Question: Can PMTx handle a Marcellus Shale well that produces about 14 bbl of liquids per mmcf of gas?

Answer: Yes, you can use PMTx for the Marcellus Shale.

1) Many, if not most or even possibly all, gas reservoirs drop out small amounts of liquids at reservoir conditions. Technically, these should be classified as gas condensates. Practically speaking, however, a different set of guidelines are useful to determine whether the liquid dropout is worth accounting for from an engineering perspective.

2) Reservoirs with GCR > 100,000 scf/STB (yield < 10 STB/MMscf) can be treated as dry gas reservoirs, with single-phase flow in the reservoir and neglecting hydrocarbon liquid volumes produced at the surface. According to my recombination calculations, 10 bbl/MMscf of liquid represents about 1% of the volume of the produced wellstream at reservoir conditions.

3) Reservoirs with GCR between 15,000 and 100,000 scf/STB (yield between 10 and 66.7 STB/MMscf) can be treated as wet gas reservoirs, with single-phase gas flow in the reservoir. Reservoir flow and material balance calculations should treat surface liquids by mathematical recombining surface liquids with surface gas volumes to obtain single-phase reservoir gas volumes. According to my recombination calculations, 66.7 STB/MMscf liquid represents about 6% of the produced wellstream at reservoir conditions.

4) Reservoirs with GCR between 3,200 and 15,000 scf/STB (yield between 66.7 and 312.5 STB/MMscf) are gas condensates. Reservoir flow and material balance calculations must account for two-phase flow of gas and condensate in the reservoir. My recombination calculations show that 312.5 STB/MMscf represents about 22.5% of the produced wellstream at reservoir conditions.

Your Marcellus well, at 14 bbls/MMscf, is well within the wet gas category according to the above guidelines, with my recombination calculations showing the liquids represent about 1.3% of the produced wellstream at reservoir conditions.

You can use PMTx ver. 1.1 for wet gases a couple of ways.
Method #1. Input the produced gas volumes into PMTx, then history match and forecast. The forecast will be the predicted separator gas volume. Multiply gas volumes by 14 bbls/MMscf to get condensate volumes for economics calculations. Matched drainage areas and permeabilities from PMTx will be about 1.3% lower than the true values.

Method #2. Calculate (in Excel) the recombined gas volumes to input into PMTx, then history match and forecast. The forecast volumes will be the wellstream gas volumes, including both separator gas and separator liquid. Divide the forecast volume by 1.013 to get separator gas volumes, then multiply separator gas volumes by 14 bbl/MMscf to get condensate volumes for economics. Matched drainage areas and permeabilities from PMTx will be the true values.

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