The "Voter Confidence & Increased Accessibility Act of 2009" (VC Bill)

March 31, 2009

This article describes beneficial features of the Voter Confidence (VC) bill for election integrity, transparency, verifiability, and accuracy; and then makes seven (7) amendment suggestions to strengthen the bill's post-election auditing provisions

BENEFICIAL FEATURES OF THE VOTER CONFIDENCE BILL

Requires voter-marked paper ballots

"voting system shall require the use of an individual, durable, voter-verified, paper ballot … that shall be marked … by the voter"

"…individual, durable, voter-verified, paper ballot means a paper ballot marked by the voter or a paper ballot marked through the use of a non-tabulating ballot marking device or system." Durable is defined as "withstanding multiple counts by hand without compromising the fundamental integrity of the ballots" and retaining "the information marked or printed on them for the full…preservation period of 22 months."

All jurisdictions using paperless touch-screen e-ballot DREs shall replace such systems by 2010. Jurisdictions using DREs with paper roll ballot records shall replace them by 2016.

In other words, this bill entirely phases out unverifiable electronically cast ballots by 2016.

Requires voter-marked paper ballots at all polling locations by 2010

For any jurisdiction not yet offering voter-marked paper ballots (such as jurisdictions using DREs w/ paper roll ballot records until 2016), jurisdictions "…shall offer each individual who is eligible to cast a vote in the election at the polling place the opportunity to cast the vote using a blank pre-printed paper ballot which the individual may mark by hand and which is not produced by the direct recording electronic voting machine…" and this ballot "shall be counted and otherwise treated as a regular ballot… not as a provisional ballot…" and "prominently displayed at each polling place a notice that describes the obligation of the official to offer individuals the opportunity to cast votes using a pre-printed blank paper ballot."

Individuals may file complaints and have a private right of action

"A person who is aggrieved by a violation…which has occurred, is occurring, or is about to occur may file a written, signed, notarized complaint with the Attorney General describing the violation and requesting the Attorney General to take appropriate actions under this section." And "any person who is authorized to file a complaint…who seeks to enforce the individual's right to a voter-verified paper ballot, the right to have the voter-verified paper ballot counted in accordance with this Act, or any other right under subtitle A of title III...may file an action…to enforce the uniform and nondiscriminatory election technology and administration requirements…"

Requires manually counting 3, 5, or 10% of all precincts in post-election audits, allowing and giving incentives for using a more scientific alternative mechanism for conducting post-election audits that are approved by the National Institute of Standards and Technology (NIST)

Requires the entity conducting the audit to meet the GAO independence standard

Unlike today's DRE voting machines, the Voter Confidence bill requires ballot secrecy

"voting system shall not preserve the voter-verified paper ballots in any manner that makes it possible, at any time after the ballot has been cast, to associate a voter with the record of the voter's vote"

(Note: Today's electronic and paper roll ballot records are stored sequentially and have time stamps, enabling election officials to pair a voter's ballot with the voter with 90+% accuracy.)

Paper ballots are the official ballot

"The individual, durable, voter-verified, paper ballot … shall constitute the official ballot and shall be preserved and used as the official ballot for purposes of any recount or audit conducted with respect to any election for Federal office…"

Recounts of Federal elections shall count ballots by hand

"…shall be counted by hand in any recount or audit conducted with respect to any election for federal office."

Paper ballots are the true and correct record of votes cast

"In the event of any inconsistencies … between any electronic vote tallies and the vote tallies determined by counting by hand the individual, durable, voter-verified, paper ballots … shall be the true and correct record of the votes cast."

Requirements include absent uniformed services voters and overseas voters

"shall applied to all ballots cast in elections for Federal office,…"

In the event of damaged paper ballots the electronic tally may not be the sole basis

If there is "clear and convincing evidence… that the paper ballots have been compromised…and that a sufficient number … have been so compromised that the result of the election could be changed…the electronic tally shall not be used as the exclusive basis for determining the official certified result."

