Example County Audit, Odd-Year Election

This simple example of a fictional county is intended to give a feel for the sort of ballot-level comparison audit many of us are envisioning for counties with CVRs.

Rough calculations suggest that in 2015, a typical ballot in a typical county in Colorado had about 4 contests on it in an odd-year election. On average, a county had 13 contests in all, many of which only showed up in certain towns or wards in the county.

Only a small number of contests in that county would have been county-wide. These are the ones we're recommending be used to determine the sample size.

Here is a very brief view of an example audit of a typical county, with two county-wide contests used to set the sample size, and 10 others which only show up in cities or wards.

Margin	Contest	Fraction of County
15	County Referendum 10A	100
25	County Referendum 10B	100
5	Springfield Council Ward 1	12
10	Springfield Council Ward 2	12
15	Springfield Council Ward 3	13
100	Springfield Council Ward 4	13
50	Springfield Mayor	50
5	Washington Council Ward 1	6
10	Washington Council Ward 2	6
15	Washington Council Ward 3	6
100	Washington Council Ward 4	7
100	Washington Mayor	25

The closest county-wide contest is County Referendum 10A, with a 15% margin. Assuming we use a 5% risk limit, and there are few discrepancies, we might need a sample size of 46 ballots to achieve the risk limit. We would only need to audit 28 of those ballots for the wider 25% margin in County Referendum 10B.

There are two cities in the county, each with a mayor contest, and council elections in 4 smaller wards. Some of the contests had just one candidate, and are uncontested. We can just ignore those in the audit.

Each ballot in one of those cities will thus have 4 contests on it. Ballots outside the cities will just have 2 contests on them (the county referendums).

Assume Springfield makes up half the county, and Washington is a quarter of the county, and a quarter of the county is unincorporated.

Then about half the ballots sampled would be in Springfield. The mayor race there had a wide margin, so we would probably only need to sample 14 ballots there to settle it. Since we're sampling 46 overall, we'd expect to see about 23 with the Springfield mayor contest on it, and we'd probably be able to “settle” the audit of that contest before the end of the sampling. After it was settled, we wouldn't need to look at that contest on the ballots any more.

The ward contests are closer and each of them shows up less frequently, perhaps 10-15% of the time, so we'd continue reporting them for each audited ballot. At the end of the audit, we might have audited each on 4 or 5 ballots (46 * 12%). We wouldn't have all the evidence that we're really like for them. But it is important to note that we might well have as much or more evidence for them than in most other elections around the country, because we'd have 4 or 5 independent, random sample results for each. That's more than a typical audit of 1% of the precincts in most counties. As noted in some of the other material we’ve submitted, if you only audit one precinct or one batch in a county, even if the precinct or batch has hundreds of ballots in it, you would be limiting the risk less than you would with 4 or 5 individual ballots sampled at random.

The audit results for the city of Washington wouldn't provide quite as much evidence for the outcomes,, but again, they would still be very helpful audits.

The overall effort would involve retrieving 46 ballots, and recording the marks on between 1 and 4 contests on each one.

This is why we have a sense that ballot-level comparison audits in Colorado counties which have CVRs can be excellent, and also very efficient.

Submitted by Neal McBurnett, 2017-03-27, based on insights and input from many of the experts.