

S.B. 252 – Support – A Stronger, More Efficient, Lower Cost Post-Election Audit

**Government Administration and Elections Committee
Testimony – February 29, 2016**

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Chairs and members of the Committee, my name is Luther Weeks. I am a Computer Scientist, and a Certified Moderator. For this bill, I am testifying for the Connecticut Citizen Election Audit.

In 2007, just prior to statewide use of optical scanners, the General Assembly passed the audit law, embodied in statute section 9-320f and modified last year in PA 15-224. Since 2007 the science of auditing has progressed substantially. There are conferences and academics dedicated to election auditing

We have also learned many valuable lessons in the shortcomings of our law and in its implementation which are not reflected in the current law. The work of dozens of Citizen Audit volunteers after each election has provided 15 independent observation reports of all major statewide post-election audits since 2007. As Executive Director of the Citizen Audit, I have personally observed 112 local audit counting sessions.

S.B. 252, is based on the Citizen Audit's experience with Connecticut's post-election audits and considering the science of post-election auditing. Our detailed testimony, which follows, covers the problems with our current law addressed by this bill, the bill's features that would strengthen the audits, and the potential of *publicly verifiable machine assisted audits*.

In past years, ROVAC has offered bills to reduce the costs of audits by 50%. This bill includes the major cost-saving items in those past ROVAC proposals, along with details that provide for a much stronger audit, with a relatively small increase in effort. In total this bill would save approximately 40% of the costs of the current manual audits and provide the potential of further savings with the option of publicly verifiable machine assisted post-election audits. Last year we offered a similar bill, everyone who testified, testified in favor: <http://tinyurl.com/y15b1041>

The current law has many omissions that result in post-election audits which provide little basis for credibility in assessing the accuracy of our elections. For instance,

- There are critical aspects of audits that are not required to be public.
- The law for ballot security has never been updated to recognize optical scanners.
- Critical details depend on procedures created by the SOTS which are inadequate, not followed, and not enforceable.
- There are no deadlines for required reports. In many cases, both local, and statewide reports are years overdue. The latest official *election* report published is for November 2011.
- PA 15-224 provided for electronic auditing, without requiring public verifiability.
- PA 15-224 provided for interrupted election night reporting, without public notice of the resumption of counting.

The current law is based on assumptions that have proven incorrect, contradictory, and some that violate fundamental laws of computer science established by Allen Turing in the 1940's.

False assumptions include:

- False: Auditing some scanners indicates the accuracy of scanners not subject to audit.
- False: Only machines make errors, not people.
- False: Officials in Connecticut can be relied upon to count ballots and votes accurately.
- False: Officials in Connecticut are always correct in claiming their manual counts in audits are highly inaccurate.
- False: In contrast, manual counts of votes and vote tallies made in the challenging conditions of election night are accurate.

Let me direct your attention to critical errata in the current text of the bill, detailed on the following page.

Thank you.

Citizen Audit Reports Demonstrating Inadequacies in the Current Law and Its Execution

Since 2007, the Connecticut Citizen Election Audit Coalition has organized observers and independently reported on 15 of Connecticut's post-election audits. In general:

- The law is inadequate to provide public verifiability and credibility
- Procedures are inadequate for a credible audit
- Procedures are not followed
- Official actions, errors, and omissions result in an audit that has little credibility

All of the reports of the Citizen Audit are available at: <http://ctelectionaudit.org/>

The Science of Effective, Credible Machine Audits

The paper copied on the last page of this document, by three leading scientists in the field of election auditing, summarizes the requirements of trustworthy, credible, publicly verifiable machine assisted audits. The machine assisted audit option provided in this bill is based in part on their work.

Errata in Current Version of the Bill:

There are two critical differences between the intent of the original draft bill submitted and the official bill text reviewed and recreated by OLR:

Lines 49-50 -- should read:

Drawing] or registrars of voters in a public drawing held at the start of such municipal audit, and (B) in the case of a primary, one office on

Lines 53 -- should read:

voters in a public drawing held at the start of such audit

Contests for audit should be drawn at the beginning of the municipal audit so that the public can easily observe and have confidence in the integrity of the drawing.

Lines 60-63 – Should be:

conduct of such audit, followed by a random drawing of contests for audit in the same number and manner as described for voting districts in paragraph (b) (1).

The intention of the bill proposed is to audit the same number of contests in central count locations as for polling places.

Features of S.B. 252 Which Save 50% of Costs and Support Past ROVAC Proposals

(e.g. ROVAC bill S.B. 348, 2014): <http://cga.ct.gov/2014/TOB/s/pdf/2014SB-00348-R00-SB.pdf>

Line 11 – Reduces the polling place districts selected for audit from 10% to 5%.