Requires accessible paper ballot verification

"at least one voting system … allows the voter to privately and independently verify the permanent paper ballot…in accessible form, of the printed or marked vote…"

Requires a study overseen by the National Science Foundation (NSF) of accessible ballot verification for voters whose primary language is not English and for voters with disabilities

"to enhance the accessibility of paper ballot voting and verification mechanisms for individuals with disabilities, for voters whose primary language is not English, and for voters with difficulties in literacy."

Funds research for development of "election-dedicated voting system software".

Requires that any technology developed under its grants are public property

"Any technology developed with the grants made under this section [accessible ballot verification] shall be treated as non-proprietary and shall be made available to the public, including to manufacturers of voting systems." and any technology "developed with the grants [for election-dedicated voting system software]…shall be treated as non-proprietary and shall be made available to the public, including to manufacturers of voting systems."

Allows use of funds for enforcement of disability access

Prohibits use of election-dedicated voting systems not certified by the State

"A voting system…may not at any time during the election contain or use any election-dedicated voting system technology which has not been certified by the State and deposited in an accredited laboratory…to be held in escrow and disclosed in accordance with this section."

Requires public disclosure of voting system technology (w/ a NDA)

"…disclose the technology and information regarding the technology to…a qualified person." A 'qualified person' includes "government entities with responsibility for the administration of voting and election-related matters", "a party to pre- or post-election litigation challenging the result of an election or the administration or the use of the technology…", "a person who reviews, analyzes, or reports on the technology solely for an academic, scientific, technological, or other investigation or inquiry concerning the accuracy or integrity of the technology."

Prohibits wireless communications devices in voting systems

"No system or device upon which ballots are programmed or votes are cast or tabulated shall contain, use, or be accessible by any wireless, powerline, or concealed communication device" (except for infrared devices used in optical scanners that are certified by the State and "cannot be used for any remote or wide area communications")

Prohibits Internet voting

"No system or device upon which ballots are programmed or votes are cast or tabulated shall be connected to the Internet at any time."

Requires public disclosure of secure chain of custody for ballots and machines

"shall document the secure chain of custody for the handling of all software, hardware, vote storage media, blank ballots, and completed ballots used" and "make the information available upon request to the Commission" and "The Commission shall make information provided to the Commission …available to any person upon request."

Prohibits conflicts of interest of Federal testing labs & establishes a process for voting system testing to meet Federal Voluntary Voting System Guidelines (VVSGs)

The voting vendors pay the US Election Assistance Commission who in turn choose and pay the laboratories which are prohibited from receiving any additional funds from the vendors, etc. An expert designated by the Commission may observe any testing.

Requires public disclosure of the VVSG test protocols, all communications with the vendors, and to the Election Assistance Commission (EAC) and the results of the testing

Requires the EAC to promptly notify Congress, State election officials, and the public when a testing laboratory accreditation is revoked, suspended or restored or experiences a security failure

Funds the replacement of voting systems in non-conforming precincts

In other words, funds the replacement of DRE voting machines with optical scanners and non-tabulating ballot marking devices.

Requires States to reimburse local jurisdictions for costs for conforming to the requirements *(Thus increasing local control by removing the ability of State Election Directors to force all Jurisdictions in their State to Purchase the Same Voting System in order to be Reimbursed)*

> "…certifies to the Commission that the State will reimburse each unit of local government in the State for any costs the unit incurs in carrying out the activities for which the payment may be used"

