

## MEMORANDUM

TO: Scott Doyle, Chair, Colorado ERC Subcommittee on Technology and Auditing  
FROM: Arlene Ash, School of Medicine, Boston University; Steve Pierson, Director of Science Policy, American Statistical Association  
RE: Recommendations to ERC

Thank you for this opportunity to review your recommendations on auditing. We applaud your determination to use risk-limiting audits and thank you for incorporating many points from our January 10 document. In general, we urge that the Commission continue to refer to "Principles and Best Practices for Post-Election Audits" (<http://electionaudits.org/principles/>) for further guidance. At this time, we also suggest that the following specific recommendations be written into the law. Note that our first two points below correspond to points 3 & 5 from the January 10 document.

We, a working group affiliated with the American Statistical Association, remain willing to provide input to refine and implement these recommendations.

***Conduct audits within counties, but coordinate audits statewide:*** All counties should report unofficial results, by audit unit,<sup>1</sup> and the Secretary of State should publish human-readable and machine-readable unofficial contest-wide results, including (for each audit unit) the number of votes for each candidate (or choices on ballot propositions), undervotes and overvotes, within a few days of the election. Any state-wide contest that is audited should be audited state-wide (that is, coordinated across all counties in the state).

***Allow for targeted audit units:*** A limited number of additional audit units should be added to the audit process, in addition to those randomly selected, to increase audit effectiveness and public confidence. Legislation should allow for a range of stakeholders, such as candidates, issue committees or parties, in addition to election administrators to specify such units. Audit units might be targeted because of major election-day problems, preliminary results that deviate markedly from historical voting patterns, or simply to improve the audit's efficiency.

***Purpose of Audit (and possible full contest-wide hand-counts):***

The current document says: "*If audits are effective, then the public can have confidence in the outcome of elections even if the voting systems used are imperfect, because a statistically valid audit can detect and be used to correct human and voting system errors.*" [our emphasis]

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<sup>1</sup> An audit unit is defined as a clearly-specified physical batch of votes from a particular counting machine or precinct or other grouping rule for which preliminary results of all contests are publicly tallied and posted, such that the sum of the tallies from all audit units is equal to the preliminary vote tally for each contest. (Adapted from "Principles and Best Practices for Post-Election Audits": <http://electionaudits.org/principles/>).

However, an audit by itself can at most correct errors in the precincts and contests audited. Correcting an incorrect *election outcome* typically requires a contest-wide hand recount. The purpose of the audit is to tell us when this is needed. Audits can lead to other corrections and improvements beyond the audit sample, but only to the extent that officials and others take actions in response to the audit findings.

Suggested alternative text: "*Effective audits can provide public confidence in election processes and outcomes even though the voting systems are imperfect. Statistically valid audits: can detect human and voting system errors; are very likely to lead to full hand counts when the outcome suggested by the preliminary tally is incorrect; and, can inform ongoing efforts to correct errors and improve election processes.*"

**Standards for hand-counting:** Hand-count procedures should use standard methods that provide high accuracy through observation by several pairs of eyes. (Research should include published methods used in states or countries that rely extensively on hand counting.) Training should be provided for audit personnel based on written and visual materials provided by the SoS or audit board.

**Outside oversight and advice:** Audits should have independent oversight by experts not involved in conducting the election. Audit procedures should be specified with advice and active participation of professional statisticians, auditors, and other experts familiar with election auditing issues.

**Address confidence level:** Under "Preliminary Audit Recommendations" on p. 4, the current text for point (b) called for "a definition of the confidence level required, e.g. 90% or some lesser confidence level." We believe it is premature to legislate specific risk levels for election auditing – and, more particularly, it would be a mistake to specify an arbitrary cap, such as 90%.

Alternatively, we suggest: b) Public release of the estimated level of risk-limitation achieved by the audits actually conducted for each contest, including the data, methods and assumptions used to make these estimates.