In 2007, the original bill proposed by Secretary Bysiewicz audited 20% of districts and all races. The GAE cut that to 10% and three races. Although this reduction to 5% is a significant cut, other provisions in this bill more than make up for the loss with a much stronger audit overall.

Line 66-67 – Limits districts audited in a municipality to three.

This change has long been sought by ROVAC. It would shift the burden of audits from larger to smaller towns. We do not agree that it is a good idea or that it is fair, yet, when combined with

the reduction of selected districts from 10% to 5% it will have a small impact on the audit and on small towns. We have included it in the spirit of compromise.

Features of S.B. 252 Bill Which Will Strengthen the Audit

Many of these features are oversights in the original law or PA 15-224 that common sense implies should have been included and should be expected to have been followed even though they were not legally required. These are of low or no cost. Other changes are a small expansion in the coverage of the audit which will insure that essentially all ballots are subject to audit. Any ballots excluded from selection for the audit provide an opportunity for fraud, for errors to be undetected, or covered-up.

We estimate that the total cost and effort of these changes amounts to approximately 10% of the cost of the current audit. Thus given the savings of cutting polling place audits by 50% the total savings of this bill would be approximately 40% of the cost of the current audits.

Lines 13-18 – and Lines 54-63 Add central count absentee and Election Day Registration (EDR) ballots to the random selection.

It is important that all ballots be subject to audit. Two classes of ballots currently exempt from the audit law are central count absentee ballots and EDR ballots. Selecting 5% of towns for those audits amounts to 9 towns. Each selected town would then draw only a single district to audit for both central count absentee and EDR. Most of those selected towns would likely only have EDR to count, without central count AB, about 1/3 would count both.

Absentee and EDR counting involves tabulators with the most complex programming, able to support all districts in each municipality. Correct function of polling place scanners provides little assurance that absentee and EDR tabulators are working without error or fraud.

Absentee votes are already a factor in deciding many contests. If EDR reaches the levels of 20% to 30% of the votes, as they have in other states, they will be a large factor in deciding contests. They need to be included in the audit.

Calculating costs exactly for this change is complex. Selecting 9 municipalities would be an increase of about 13% of the districts selected in the current audit, yet the number of ballots in each district would entail much less counting, currently 10% of a polling place district, perhaps rising over the years to 30%. The bottom line would be adding back well less than 10% of the cost of the current audits across the state.

Lines 18-24 – Enhance notification requirements and provide remedies for errors in drawing lists

The current law requires that local audit counting sessions be public, yet contains no advance notice requirements. A registrar could post a notice on their office at 7:45am for an audit at 8:00am and meet the requirements of the current law. The Citizen Audit has several times called registrars almost daily to obtain the date and time of the audit, only to be told it was held the day before or was underway. This bill includes a three-day notification requirement and a workable method of notifying interested members of the public in advance.

Also the Citizen Audit has shown that frequently there are significant errors in the list of districts in the random drawing. Such differences provide openings for fraud and error to go undetected or covered up, reducing the integrity and credibility of the audit. Creating an accurate list is the joint responsibility of the Secretary of the State and all registrars. This bill would provide a workable remedy to restore the integrity of the audit, for any such errors in the drawing that are discovered.

Line 33 – Include questions as well as offices in the random selection of offices

Questions are currently exempt from audit -- they are not exempt from error and fraud. This change would not add to the work of the audit, since the number of contests selected would remain at three. Actually, it would slightly reduce the effort for municipal elections, since those often involve multi-vote races that take more effort to count than single-vote contests. (Because on average then, fewer, more demanding multi-vote races would be selected)

Lines 44 – Only contested races included in the random drawing of races.

Selecting and counting uncontested races makes little sense.

This would make the audit stronger, since for every uncontested race not audited, another contest will be audited.

Lines 45-50 – Simplifies and strengthens contest drawing, making it by district, drawn locally.

The current law is overly complex, based on choosing contests for audit after those mandated by Federal laws - for Federal audit laws anticipated in 2007. No such laws were ever passed and are not anticipated in the foreseeable future.

Currently for even year elections, contests are selected statewide by the SOTS. This can be a problem, since town ballots and contests can vary in even years. Currently for odd year elections, contests are selected by municipal clerks.

This change would strengthen the audit. It would have all contests selected locally. It would codify selecting separately for each district, which some towns do now. The effect would be an audit with more coverage of a variety of contests – in even year elections, not just three contests statewide – in odd year elections different contests in each selected district in a town where more than one district was selected.