AMENDMENTS COULD IMPROVE THE VOTER CONFIDENCE BILL

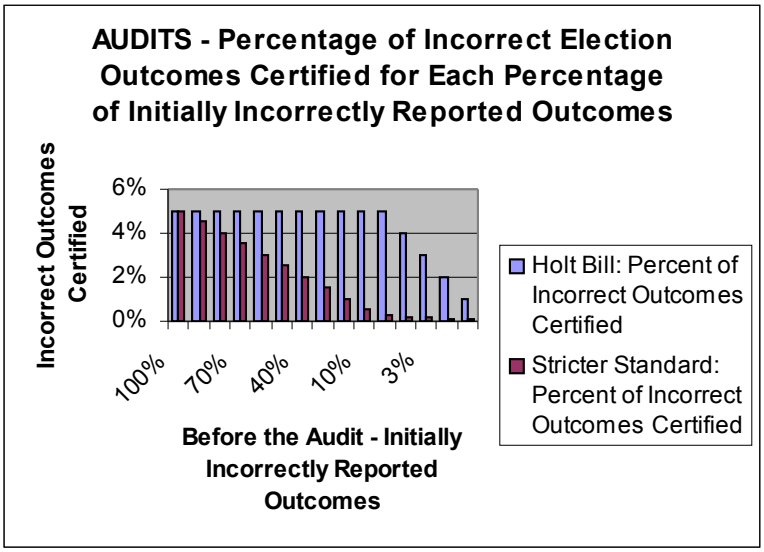
1. Raise the bill's Federal standard for alternative audit mechanisms

The bill states:

> "SEC. 322. NUMBER OF BALLOTS COUNTED UNDER AUDIT …(b) USE OF ALTERNATIVE MECHANISM… (2)the National Institute of Standards and Technology shall ensure that the audit procedure will have the property that for each election the reported election outcome will have at least a 95% chance of being consistent with the election outcome that would be obtained by a full recount."

Problems: The phrase "for each election the [FINAL] reported election outcome will have at least a 95% chance of being consistent with the election outcome that would be obtained by a full recount" can be interpreted in three different ways that all having significant problems.

One interpretation of this federal standard language is that "at least 95% of election outcomes must be correct" (or at most 1 in every 20 election outcomes be incorrect) when finally reported. This standard is very lax and differs starkly from a more stringent standard that requires that "at least 95% of initially incorrectly reported election outcomes must be detected and corrected". This chart shows the difference between the percent of incorrect final election outcomes that are certified under these two standards in the case that 100% to 1% of initially reported election outcomes were incorrectly reported prior to the audit. The blue bars represent the maximum acceptable rate of incorrectly certified election outcomes under Holt's current standard. The red bars represent the maximum acceptable rate of incorrectly certified election outcomes under a higher standard.



Examples

If 50% of initial unaudited outcomes are *incorrectly* reported then:

- Holt's standard expects that at most 5% or 1 in every 20 final incorrect outcomes are certified.
- The higher standard would expect that the number of final incorrect outcomes certified is at most 2.5% or 1 in every 40 certified.

If 20% of initial unaudited outcomes are *incorrectly reported* then:

- Holt's standard expects that at most 5% or 1 in every 20 final incorrect outcomes are certified.

- The higher standard would Expect that at most 1% or 1 in every 100 of Final Incorrect Outcomes are certified.

If 5% of initial unaudited outcomes are *incorrectly* reported then:

- Holt's standard expects that at most 5% or 1 in every 20 final incorrect outcomes are certified.
- The higher standard would expect that at most 0.3% or 3 in every 1,000 of final incorrect outcomes are certified.

A second possible interpretation of the Holt bill federal audit standard language is that the audit sample size and discrepancy analysis must be consistent with what a full hand would show in at least 95% of cases (meaning that in at most 5% of cases the audit sample size and discrepancy analysis would be inconsistent with what a full hand count would show.) This is a reasonable interpretation of Holt's bill language because the final reported outcome is determined by the audit procedures (sample size, discrepancy analysis, and expansion algorithm applied to the initially reported outcome.)

There are two cases where audit procedures are inconsistent with what a full hand count shows and Holt's bill requires that these cases must occur in less than one in every 20 cases:

1. If the full hand count would show an Initially reported *incorrect* outcome and the audit says to *certify* the outcome, or
2. If the full hand count would show a *correct* outcome and the audit says to *expand* the audit (inconsistent with the full hand count).

