**Documentation for Map #8: Part B.**

John F Nagle, 1/7/2018

**How #8 was drawn, county by county.**

It is generally easier to start from corners and edges and work toward the center. Start in the South East. CD2 was kept fixed as a VRA district from the present map. Bucks was kept entirely in CD8, but CD8 needs more people than Bucks has. Lehigh and Northampton counties in the Lehigh valley belong together in CD15, so CD8 has to add people from Montgomery and/or Philadelphia. Montgomery county has more than enough people for one CD, and it should have the full CD13. This still leaves extra for CD8, but not enough to complete CD8, so CD8 has to include part of Philadelphia county. One could choose to add precincts from northern Montgomery to CD8 instead of the southern precincts I added, but my choice is more compact. CD1 now includes most of the rest of Philadelphia and is entirely included in Philadelphia county. With CD2 fixed, Philadelphia county has parts that have to be included in CD7. CD 7 keeps Delaware county intact but it needs more people which are most compactly taken from the eastern corner of Chester county. CD6 has the remainder of Chester county, but it needs more people. Rather than splitting Lancaster county, CD 6 is extended into Berks. Lancaster and Lebanon counties are compactly placed in CD16 which needs a few more people which were taken from Berks, thereby not splitting any more counties. York and Adams counties make a natural CD4, but additional people are required and the most compact way includes part of Cumberland county. It seems to me that there are no good alternatives so far.

Now go to the North East. Lackawanna, and Luzerne counties contain the Scranton/Wilkes-Barre area and adding Monroe county makes a district that is only 4000 people short. Coming back to CD15, it needs more people than just Lehigh and Northampton counties. #8 draws those people from Berks. An alternative is described at the end.

Now proceed to the North West corner. CD3 includes many whole counties and splitting Clarion county is the most compact way to achieve population equality. CD5 borders CD3 on its west and it follows the mountains on its east side, including many whole counties except for a bit of Cambria county.

The South West corner naturally includes Greene, Washington and Fayette counties in CD18, but the total population of those three counties is only a little more than half of a CD. CD9 naturally includes Somerset county, so where to obtain the remaining population for CD18 depends on what is done in Beaver, Allegheny, and Westmoreland counties. Allegheny county has too many people for one CD, but according to our principles, such a county should contain at least one complete CD. #8 does this by drawing CD14 in the northern part of Allegheny county which then means that all of Beaver county and a part of Allegheny county makes up CD18, leaving the remainder of Allegheny county and most of Westmoreland county to make CD12. A variant is described at the end.

CD9 now fits naturally between CD18 and CD4, extending northward, including many whole counties but requiring a split which is taken in Centre county on the principal of splitting the more populous county first. CD 10 extends north from CD9, including many whole counties, but requires splitting one of Northumberland or Columbia counties (Montour doesn’t have enough people) and Northumberland was chosen in order to split the more populous county first. All districts are now accounted for except CD17 which consists of the remaining part of the map.

Recapitulation of what I wrote earlier in Part A: The political subdivisions that are split in #8 before splitting precincts are Pittsburgh, Monroeville, South Fayette, Mt Pleasant, Upper Yoder, Carlisle, Upper Augusta, Douglas Twp, and Upper Moreland for a total of 9. Of course Philadelphia has to be split. Splitting precincts adds three more, N.Heidelberg, Cumru #1, and LehighTwp . The latter adds one to the number 7 of counties clearly split.

12 Split municipalities and townships, compared to 68 split in the current PA Act131 plan.

16 Split precincts. Of course, some of the previously split precincts for Congressional elections could be made whole again.

8 Split counties, not counting Philadelphia, Allegheny and Montgomery which have to be split. Each of these three counties contains one full CD. The 8 split counties are Chester, Berks, Cumberand, Northumberland, Centre, Clarion, Westmoreland, and Wayne (one split precinct, not evident in the pdf image map).

List of general criteria:

1.      Hold the current VRA district CD2

2.      Provide contiguity of each district

3.      Obtain equal population within one for all districts

4.      Maximize the number of un-split counties

5.      Maximize the number of un-split municipalities, boroughs and townships

6.      Obtain compactness

7.      Maximize an estimated number of districts responsive to shifts in voters preferences

There are two variants to #8 that I have also considered. In #8b, one draws CD 12 to include all of Beaver county (171000 people) and the western nearly half of Allegheny county, leaving only enough people in Allegheny county to make a whole CD14. Unfortunately, this doesn’t leave enough people in Allegheny county to combine with Beaver to make a CD12 with enough people, so Washington county has to be split. Then, CD18 would have to include the remaining large portion of Washington county as well as that part of Westmoreland county that is in CD12 in the #8 map. While this variant is pleasing to the eye, it loses to #8 because it splits one additional county. It is also nearly one full seat less responsive than #8 because both CD14 and CD18 become safer in opposite directions. There is also an alternative plan #8c in the North East. #8c adds Pike county to CD11 and CD10 is compensated on the border with CD17. Part of Monroe county then has to be split with part added to CD15 while removing all of CD15 from Berks and giving it to CD17. The attractive feature is that Berks would only be split into three parts instead of four, but this variant would split Monroe county and, when exact population equality is applied, it looks like it would split others more than #8. It might also be noted that there is negligible difference in responsiveness between #8c and #8.