Contests would be selected at the start of the municipal audit, so that the public can easily observe and have confidence in the integrity of the drawing.

Lines 52-55 (Referring to text as in Errata above) – All drawings in public as part of the local audit,

Currently drawing of contests must be conducted by the municipal clerk any time prior to the local counting session. These sessions are difficult for the public to observe, reducing credibility of the audit.

This change requires all drawings to be in public as part of the local audit counting session. For convenience, it also provides that the registrar as well as the municipal clerk can do the random selection.

Lines 83-86 – Subjects most originally hand counted paper ballots to audit.

We have seen instances of large numbers of ballots hand counted on election night, usually because of pre-printed ballot shortages. For example, in November 2010, in addition to the widely publicized shortages in Bridgeport, there were a handful of other towns with significant numbers of hand counted ballots. None of those were subjected to audit.

Also in recent elections, mostly primary elections, several towns have opted to save money in scanner programming and avoiding the audit by not using scanners and holding hand count elections only elections.

Hand counted ballots are not exempt for error and fraud. They should be eligible for audit.

This changes makes hand counted ballots, when there are over 50 in a district, subject to audit. In a concession to concerns raised by ROVAC in 2015, we have increased the threshold from 20 to 50.

Line 85-86 – Immediate transmission of local audit reports.

An oversight in the current law is neglecting to specify a deadline for submitting local audit reports to the SOTS. -- 24 or 48 hours would be sufficient, yet since the current law requires the SOTS, in turn, to submit them ‘immediately’ to UConn, we specified the same for registrars.

Currently without that clause, frequently reports are not sent to the SOTS for at least months, likely many past reports remain outstanding after several years. We know this because we have frequently asked both the SOTS Office and UConn for some of those reports and they confirmed they had not received them. See the post-election audit reports at <http://ctelectionaudit.org>

Line 88-89 – Completion of mandated reports by UConn within 180 days

An oversight in the current law is neglecting to specify a deadline for UConn to complete audit reports required after every election and primary. The audits are intended to discover problems with our scanners - one would hope such reports would be in time to a) resolve any problems discovered in time for subsequent elections b) before the ballots involved are destroyed, and c) while the staff and contract at UConn are still available to complete the required reports.

Unfortunately, that oversight has left the public without those official reports. Looking at UConn’s web site: <https://voter.engr.uconn.edu/voter/reports/> and the SOTS web site: <http://voter.engr.uconn.edu/voter/ct-sots/> We see that since November 2011 there has only been one post-election audit report completed out of seven major audits since that time. In addition, the report of the August 2008 primary has yet to be completed (in that audit Secretary Bysiewicz tripled the size of the audit to assure the scanners were ready for the Presidential election, - unfortunately after all that work on the part of local officials a timely report was never posted).

Lines 109-144 – Machine assisted audit option

PA 15-224 provided for *electronic audits* by any mechanism approved by the SOTS. PA 15-224 provided for electronic auditing, without requiring public verifiability. Public verifiability should be required and specified in the law, not subject the desires and interpretations of the current or future Secretaries of the State.

Machine assisted auditing as provided in this bill would save effort for local officials and make a more credible, accurate audit while also auditing the entire ballot, not just three contests.

The last page of this document reprints a summary of the science of machine assisted auditing and also what would not work. The proposed machine assisted audit is based on that science.

Luther Weeks, a computer scientist, long a supporter and catalyst for machine auditing reviewed the methods proposed in this bill with Dr. Shvartsman of UConn. Dr. Shvartsman agreed that the SOTS Office/UConn electronic auditing system could easily be modified to support the text of this law (A couple of days of programing and testing – the system already creates the data required, it just needs to retain it briefly and export it.).

Luther Weeks also reviewed these requirements with Larry Moore, founder of the Clear Ballot Group, creator of the leading commercially available system. Mr. Moore confirmed that the Clear Ballot system supports this audit method.

Electronic auditing is entirely optional, so should not result in required costs in a financial note to the bill. Some towns may choose to purchase or lease a commercial system at their option. The SOTS Office/UConn has secured a bonding authorization to purchase 10 systems for use

across Connecticut. In any case, there is no required additional expenditure by the State, no unfunded mandate. This the bill should remain as a net cost reduction of about 40% of the costs of the current law!

Lines 148-150 – Correcting the definition of a discrepancy to match the intent of the audit and the actual function of optical scanners.

The current law, written in 2007, did not take into account an accurate understanding of the function of the AccuVoteOS optical scanners. This clause has caused confusion on the part of election officials.