There are Four possibilities	*Column 1.* **Initially reported election outcome is Incorrect**	*Column 2.* **Initially reported election outcome is Correct**
Row 1. **The audit is consistent with the full hand count**	At least 95% chance that audit is Expanded when the initially reported outcome is incorrect.	At least 95% chance that the audit says to Certify when the initially reported outcome is correct.
Row 2. **The audit is *not* consistent with the full hand count**	At most 5% chance that the audit says to Incorrectly Certify when the initially reported outcome is incorrect.	At most a 5% chance that the audit Unnecessarily Expands the sample size when the initially reported outcome is correct.

Thus the Holt federal standard, as interpreted this way, sets the standards shown above. The standards set in Column 1 are desirable. However, the requirements set in column 2 will create problems such as:

1. The requirements in column 2 have no known translation directly into any mathematical formula for an audit sample size or for an algorithm for analyzing audit discrepancies,
2. The requirement in column 2, row 2 sets an upper limit for the chance of expanding the audit sample size that will conflict in some cases with the requirement set in column 1, row 1.
3. The requirement in column 2, row 1 sets a lower limit for the chance for certifying an initially correctly reported outcome without expanding the sample size that will conflict in some cases with the requirement set in column 1, row 2.

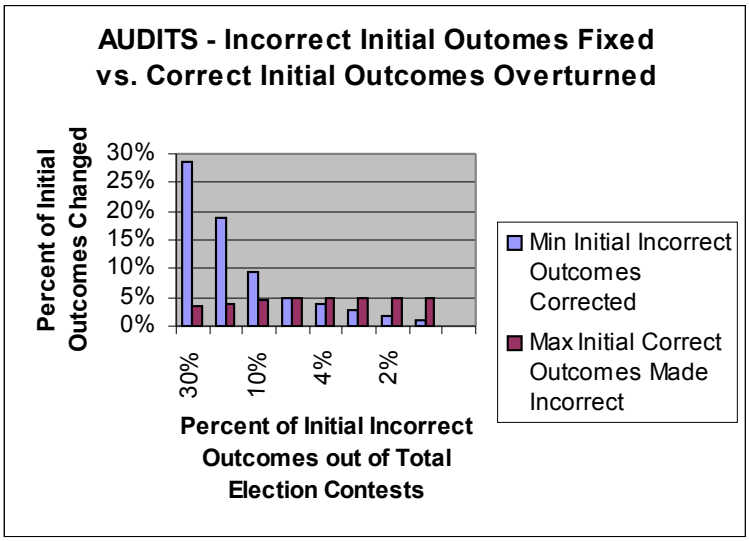
This interpretation - that no more than one in every 20 times may an audit be expanded when the full hand count would show that the initially reported outcome was correct – could be used to claim that audit procedures violate federal law whenever audits are found to expand audit sample sizes more than one in

20 times in cases when the initially reported outcome is found to be correct. This would put downward pressure on auditors not to expand audits in cases when election outcomes are in question, and conflicts with any requirements that incorrect election outcomes are detected with at least 95% probability. Would we put similar limits on the effectiveness of audits in banking or business by requiring that auditors must show that there is less than a 5% chance of doing any unnecessary work?! Yet of course auditors can not know in advance of doing the work whether or not the work is necessary or not, so how will this standard be enforced? Of course we would not make such a requirement in any other field! If interpreted this way, the bill's federal standard would be very likely to be mathematically impossible to implement due to its conflicting requirements and its concern for ensuring that there is a very low probability for expanding the audit sample size in cases when it turns out that the initial election outcome was correctly reported. This standard could make it very difficult, if not impossible for States to adopt procedures that would improve upon, the overall effectiveness of the bill's 3, 5, 10% audit rates.

A third possible interpretation of Holt's alternative mechanism language that is proposed by the language's supporters is to interpret the language as if it says "that for each initial reported election outcome, the final reported election outcome will have at least a 95% chance of being consistent with the election outcome that would be obtained by a full recount", thus requiring that the audit provides that:

- every election with an *incorrect* initial outcome has at least a 95% chance of having a correct final outcome, and
- every election with a *correct* initial outcome has at least a 95% chance of having a correct final outcome. Therefore Holt's alternative audit mechanism language allows up to a 5% chance that any correct initial outcome will be overturned to then have a final incorrect outcome (the conclusion that probably no one wants to have.)

