

Comments on Preliminary Draft (May 31) of Proposed Election Rules

Mark Lindeman and risk-limiting audit advocates [draft of June 28]

We again thank the Secretary of State's office for the opportunity to make extensive comments on an earlier working draft of the proposed rules. The [preliminary draft of May 31](#) evinces many hours of hard and thoughtful staff work; we are grateful.

We continue to wish that the rule described the scope of audits in 2018 and beyond, but we acknowledge the reluctance to address the longer term before any statewide audits have been completed. In general, in 2017 and in the future, the SoS's office should strive to ensure that contests of the greatest public interest – due to their prominence and/or closeness – are subject to a risk-limiting tabulation audit or at least to some weaker audit that provides some evidence that votes were tabulated accurately. We believe that even in 2017, the rule should explicitly require that risk limits apply to all statewide contests.

Page 6, lines 31-34: **Unaffiliated voters in a primary election.** Following Harvie Branscomb, we suggest adding, “If possible, the ballot style should also be recorded.” The broad goal is to be able to include complete style information in the ballot manifest at the earliest possible date. This goal will require software improvements at this and other stages.

Page 10, line 7: change “inclduing” to “including”.

Page 15, lines 15-17: **Definition of “audited contest.”** (1) The current definition, in context, appears to preclude opportunistic auditing of contests that are not subject to a risk limit – even though the text later (page 19, lines 18-19) appears to endorse opportunistic auditing. It seems possible, although confusing, to define “audited contest” as entailing a risk limit, while also providing for other contests to be audited to the extent they appear on ballots in the audit sample. The alternative is to define terms such that some “audited contests” have a risk limit and others do not.

(2) “The audited contest determines the number of ballots that must be examined and verified during the RLA.” This seems wrong or confusing, because several contests may be audited simultaneously (using the same sample), and the number of ballots that must be examined and verified may depend on all these contests and any discrepancies found therein. It seems easiest to remove this sentence, since it is not definitional. In the alternative (and assuming that only contests with a risk limit count as “audited contests”), it would not be far off to say “The audited contest(s) determine the expected number of ballots...” or perhaps “the minimum number of ballots.”

Page 15, line 23: **Definition of “comparison audit.”** (1) Change “and then compared” to “which are then compared” or otherwise clarify what is being compared to what. (2) For parsimony and clarity, remove “tabulation as reflected in the”. (3) Consider adding “as reported to the Audit Board prior to the selection” (thus briefly recapitulating the correct sequence of events).

Page 15, lines 25-33: **Definition of “diluted margin.”** (1) Cleaner would be “the smallest reported margin – that is, the margin in votes between the reported contest winner with the

fewest [not “least”] votes in the contest and the reported contest loser with the most votes in the contest.” (This is a definition of “smallest reported margin”; there is only one margin between these two candidates/positions.) Similarly, in the example, “least number of” and “most number of” should be just “fewest” and “most.”

(2) This definition is incorrect or incomplete. We see no need to define “diluted margin,” given that the term isn’t referenced anywhere else in the draft rules. However, if it seems appropriate to define the term, a complete definition would add the statement from later in the “Gentle Introduction” paper: “For simultaneous audits of multiple contests, the diluted margin is the smallest reported margin in votes, divided by the total number of ballots on which at least one of the contests appears.” (Notice how this differs from “the number of ballots counted in that contest,” as in the draft definition.)

Here “simultaneous” means “using one sample”: for instance, using a statewide sample to audit both a statewide contest and a county contest. Although simultaneous samples are not always most efficient, they often are. Note also that an audit of (say) a countywide contest can begin with a statewide sample, then expand that sample within the county where the contest appears.

Page 15, lines 34ff.: **Definition of “margin overstatement.”** This definition is incorrect or incomplete. In brief, any discrepancy that increases the margin between *any* reported winner and *any* reported loser (in the same contest, of course!) – not just the winner with the fewest reported votes vis-à-vis the loser with the most – is a margin overstatement.

If this were not so, then (for instance) the reported top vote-getter in a vote-for-two contest would be exempt from margin overstatements, no matter how many votes were reported incorrectly! (The “Gentle Introduction” paper sketches how the “maximum relative overstatement of pairwise margins” (MRO) measure can be used to consolidate comparisons across multiple pairs of winners and losers, whether within one contest or across multiple contests.)

