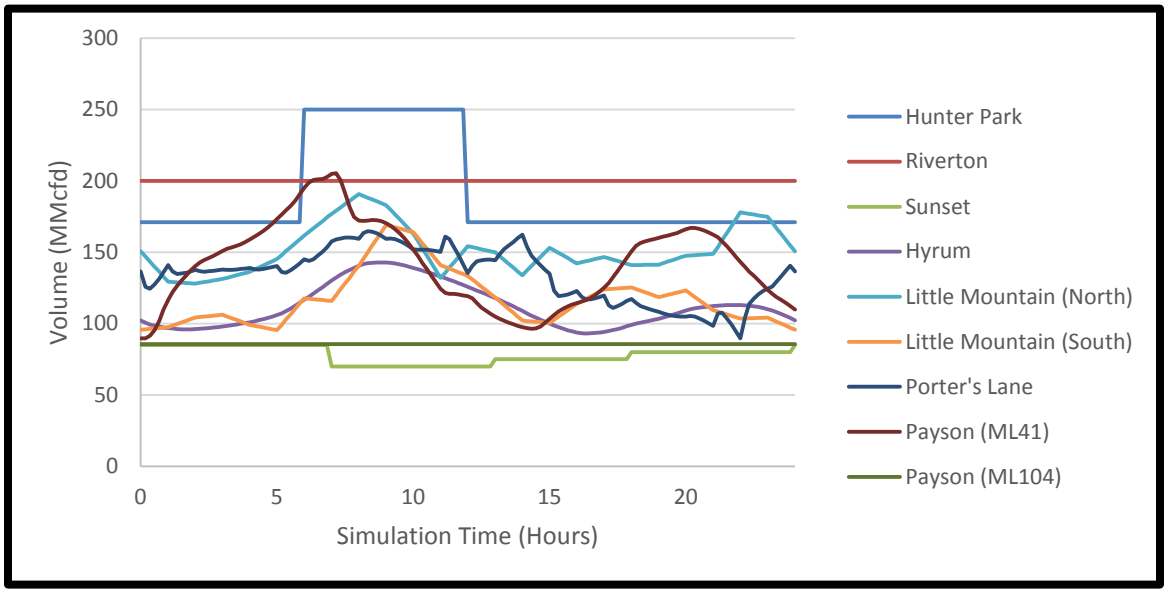

Figure 9: Gate Station Flow Rates - OPAL Malfunction Scenario

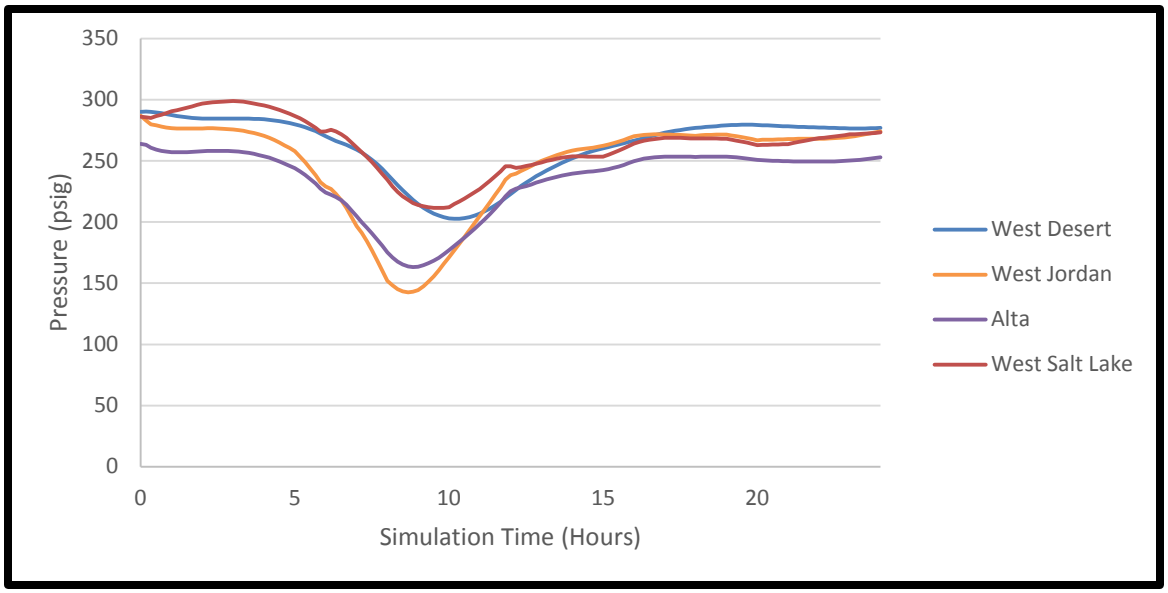

Figure 10: JOA Central HP System Results - OPAL Malfunction Scenario

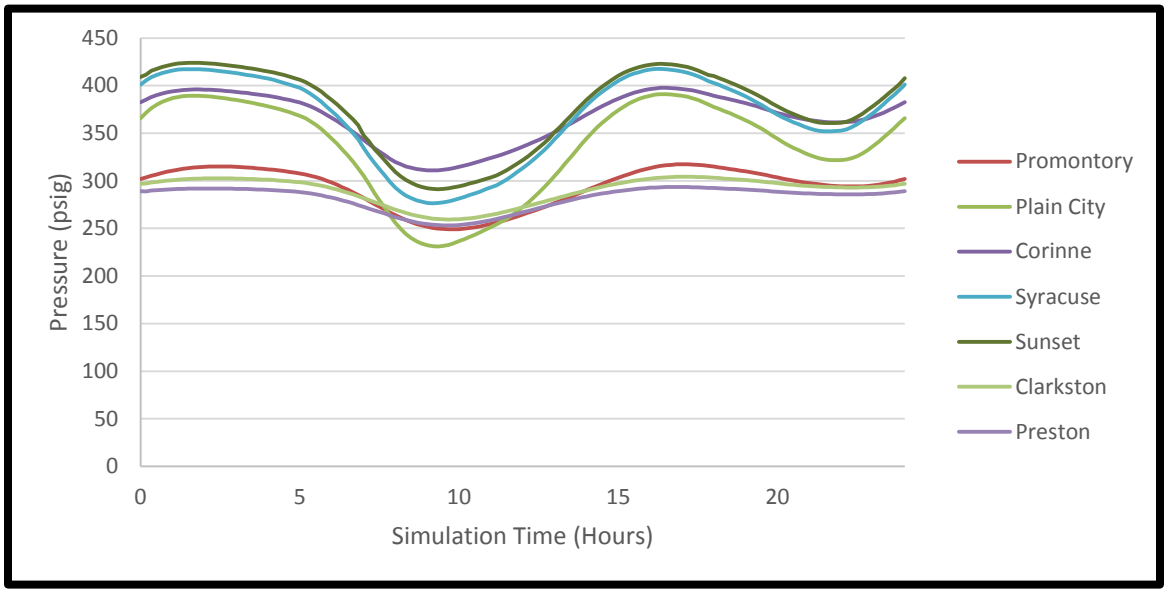

Figure 11: JOA Northern HP System Results - OPAL Malfunction Scenario

Conclusion

The proposed LNG facility will allow the Company to maintain operational pressures during the most likely supply shortfall scenarios on a Design-Peak Day. The facility is capable of feeding up to the design capacity at the proposed site.