The scanner is designed to only read marks within ovals. Using suitable marking instruments, the scanner is designed to read any mark covering 16% or more of an oval. In practice almost any mark, no matter how small within an oval is counted. Thus the audit should only be concerned with evaluating scanners on the basis of marks within ovals, and take account that scanners might have counted any mark, and expect scanners to count ovals that are clearly over 16% filled in. Our proposed text is a simplified, high level version of that expectation.

Lines 165-166 – Manual count required for discrepancies.

The current text in effect requires a machine recount, if the machines are found to be inaccurate. When the law was written in 2007 a recanvass was a manual count. Since that time, via regulation, Secretary Bysiewicz changed the recanvass to a machine count. This change returns the law to the original intent.

Lines 250-252 – Accounting for write-ins, compensating for a known scanner error.

A known AccuVoteOS scanner error can easily cause write-in votes to go uncounted. The scanner frequently fails to properly separate some write-in votes to the write-in bin for manual counting on election night. Current election closing procedures will not uncover such errors.

The recognition of the seriousness of this error was surfaced in the 2014 post-election audit, due to Citizen Audit observations, and the diligence of one of our volunteer observers. This change mitigates that flaw, such that all write-in marks are accounted for. Checking with experts across the country, there was no easier procedure proposed or known.

Also audits have surface increasing occurrences of errors in reported counts, based on incorrectly scanning write-in ballots a second time on election night. These changes should also help officials detect and correct such errors before results are certified.

Lines 267-260 – Increasing the period after elections when tabulators and memory cards must be sealed.

If problems are discovered in an audit, tabulators and memory cards need to be evaluated for errors or fraud. Yet, tabulators must be available for subsequent elections, maintenance, etc. Ironically, the current law allows memory cards and scanners to be unsealed one day before the audit begins. Based on a concession to concerns raised by ROVAC in 2015 we have rewritten this section to continue to address our concerns, yet to address ROVAC's concerns in a way that would meet their needs more fully than the current law.

Lines 272-293 -- Sealing of ballots and their retention

There is a major oversight in the current law and an omission in technical changes made later to account for the replacement of lever machines with scanners.

There is no recognition in the law that the tabulator voting involves paper ballots that must be preserved. The interpretation of the current law is that ballots only need to be sealed for 14 days after the election, just like scanners. Ironically, that is one day before the audits begin.

Citizen Audit observations indicate that frequently, ballots are unsealed before local audit counting sessions. This lack of ballot security or the chain-of-custody completely erodes confidence in the audits and in election integrity. Unlike scanners, there is little hurry to unseal ballots and many reasons to keep them sealed.

This bill would require ballots to remain sealed as long as they are needed for audit, and for subsequent audit investigations. Some towns may be required to purchase a few more ballot containers to accommodate the additional ballots under seal (space for retaining the ballots is required today, in any case).

Lines 351-355– Correct a public integrity issue introduced by PA 15-224

PA 15-224 provided for interrupted election night reporting, without public notice of the resumption of counting. This is a serious issue allowing part of the election results to be counted without the opportunity for the public, candidates, and parties to observe the counting.

This text corrects that with a reasonable means for officials to provide that notice and for interested parties to find the date, time, and place for such counting to continue.

Lines 458-467– Treat absentee ballots like polling place ballots

This change requires absentee ballots and EDR ballots to be sealed in the same manner as polling place election-day ballots. It also shifts their retention to be with the other ballots kept by the registrars, rather than absentee ballots with the municipal clerk. For polling place counted absentee ballots it will have the effect of their being sealed in the same containers as other ballots with more security, especially while they are in the polling place and on their way to town hall.

OP-ED CTNewsJunkie | End Exemptions to Post-Election Audits

by Luther Weeks | Oct 15, 2014

When auditing town expense accounts, would it make sense to exempt some departments? When inspecting trucks, would it make sense to exempt school buses? When inspecting restaurants, would it make sense to exempt diners? Any exemption is an opening for errors to go undetected and an opportunity for fraud.

Equally it doesn't make sense that the Connecticut's post-election audit law exempts all votes on questions, election day registration, originally hand-counted ballots and absentee ballots from our post-election audit. Election integrity and public confidence demand that all ballots be subject to random selection for audit. Exempt ballots already determine many elections, while the number and percentage of exempt ballots is growing.

Currently about 9 percent of ballots are absentee ballots, many elections and primaries are decided by much lower margins than 9 percent. If the State enacts early voting, following other states those numbers will almost certainly rise to over 30 percent within a few years. Compare that to the race for governor in 2010, which was officially decided by about 0.6 percent—more than triple the 2000 vote margin necessary for a recanvass. Since Connecticut recently initiated Election Day registration, we can anticipate those votes to reach 10 percent of votes in a few years, which will further add to the totals exempt from the audit.

