0 Connecticut Citizen Election Audit

Citizen Post-Election Audit Report

Independent Observation and Analysis of Connecticut's Post-Election Audit of the 2016 General Election

March 28, 2017

In this Presidential election, national attention focused on the vulnerability of our election systems to conventional and cyber attacks. The election was followed by an embarrassing demonstration that recount laws in at least three states were inadequate to provide convincing evidence that the correct winner was certified.

Coinciding with those national concerns, post-election audits and election credibility in Connecticut suffered two devastating blows:

- **Early in 2016, the General Assembly cut post-election audits in half from 10% to 5% of voting districts, without adopting reforms to address glaring weaknesses in the audit law.**
- **Connecticut became the first state to replace publicly verifiable hand-count audits with unverifiable electronic audits. Now the public cannot verify the integrity of those audits and has less reason to have confidence in election results.**

Electronic audits were conducted for six municipalities, while 22 conducted manual post-election audits with varying levels of organization, accuracy and credibility.

The public, candidates, and the Secretary of the State should expect local election officials to be able to organize audits and produce accurate, complete audit reports. The public should expect the Secretary of the State's Office to take the lead in ensuring that audits are complete, credible, and publicly verifiable.

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Introduction

After the November 2016 Election, Connecticut conducted its 17th large-scale post-election audit.[1,2] This was also the 17th large-scale audit observation for the Connecticut Citizen Election Audit ("Citizen Audit").

The purposes of our observations are to create election integrity, demonstrate citizen interest in the process, increase citizen involvement in elections, provide feedback to the Secretary of the State and the Connecticut General Assembly on the audit process, and provide the public with the information necessary to determine its confidence in Connecticut's elections.

Citizen Audit volunteer observers invested 31 days observing 25 local counting sessions. Without the service of these volunteers, Connecticut's post-election audits would take place without public observation, and the insights in this report would not be possible.

[1] In this document we will frequently use the term "audit" when we mean "post-election audit," "post-election audit counting session," or other parts of the process, from the random selection to the official report of each post-election audit from the University of Connecticut Voter Center (UConn).
[2] Connecticut statutes require the Secretary of the State and registrars of voters to conduct audits after every election and primary.

Findings

We conclude, based on citizen observations and analysis of official audit reports, that the 2016 post-election audits continue to fail to inspire confidence in the accuracy of our elections system and in our election officials. This is due to a lack of attention to detail and follow-through:

- **Incomplete and missing official reports precluded judging the accuracy of all the randomly selected optical scanners and assessing the integrity of the random selection itself.**
- **The lack of action on the part of the Secretary of the State's Office to check that all required reports are submitted and that all submitted reports are completed fully.**
- **Weaknesses in ballot chain-of-custody and security necessary for confidence that ballots were not tampered with between the election and the municipal audit counting sessions.**

Connecticut, First in the Nation to Drop Publicly Verifiable Audits

- **Unlike the previous manual hand count audits, the electronic audits just initiated were not transparent and publicly verifiable. It does not have to be that way. Using sound science, electronic audits can be manually checked with approximately the same effort used last November.**
- **Early in 2016, the General Assembly cut post-election audits in half from 10% to 5% of voting districts, without adopting reforms to address glaring weaknesses in the audit law.**

We emphasize that this report does not question election officials' integrity. Most election officials are well motivated and of high integrity, as are other public officials. However, unjustified trust and lack of knowledge can lead to a lack of vigilance that allows errors to be overlooked and opportunity for the occasional bad actor to manipulate elections and audits.

The public, candidates, and the Secretary of the State should expect local election officials to be able to organize audits and produce accurate, complete audit reports. The public should expect the Secretary of the State's Office to take the lead in ensuring that the audit is complete and publicly verifiable.

Connecticut, First in the Nation to Drop Publicly Verifiable Audits

Summary

For the first time, six municipalities, the SOTS Office, and the UConn Voter Center conducted electronic audits. Of about half the states that conduct post-election audits, Connecticut is the first to replace publicly verifiable audits with unverifiable electronic audits.

These audits represent several steps backward from the traditional manual, hand-count audits:

- **Unlike hand-count audits, as conducted, the electronic audits were not publicly verifiable.**[3] The public and the Citizen Audit cannot determine the accuracy of such audits.
- **The officials did not count all the ballots required by the Secretary of the State's published audit procedures**. The UConn "Audit Station" currently cannot count ballots that are not printed on white stock. That limitation was used as an excuse to not audit polling-place-counted absentee and Election Day registration ballots for the districts audited electronically.
- **The audits were conducted without written procedures approved by the Secretary of the State**.

