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Operations Engineering - System Planning and Analysis



Feeder Line 22 Replacement Size Analysis

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Feeder Line 22 Replacement Diameter Analysis

Analysis Performed by: Mike Platt

Scope

Feeder Line 22 (FL22) is scheduled to be replaced in 2013 as part of the Feeder Line Replacement Program. This analysis examines the effects of replacing the pipe with various diameters and determines the appropriate diameter replacement. Figure 1 is a map of FL22 and the surrounding area.



Figure 1: Map of FL22

Analysis

There are two distinct sections of FL22 that a replacement diameter needs to be determined: the section north of the Feeder Line 19 (FL19) tie and the section south of this location. The northern portion of FL22 lies in between FL19 and Feeder Line 23 (FL23), both of which have been previously sized as 20-inch. The southern segment of FL22 runs parallel to Feeder line 53 and provides reliable feed to a number of regulator stations and industrial customers, but is not a major trunk line in the High Pressure (HP) System.

There are many combinations of replacement that could be chosen to serve the HP system. Table 1 shows the minimum daily (transient) pressures determined from the 2011 Peak Day Unsteady-State Model. The option column lists the diameter, in inches, of the north section on the left and the diameter of the south section on the right (e.g. “20 N / 8 S”). All the options considered, except for line 3, assume that FL53 is retired and a single line feeds the area. There are significant improvements in pressure from a 4-inch replacement to a 12-inch replacement on the south end. There are also significant differences in the resulting pressures if the north section is replaced with a diameter less than 20-inch (lines 7 – 9).

Table 1: 2011 Northern Minimum Unsteady-State Pressures (psig)

Line	Option	Promontory	Bear River	Corinne	Ogden	Preston	Syracuse	Plain City	Plymouth	Hyrum Flow
1	20 N / 4 S	363	370	399	361	346	365	139	354	138
2	20 N / 8 S	360	366	396	364	343	368	343	350	141
3	20 N / 8 S *	360	366	396	365	343	368	346	350	141
4	20 N / 12 S	359	365	395	365	342	369	347	349	142
5	20 N / 16 S	359	365	395	365	342	369	348	349	142
6	20 N / 20 S	359	365	395	366	342	370	349	349	142
7	16 N / 8 S	367	373	403	356	350	360	334	357	134
8	12 N / 8 S	381	387	417	338	364	343	314	371	121
9	8 N / 8 S	403	409	440	290	386	298	261	393	93

Note: Hyrum flow, in the rightmost column, is shown in MMcfd

The 2020 Master Planning Model (unsteady-state) was also used to determine the expected pressures resulting from different replacement diameters. Table 2 shows the 2020 minimum expected pressures at each location specified. Again, there are significant improvements in diameters up to 12-inch on the south section. Beyond 12-inch, pressures show marginal improvement, there is a 4 psig pressure increase from 12-inch to 20-inch pipe.

Table 2: 2020 Northern Minimum Unsteady-State Pressures (psig)

Line	Option	Bear River	Corinne	Ogden	Preston	Syracuse	Plain City	Plymouth	Hooper	Hyrum Flow
1	20 N / 4 S	254	245	313	248	213	102	253	168	166
2	20 N / 8 S	251	238	314	246	274	254	251	270	168
3	20 N / 12 S	250	238	315	246	280	265	251	277	169
4	20 N / 16 S	251	238	316	246	281	267	251	279	169
5	20 N / 20 S	251	239	317	246	283	269	251	281	169

Note: Hyrum flow, in the rightmost column, is shown in MMcfd

The diameter of the northern section of FL22 was determined in a previous analysis (Schwarzenbach 2009). In this analysis, it was determined that a 20-inch “trunk line” from Sunset gate station to Hyrum gate station would best serve Questar Gas customers. This trunk line will provide take away capacity for both gate stations and globally increase average pressures in the northern high pressure system.

Conclusion

The northern section of FL22 will be replaced with 20-inch pipe to stay consistent with FL19 and FL23, as well as provide the pressure per installed diameter. The appropriate replacement diameter for the southern section of FL22 is 12-inch.