The red bars in the chart below shows that as the percentage of initial incorrect outcomes before the audit varies, the maximum percentage of initial correct outcomes that may be turned into *incorrect* final outcomes as a result of audit procedures rises to 5% of all election outcomes. While we would expect that an audit would be unlikely to change an initial correct election into an incorrect final outcome, setting a federal standard that allows for this is very surprising! How would the results from such audits be defended when challenged in court with election officials swearing on a bible that their initial machine counted results are 100% correct?



This interpretation of Holt's language allows for the audit procedure to possibly *overturn more correct election outcomes than it corrects incorrect election outcomes* in cases when the rate of initial incorrect outcomes falls below 5% of all outcomes! By failing to apply any constraint with respect to the correctness or incorrectness of initial outcomes Holt's federal audit standard does not discriminate between initially correct outcomes (to be left alone) and the initially incorrect outcomes (to be addressed by the audit process- either to be corrected or, in an acceptably small number of cases, fail to be corrected). Will the public and the US Congress be willing to invest the time, effort, and money on a post-election audit procedure that is allowed to produce a net increase in incorrect final election outcomes?

In conclusion, *any* possible interpretation of Holt's current language for a federal alternative audit mechanism for post-election audits seems to have serious flaws.

Amend the bill to require what most election auditing experts recommend, i.e. that a higher standard be used that would require that any alternative audit mechanism shall provide at least a 95% chance that in every election whenever a preliminary *election outcome is incorrectly reported, the audit will lead to a full hand count.*

Or alternatively, that any alternative audit mechanism shall provide at least a 95% chance that in every election whenever a preliminary *election outcome is incorrectly reported, the audit will detect the incorrect outcome, correct it, and say to certify the correct outcome.*

2. Allow more effective scientific random selection methods for audits

"SEC. 324. SELECTION OF PRECINCTS of the bill states:

> "the selection of the precincts … shall be made … on an entirely random basis in which all precincts in a Congressional district have an equal chance of being selected… except that at least one precinct shall be selected at random in each county, with additional precincts selected by the Election Auditor at the Auditor's discretion.

a. **Problem 1**: This language Prohibits effective random Selection of Audit Units

The requirement that every audit unit must have an "equal chance of being selected" prohibits more effective random selection methods that weight the selection of audit units by the amount of error that these audit units have potential to contribute to the election results.

Amend the VC bill to require that random selection of audit units shall be made requiring the use of: "probability sampling methods including simple random samples or stratified random samples".

b. **Problem 2:** This language reduces the standard for detecting election fraud

The bill's current requirement for selecting one audit unit per county reduces the chance of detecting vote miscount in the more urban counties. Here is why:

In many states, the number of total counties or election jurisdictions will often approach or exceed the number of audit units required by the bill's audits. Thus under the existing language, in many instances only one (1) precinct per county would be audited, giving any perpetrator a roadmap for how to undetectably cause an incorrect outcome by simply manipulating vote counts in the more urban counties.

For example, in some States such as Utah, half of the entire population lives in one county (Salt Lake County), having thousands of precincts, so that such a plan for selecting precincts would mean that any fraudulent miscount in this most urban county would have a larger probability of escaping detection under the bill's current selection requirements.

This is because requiring that one precinct or audit unit is selected in each county means that the bulk of precincts/audit units are not chosen at random from the entire pool of all precincts/audit units in the election contest, negating the predicted confidence for detecting incorrect election outcomes for this sample size.

While it is great to require the selection of at least one audit unit in each separately administered election jurisdiction, such selections must be done in addition to, not in place of, the random selections, or the effectiveness of the audit to detect vote fraud significantly diminishes.