The Citizen Audit strongly recommends "Electronically-Assisted Manual Post-Election Audits":

- **The sound science of Evidence Based Elections provides the basis for manually checking and transparently verifying the results of an electronic audit.** If efficiently conducted, such audits would take approximately the same effort for election officials as the unverifiable electronic audits used for this election.
- **Electronically-Assisted Post-Election Audits could provide confidence, with less tedious work, with high accuracy and integrity.**

The Unverifiable Methods Used for the Electronic Audits

The electronic audits were conducted with the UConn Audit Station, developed over that last few years by the UConn Voter Center.[4] The audits generally followed the methods and claims made in a 2013 paper authored by UConn and the SOTS Office:[5]

[3] Unlike most government agency and business audits, post-election audits are not conducted independently. They are conducted by the same organizations responsible for conducting the elections and specifying election equipment. Elections are also highly political. The solution is publicly verifiable audits – audits that can be independently verified by candidates and the public.

- Ballots are rescanned, analyzed, and recounted by the Audit Station in batches.
- The scanner ballot images, the system's interpretation of marks on the image, and how the votes were counted for each image are simultaneously projected on a screen.
- Two local election officials are to view each image, check the interpretation, and check the votes counted. They may override the system's interpretation of each image. On the projected ballot images, bubbles interpreted and counted by the system as votes or as possible (questionable) votes are over-marked by shades of light green and light red.
- At the end of counting a voting district, a summary report of the totals of the counts for the district for each contest is printed.

The Audit Station is creative in its method of displaying images for verification and adjudication by officials. Unfortunately, that creativity adds nothing to the public verifiability of the audit, while requiring unnecessary, tedious, and challenging work for local officials. Leading scientists in the field of post-election auditing have explained why such audits fall short:[6]

- **Like all electronic and computer equipment, the scanner is subject to error and fraud via hacking:**
    - **There is no guarantee that the images displayed represent an accurate rendition of the actual ballots.**
    - **There is no guarantee that counts displayed for each image are faithfully added to the totals printed at the end of the district audit.**
- It has not been established that individual officials can and will actually and faithfully review hundreds or thousands of individual images, the system's interpretation, and the system's associated race counts.

  Note: Such claims would need to be verified in theory and in practice. The officials reviewing images and counts for hours are likely to believe in the accuracy of the AccuVoteOS and the Audit Station. At minimum, it should be proven that individuals with such beliefs, could and would reliably detect differences less than 0.5% affecting a single candidate in an election with many races, while reviewing thousands of ballots for a voting district.

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[4] University of Connecticut, School of Engineering, Center for Voting Technology Research: https://voter.engr.uconn.edu/voter/
[5] https://voter.engr.uconn.edu/voter/2013/06/computer-assisted-post-election-audits/
[6] statistics.berkeley.edu/~stark/Preprints/retabNotAudit13.pdf

- Our observation indicated that faithful evaluation of images was not possible in the November audit. Under the control of officials, images and counts were displayed for from one to three seconds.
    - In six of seven teams of officials, two officials did not faithfully watch the projected display of all ballots. As ballots were displayed under the control of one official, the other official at times looked away, stood and turned away to prepare the next batch of ballots for scanning, or were reading and typing on their cell phones.
    - At the rate of one to three seconds, we believe it would be difficult for officials to determine if the Audit Station had marked a bubble that was not filled in.
    - At the rate of one to three seconds, we believe it would be difficult for officials to notice if the Audit Station missed a mark that was filled-in elsewhere on the ballot.
    - At the rate of one to three seconds, we believe it was not possible to verify that all bubbles highlighted were correctly counted and that those not highlighted were not counted.

      At about three seconds, observers found it barely possible to verify only that the race for President was accurately marked and counted. Doing that for even a handful of votes in succession took extreme concentration – it is not reasonable to think that officials could maintain the necessary concentration for dozens of ballots, let alone thousands.
    - The November Election ballot, like every even year election, was a relatively simple 8.5" x 11" single-sided ballot, with five vote-for-one races. November Municipal election ballots range from 11 columns with a couple of vote-for-multiple races, to back-to-back 8.5" x 17" pages with many large vote-for-multiple races. The UConn researchers explained that in those cases both sides of the ballots and all the candidate counts would appear on a single projected screen. We cannot estimate the focus and time it would take officials to verify each image in such elections.