Page 16, lines 4-14: **Definition of “margin understatement.”** Similarly (but distinctly), “margin understatement” – as defined in the literature summarized by “Gentle Introduction” – refers to a discrepancy that reduces the margin between *every* winner and *every* loser (in the same contest), not just between the winner with the fewest votes and the loser with the most votes. Starting from the draft definition: “...reveals that every reported contest winner received more votes than the voting system’s interpretation..., or that every reported contest loser received fewer votes....” Thus, margin understatements are unusual in comparisons across multiple winners and losers.

Some discrepancies are neither margin overstatements nor margin understatements. We recommend changing the reporting requirement (see below) so that all discrepancies are reported, even if the definitions are corrected and retained.

Page 16, lines 17-18: **Definition of “risk limit.”** The phrase “incorrect reported outcome” (and the associated “detected and corrected”) is misleading in that “incorrect” has a specific yet unstated technical meaning here. In the words of the RLA definition, “incorrect” here means that

“the outcome of a full hand count would differ from the reported outcome.” An election outcome could be “incorrect” in various ways that a vote tabulation audit is powerless to detect and correct. Perhaps the easiest way to clarify this definition is to say that risk limit “means the pre-specified minimum chance referenced in the definition of ‘risk-limiting audit.’” Harvie Branscomb has proposed two valid alternatives on p. 19 of his [published comments](#) (markup of p. 16).

Page 16, lines 19-23: **Definition of “risk-limiting audit.”** While “risk-limiting audit” has become a term of art, a majority of us agree with Harvie Branscomb that it would be more accurate to refer to these audits as risk-limiting tabulation audits, because they only check the tabulation, and not, for instance, whether all ballots are accounted for. Election audits can and ideally should address processes beyond vote tabulation, such as eligibility verification, that also are subject to measurable errors. Audits that check whether the paper trail is trustworthy, as a prerequisite to risk-limiting audits of the results against the paper trail, are commonly called “compliance audits.” If the paper trail is not trustworthy, a risk-limiting audit cannot be relied upon to correct incorrect outcomes. All that said, the draft rule language does comport with the current statutory definition of risk-limiting audits, and defines them accurately without overpromising – for instance, by vaguely referring to “incorrect outcomes” as in the current draft definition of “risk limit.”

Page 16, lines 29-32: **Methods that counties are required to use.** Note that an audit of a statewide or other multi-county contest may combine results from comparison auditing in some counties and ballot polling auditing in other counties, using risk calculations different from those for “pure” comparison or ballot polling audits. Such an audit is either a comparison audit or a ballot polling audit from the standpoint of a particular county, but a distinctive hybrid from the SoS office’s perspective.

Page 17, line 13: **Audit board.** We agree with Harvie Branscomb’s addition, with one slight adjustment: “...but shall not interpret voter marks. To the extent possible, the audit board shall not include original adjudicators.” (It may be desirable to clarify by adding further: “whose work is reflected in the Cast Vote Records.”) These provisions underscore the desired independence of the audit board’s work from the original tabulation.

Page 17, lines 35ff.: **CVR export verification.** (1) For grammatical agreement, “Counties...” should read “Each county...” (2) The draft language implies that all these conditions will invariably be met, but this is not self-evident. Is the intent that any discrepancies can and must be resolved before the comparison audit uploads? If so, this should be made explicit. If it seems possible that some discrepancies will *not* be resolved, then there should be a reporting and investigation requirement. (It may also be desirable to report discrepancies that are resolved, but we have no considered group opinion on that point.)

Page 18, line 10: “must apply a hash value to” seems garbled; this could read “must calculate a hash value for.” (One applies a hash function to calculate a hash value.) This hash value should also be published, so that it can be used by outside observers to confirm that the export file is unchanged.

Page 19, lines 19-20: **Selection of audited contests: opportunistic auditing.** We support “opportunistic auditing” of contests that appear on ballots that are part of the RLA sample(s). Contests that are audited opportunistically are not subject to a risk limit, but including them in the audit does provide valuable evidence about whether they were tabulated accurately. We recommend defining the term or otherwise clarifying that some contests will be audited opportunistically even though they are not subject to a risk limit. Indeed, we recommend auditing *all* contests (except for uncontested ones) opportunistically, optionally providing for the possibility of ending an opportunistic audit of a contest if a very low measured risk has already been attained. (Note that if a local contest is subject only to opportunistic auditing, it may not be known in advance whether it will appear in the audit sample.)

