

## *Feeder Line 50 Replacement Size Analysis*

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### ***Scope***

Feeder Line 50 (FL50) is 5.5 miles in length and is located in Henefer, Utah. This high pressure (HP) pipeline feeds the city of Henefer, the town of Croydon, and Holcim Cement Company, which is a Transportation Service (TS) customer. The feeder line is scheduled to be replaced starting in 2011. This document considers the effects of different replacement sizes on system operation.

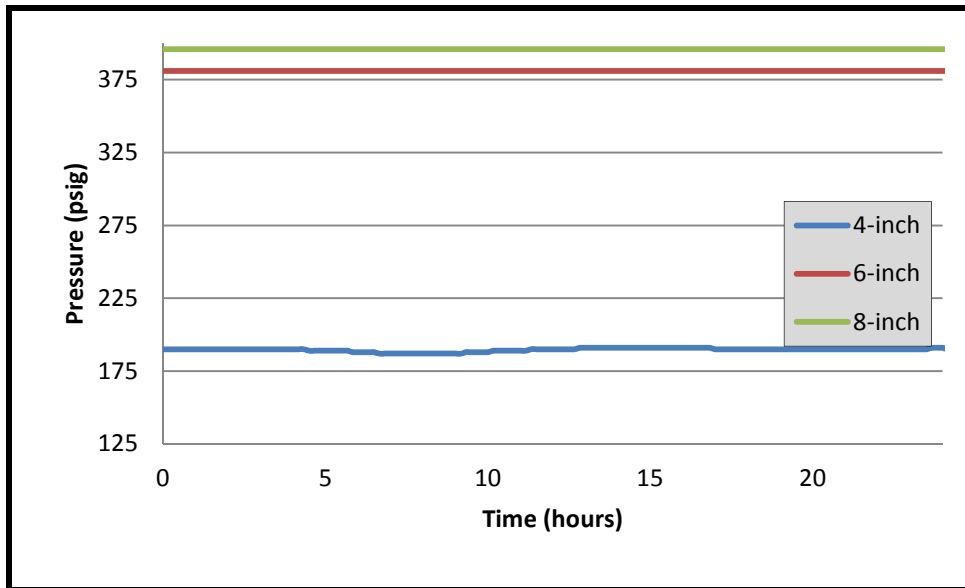


**Figure 1: Feeder Line 50**

**Analysis**

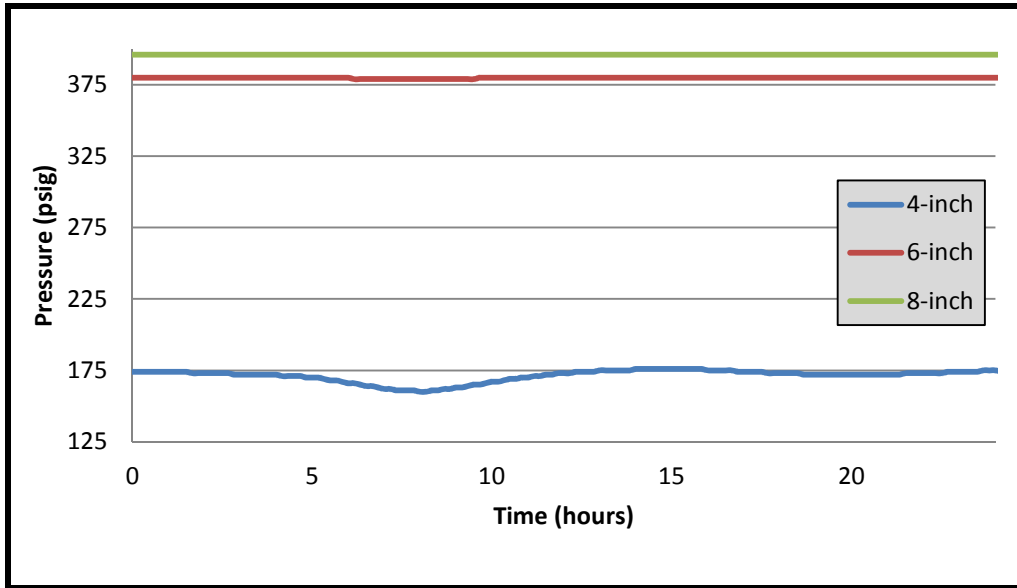
Currently the upstream operating pressure is about 500 psig while the outlet of Henefer Gate Station is set to 100 psig which significantly limits the capacity of the line. The new line should be installed into the Northern MAOP Zone which has an MAOP of 471 psig. Increasing the operating pressure of FL50 will allow the diameter pipe installed to be reduced and still provide ample excess capacity for future growth of firm demands. For example, if the firm demand is tripled a 4-inch replacement provides a constant pressure higher than 390 psig at the end point of FL50 without Holcim Cement operating. The demand in this area could realistically triple in a short period quite easily given the current demand and the area’s attractiveness to resort developers.

The diameter chosen will have a significant impact on the operating conditions while Holcim Cement is burning. Figure 2 shows the resulting Croydon pressure at different diameters, assuming the actual FL50 inlet pressure is set to 400 psig. At 4-inch, the pressure drop through this ~5 mile long feeder line is 213 psig. Six-inch and 8-inch diameters have a pressure drop of 20 psig and 4 psig respectively. While the 4-inch pipe causes significant pressure loss (greater than 200 psig), the steady-state gas velocity in the pipe remains below 80 ft/s, the highest velocity is almost 60 ft/s.



**Figure 3: FL50 Minimum Pressure at Various Replacement Diameters**

In order to be confident that the replacement diameter chosen will provide sufficient pressures and volumes in the future, a general growth model was created. This model assumes that the regulator station loads in the area triple in demand which is possible in the foreseeable future, but highly unlikely. Figure 3 shows that the system results are nearly identical to the 2010 results for the 6-inch and 8-inch diameters, the 4-inch has about 20 psig less pressure during the peak of the day.



**Figure 4: FL50 Minimum Pressure with 300% Growth**

**Capital Cost Estimates**

Cost estimates completed for each possible scenario are shown in Table 1 below. It is common practice to install no smaller than 4-inch diameter pipe for high pressure applications of this distance (5.3 miles). The cost estimates, therefore, do not consider smaller diameters.

**Table 1: Cost Estimate Summary**

Diameter	Estimated Cost
8-inch	\$4,564,000
6-inch	\$4,476,000
4-inch	\$4,103,000

**Additional Information**

Holcim Cement has opted to upgrade the installed line from 4-inch to 6-inch. This will allow them the latitude to operate without any pressure problems. This will also allow Holcim some room for growth should they ever increase their demand or change the installed facilities. Holcim will cover the cost difference from the minimum required system to the 6-inch replacement, which they did so through subscription to firm capacity.

**Conclusions**

A 4-inch pipe could sufficiently serve the residential and commercial growth likely to occur on FL50. Holcim Cement will be paying to upgrade the pipe to a 6-inch. This will provide sufficient gas supply for Henefer, Croydon, and Holcim Cement in the foreseeable future.