Amend the bill to require random selections of audit units in the entire pool of audit units in the election contest district

> Require that the entire amount of the 3, 5, or 10% of total audit units, depending on margins of victory, shall be selected randomly from the entire district(s) in which an election contest is held and then in addition, AFTER the random selections are made, one precinct per separately-administered election jurisdiction should be randomly selected from any jurisdiction that had no precincts selected during the prior random selection of the 3, 5, or 10% of audit units, or alternatively

Alternatively Amend the bill to Require random selection of at least 3, 5, or 10% of audit units, depending on margins, within each separately-administered election jurisdiction within each state, being sure to round up any fractions to the next whole number.

c. Problem 3: Not all elections are administered by counties. For instance, Connecticut is administered by townships, Louisiana is administered by parishes, and some States such as Virginia and Maryland have mixed election administration – sometimes by counties and sometimes by cities.

Amend the bill to replace the use of "county" with "separately-administered election jurisdiction".

3. Define "margin of victory"

The bill requires post-election audit sample sizes to be decided based on the "margin of victory" but does not define what "margin of victory" is.

Problem: As others have noted, the denominator we must accurately use: "total votes cast (i.e. total cast for each candidate including write-in, plus under and overvotes, otherwise the calculated victory margin used for the threshold will be unreasonably inflated in case of a high percentage of undervotes, for example).

Whenever there are lots of undervotes, spoiled ballots, or over-votes the sample size will be inadequate to achieve a desired confidence in election outcome accuracy if the margin of victory is miscalculated by using for the denominator the number of votes counted rather than the number of ballots cast that were eligible to vote in the contest.

Amend the bill to define "margin of victory" as:

(#total votes for winner - #total votes for closest runnerup) divided by (#total ballots cast that were eligible to vote in the contest)

4. Remove the exception to auditing for certain elections

The bill states:

> EXCEPTION FOR CERTAIN ELECTIONS.—A State shall not be required to administer an audit of the results of an election for Federal office under this subtitle if the winning candidate in the election—
> ''(A) had no opposition on the ballot; or
> ''(B) received 80 percent or more of the total number of votes cast in the election, as determined on the basis of the final unofficial vote count.

Problem: Without any prior independent audits, this provision provides a loophole that perpetrators could use to avoid detection of vote fraud by producing an 80% margin. Although it may be unlikely, even 80% margin election contest could be fraudulent, and political events can change public opinion and voting patterns. A randomly selected one (1) audit unit sample size is likely to be adequate for all such contests to check the election outcome accuracy.

Amend the bill to require that one (1) randomly selected precinct/audit unit shall be audited for election contests having at least an 80% margin of victory, or

Alternatively amend the bill to exempt all contests from being audited in the case that the same candidate in the same district won with at least 80% margin of victory in a prior election that was audited under this bill's provisions

5. Require states to publicly publish election results in usable format

The bill states:

> ‘‘(1) Within 24 hours after the State announces the final unofficial vote count (as defined by the State) in each precinct in the State, the Election Auditor shall—
> ‘‘(A) determine and then announce the precincts or equivalent locations (or alternative audit units used in accordance with the method provided under section 322(b)) in the State in which it will administer the audits; and
> ‘‘(B) with respect to votes cast at the precinct or equivalent location on or before the date of the election (other than provisional ballots described in paragraph (2)), begin to administer the hand count of the votes on the voter-verified paper ballots required to be used and preserved under section 301(a)(2)(A) and the comparison of the count of the votes on those ballots with the final unofficial count of such votes as announced by the State.

Problem 1: The bill assumes that all States publicly publish state-wide vote counts in a uniform machine and humanly-readable format that would permit the audits to begin within 24 hours of the public posting of election results. For instance, States like CO and UT do not currently even publicly post timely and unofficial state-wide precinct-level vote counts and each county's precinct-level report of vote counts is reported in entirely different formats with different orderings of candidates and contests and reported data. (It took me three full days after having made my open records request, paying $25, and waiting to receive the CD, to simply rearrange all the data for all of Utah's separate counties to create one spreadsheet with one worksheet containing all the precinct-level vote count data from the separate 29 counties' data due to the various formats for the data. This is despite the fact that all 29 counties in Utah use the same Premier/Diebold voting system.)