As noted before, the specific language would depend in part on whether the term “audited contests” is reserved for contests subject to a risk limit. If so, then instead of alluding to opportunistic auditing as point (4) of five pertaining to “selection of audited contests,” a separate paragraph – perhaps a separate subsection – should state that vote markings in all contests (except uncontested ones?) that appear in ballots in the random sample will be recorded and those contests will be audited, with whatever caveats may apply. This point can be revisited at 25.2.3(b) on conducting the audit (page 20, lines 18-29).

We also recommend adding language to the effect that “County audit boards may select additional contests to audit, using a risk limit or sample size of their choice.”

Page 19, line 22 and following: **Number of ballots to audit.** (1) As we mention above, if a contest selected for RLA spans both ‘CVR counties’ and others, the risk calculations – and therefore the size of the audit sample – will employ hybrid methods that don’t appear in “Gentle Introduction” and the existing web tools. (An alternative is to use the samples in CVR counties in ballot-polling computations rather than comparison computations, which may be very inefficient when contest margins are small.) We recommend specifying – perhaps at the end of this paragraph, after the references (i.e., after page 20, line 4) – language similar to the following: “Any additional statistical methods used for auditing will be published by the Secretary of State no later than 30 days preceding the election.” This provides time for hybrid methods to be optimized if appropriate as operational details of the 2017 election become clearer. It also allows the Secretary of State to substitute more efficient RLA methods if such methods are developed in the future. For instance, recently developed methods for conducting ballot-polling or comparison RLAs based on sampling ballots without replacement may increase efficiency.

(2) We also recommend setting a minimum audit size for each county, or in the alternative, reserving the authority to set a minimum size. A minimum audit size, which need not (and should not) be onerous, would provide some predictability for local election officials and for the public. An example is [Harvie Branscomb’s](#) proposal: “In no instance shall a county be directed to audit fewer than 16 ballots.”

Page 20, lines 5-12 (and 38-41): **Random selection of ballots to be audited.** The language envisages that the Secretary of State’s office will select an initial list of ballots to be audited, and will produce additional lists as necessary. This is an unnecessary complication. The SoS can

produce a comprehensive (typically statewide) list of as many ballots as would ever be included in a random sample before resorting to a full hand count – subdivided by county – and indicate the minimum number of ballots to be audited initially in each county. (It is a subtle point, but the comprehensive list helps to determine how many ballots should be audited in each county at any point in the audit.) Each county then can plan ahead as conservatively as it wishes, or simply consider one ballot at a time.

For instance, here is an adaptation of Harvie Branscomb’s proposal with minor edits: “The Secretary of State will create a list of randomly selected ballots for possible audit throughout the state.... The Secretary of State will notify each county of, and publish on the Audit Center, this list and the corresponding list of auditable ballots in each county, as well as the minimum number of ballots for each county to audit....” Then lines 40-41 could state: “...the Secretary of State will designate additional numbers of ballots to be audited in each affected county [or, each county in which ballots containing the audited contest were cast].”

Page 20, lines 18-29: **Audit board reporting of each ballot.** (1) We recommend clarifying that the “voter markings or choices” to be reported may include contests being audited opportunistically, i.e., not subject to a risk limit. (This may have been clarified under “Selection of audited contests” above.) So, for instance: “...report the voter markings or choices in each contest (whether or not that contest was selected to be audited), except for uncontested contests, using the RLA tool....”

(2) We suggest that audit boards at least be encouraged, if not required, to submit color photographic images of each ballot selected for audit, via the RLA tool. These photos – taken manually, e.g. with a camera, rather than using scans produced by the voting system – would be valuable in subsequent reviews of the audit process and the functioning of the voting system. We think the benefits justify the effort of capturing and submitting these images.

Page 20, lines 35-36: **Reporting margin overstatements and understatements.** As noted earlier, some discrepancies are neither margin overstatements nor margin understatements. All discrepancies should be reported.

Page 20, after line 41: **New subsection on audit reporting.** Along with the audit results, we recommend systematically gathering information on how the audit was conducted. For instance, a slight revision of a suggestion by Harvie Branscomb: “[At/By a particular time], the Audit Board shall submit a report of actions taken and exceptions encountered, including any divergence from expected or standard practice, and a detailed accounting of workload including numbers and hours of any audit personnel.”