In 2010, the audit counted over 23,000 ballots from Bridgeport for the governor's race. We found many counting and accounting errors, especially with emergency paper ballots that were counted by hand on election night. Less known is that a handful of other towns also had similar numbers of emergency hand-counted ballots in 2010. There are hand-counted ballots in every election – all of these are currently exempt from the post-election audits.

Officials in many states hand-count votes accurately in audits, using uniform, proven and effective counting methods. In Connecticut, many municipalities use ad hoc, inadequate methods to manually count ballots. Even under the ideal planned conditions of audits, many officials argue that they cannot count ballots accurately by hand and attribute almost all differences large and small, to their own errors. Many towns manually count large numbers of ballots at the end of a demanding seventeen-hour-plus election day, when there is no expectation, planning, staff, or training to count large numbers of ballots by hand on election night. How many voters are aware that many towns now avoid scanners and hand-count all votes in some primaries? Yet, we have no audit to assess how accurate these manual-counts are.

In November 2012 officials in one town investigated a difference and determined that polling place officials mistakenly read 151 ballots into a scanner a second time. Despite checks that could have caught the error before certification, the discrepancy was not detected until the audit. In another town, a similar error was made in the central count of absentee votes. It was discovered by citizens reviewing election records and resulted in reversing the official result on a highly charged question. How common are such errors? We will never know until we stop exempting absentee ballots and questions from the audit.

The good news is that we do not have to spend more to increase confidence in our elections. Connecticut is one of twenty states with hand-count audits. Our existing audit, at 10 percent of polling places, seems among the strongest. A small state needs to audit more to achieve the same confidence as a large state. This is because the statistical confidence of an audit, just like the confidence of a poll, is more dependent on the number of units counted than on the percent of the votes or voters in the election. We can reduce that 10 percent, even counting fewer total ballots, and gain confidence by subjecting all ballots to audit, while using efficient, proven counting methods.

Luther Weeks is executive director of the Connecticut Citizen Election Audit.

Machine Retabulation is not Auditing

Mark Lindeman, Ronald L. Rivest*, and Philip B. Stark
24 March 2013

- A **post-election vote tabulation audit** checks election results by manually inspecting some voter-verified records (usually paper ballots). A well-designed audit can produce strong evidence that election outcomes are correct—and can correct incorrect outcomes.
- The principle of **evidence-based elections** says that an election should provide convincing evidence that election outcomes are correct. True audits allow observers to see directly how well the voting system performed, which can provide such evidence.
- Some claim that election results can be checked by **machine retabulation**, in which ballots are rescanned on other equipment. Machine retabulation may happen to catch some errors, but it is not really an audit. Machine retabulation relies on the false assumption that two machines can't *both* be wrong.
- Some claim that retabulation adequately checks the voting system because it is “independent” of the voting system. But a retabulation system could be misconfigured in the same way as the voting system, could misinterpret some ballots in the same way, or could be subverted to cause it to report the same incorrect results. Two unaudited machine counts are not necessarily better than one.
- Some claim that retabulation can adequately check the voting system results provided that the two sets of vote counts match in sufficient detail. This is like claiming that if two expense reports list the same expenses, both must be right and there is no reason to look at any receipts.
- Some claim that retabulation itself can be “audited” by comparing ballot images produced by the retabulation system with the system's interpretation of those images. At best, this tests internal consistency: whether two parts of the retabulation system agree with each other. It does not test whether the system correctly interpreted the ballots. At worst, a subverted retabulation system could pass this test, yet misreport *every* vote. This is not an audit. It cannot confirm that the election outcome is correct.
- A well-designed retabulation system can help in a **machine-assisted audit**. In a machine-assisted audit, the retabulation system produces an interpretation of votes on each ballot (a Cast Vote Record, or CVR) that can be matched with that ballot. The CVRs are exported from the retabulation system. Observers verify that these exported CVRs produce the same electoral outcome (winners, etc.) as the voting system. Then observers compare a random sample of actual ballots against the corresponding CVRs. *This comparison is between actual ballots and CVRs, not between digital images of ballots and CVRs.* A machine-assisted audit can produce strong evidence that election outcomes are correct. Retabulation cannot, even if the CVRs are checked against the digital images of the ballots.
- There is currently no way to audit votes cast online, and there is little prospect for the foreseeable future. Despite claims about “military grade encryption,” Internet voting does not create a durable, voter-verifiable record against which the results can be checked. While votes cast on the Internet could be retabulated, they cannot be audited. Both NIST and the Department of Homeland Security agree that secure online voting does not currently exist, and—if it is possible at all—is a long way off.

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