Amend the bill to require the Chief State Election Official to, in a timely fashion, 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 and also as soon as possible after any late-counted ballots are counted. Any state-wide contest that is audited should be audited state-wide (that is, coordinated across all counties in the state).

Problem 2: Twenty-four (24) hours may be too short a time period after reporting the state-wide audit units to begin the manual counts unless these audit units are reported in a uniform format statewide. This time period may be unworkable today for most states – although this time period is a good goal and should become possible over time.

For using alternative more scientific, efficient, effective audit mechanisms, the 24 hours may not currently allow sufficient time to obtain a usable standard report of audit units from, to calculate the correct audit sample sizes for risk-limiting post-election audits, and to arrange for sufficient auditors. Hence, this 24 hour time-line may discourage some states from attempting to switch to risk-limiting post-election audits.

A time crunch is created by the fact that today's voting systems only create reports of vote counts for precincts and do not for batches of absentee ballots that are counted and stored together, so that states like Colorado whose absentee ballots comprise more than half of total ballots cast, and many counties collect combined precinct-marked paper ballots for central counting must first sort all their absentee ballots into precincts in order to begin an audit based on precinct audit units.

If different audit units such as individual batches of paper ballots or DRE machines are used as audit units to make audits more efficient, then currently it requires that first election officials print and save copies of a cumulative report after each batch of absentee or DRE ballots are uploaded and subtract each prior cumulative reports' vote counts for each contest and candidate from the current cumulative report to obtain an auditable report of audit units to randomly select from. Regardless of whether calculations are done by hand or not, this will require at least several hours of work in a medium-sized county. While this can and has been done by writing detailed parsing programs that are tedious to write, most jurisdictions will not have these programs available immediately. The difficulty of writing such programs to create auditable reports of audit units other than precincts is compounded by the proprietary data formats that all of today's commercial voting vendors are using.

The best long-term solution to address this problem would be for the federal government to force the adoption of open data standards for voting systems such as the OASIS Election Markup Language (EML) standard just as the federal government previously required the use of open data standards for the banking and health care industries. This would bring great benefits to the elections industry that would make voting systems interoperable, please the press, and improve voting systems overall.

6. Require effective auditing of late-counted ballots

The VC bill says:

> ''(c) MANDATORY SELECTION OF PRECINCTS ESTABLISHED SPECIFICALLY FOR ABSENTEE BALLOTS.—If a State does not sort absentee ballots by precinct and include those ballots in the hand count with respect to that precinct, the State shall create absentee ballot precincts or audit units which are of similar size to the average precinct or audit unit in the jurisdiction being audited, and shall include those absentee precincts or audit units among the precincts in the State in which the Election Auditor shall administer the hand counts under this subtitle.

Problem: California already meets this requirement by sorting and reporting absentee ballots by precinct, but selects the precincts to count before all the absentee ballots are counted. Thus during the counting of absentee ballots, it is already known which ballots will be manually audited, giving a perpetrator freedom to alter any of the counts that will not be audited.

Amend the VC bill to require a separate random selection of any late-counted ballots that are not counted until after the first random selections of initially reported audit units for the manual audit. All ballots including late-counted absentee, provisional, and early voting ballots must be randomly selected for auditing only *after* these ballots been publicly reported by the State.

7. **Require that the manual counts for the audit shall begin within 24 hours of making the random selections of audit units for auditing.**

The audits of any ballots should be begun within 24 hours of making the random selections of the audit units. Otherwise, as we have seen in some prior elections, insiders could go through ballots before the audit begins, replacing or altering ballots to ensure that the manual counts match the reported computer counts for the selected audit units.

ACKNOWLEDGMENTS

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We encourage you to read for yourself the latest version of the "Voter Confidence and Increased Accessibility Act of 2009" bill that this document addresses is posted online here: http://electionmathematics.org/em-legislation/2009-federal/HOLT_VOTERCONFIDENCE_FINAL_xml.pdf