A Simpler Way, A Better Way, A Publicly Verifiable Way

Electronically-Assisted Manual Post-Election Audits

There is a way to get the efficiency and accuracy benefits of electronic auditing with the confidence of public verifiability. It is to manually audit the electronic counting and to verify both the interpretations of ballots and the totaling of results. The sound science of Evidence Based Elections[7] points the way to performing such a manual audit of an electronic audit:

- As each ballot is interpreted by the system, a so-called Cast Vote Record (CVR) is created that is associated with the ballot. The Cast Vote Record is a database record that lists the interpretation of each bubble as voted, possibly voted, or not voted.

[7] http://www.stat.berkeley.edu/~stark/Preprints/evidenceVote12.pdf

- At the completion of the scanning and interpretation of a district, all the CVRs are exported in a standard computer readable format (such as .csv) and made available to a reasonable number of observers on a standard media (such as CDs or thumb drives). The file of CVRs can then be independently counted by observers to assure that the sum of the CVRs equals the totals printed by the Audit Station[8]. Such counting could use software trusted by observers and, if necessary, verified by a hand count of each CVR.

- A relatively small number CVRs are randomly selected and compared to the associated ballots. Any differences between the CVRs and the actual ballots as interpreted by officials must be recorded .

  Since ballots are in order and in batches, it is relatively easy to locate each randomly selected ballot. If the system printed out an easily read page for each randomly selected ballot with the batch number, ballot number in the batch, and the bubble interpretations for the CVRs, it would be relatively easy for officials to locate ballots and compare them to the printed CVRs. It could be done openly such that observers could verify that the printed CVRs matched the exported CVRs, and that the officials correctly compared the CVRs to the ballots and correctly recorded any differences.

- Any differences between the CVRs and the selected ballots are a cause for concern with the accuracy of the Audit Station and may be cause to question the accuracy of the audit. With a well-designed and functioning system differences, if any, should be rare.

The following are selected observer comments, with our editorial comments in brackets[]:[9]

> *A batch of ballots was fed thru the scanner. The scanner read the ballots, then projected them in a batch on the screen. The counters could go thru each ballot together and accept or reject each ballot and tally that was registered on a side bar. One could set the pace of reviewing ballots as auto or could review by pressing "next" at one's own pace. These registrars used the auto review method. Two sets of eyes reviewing the ballots and tally fell apart when one had to print out the tally sheet for the batch and the other had to load and set aside batches. I would recommend no less than a 4 member team. There was no easy way to tell if the scanner counted the ballot races properly by reviewing the side bar. The summary of the batch totals could have been printed and put with the batch coversheet. It wasn't done in this case. There is also a CVR (Cast Vote Record) that could be used to randomly check a ballot.*
>
> *Basically, they just started agreeing with whatever the machine said was questionable. They did not look at the ballot itself and compare to what the machine showed as Questionable--the machine could be reporting anything at all. At the end, any discrepancy in the totals was assumed to be because of the Questionable ballots.*
>
> *The officials asked the UConn team if they needed to fill out any report. "We don't know, but don't see why you need to". "OK, I'll do it when I get back to the office," the Registrar said. I pointed out to the Registrar*

[8] A quick survey of election officials and advocates indicates that CVRs for entire elections or audits are regularly provided to requesters in the states of AZ, NY, CO and SC. In SC, they are published online.
[9] Comments by observers and officials in this document have been edited for length, punctuation, and clarity.

that she needed to fill in the [audit] report in front of witnesses. She acknowledged that, but didn't do it. Assumed that sending in the Audit Summary from the machine was adequate.

Officials were there before we arrived. The seal numbers had been changed: they said that they needed to open the boxes to sort by district for the audit. [Instead, they could have brought all the ballots to the audit, and unsealed and separated them publicly.]

Only one official in one of the rooms. There was no confirmation of anything. The form that gets printed does not include the totals for the votes in the batch. The complete trust in the accuracy of this machine is the real issue. The official kept repeating: "This is so easy. The machine is doing a great job. You should call the President and tell him this system should be used all over the country. We'll save so much time and money. This machine is always right. "

Only one of seven districts were observed where 90% of the time both people were the watching screen.

One ballot with a small crease could not be read by Audit Station. I wonder how it would work on absentees which are all folded?

Ballots not resealed, were left alone and vulnerable. Did not bring write-ins, although they are supposed to be part of the audit. SOTS needs to be clear that it is necessary to follow the procedures to bring write-ins, seals, and count EDR and AB ballots that were counted in a selected polling place.

Hand counted and write-ins were mixed in with scanned ballots, contrary to Moderator's Manual and the law. [two municipalities]

The SOTS official Audit Procedures require that all ballots fed thru the scanner should be counted in the audit. The electronic scanner could not read colored ballots. So, the EDR ballots and the Absentee Ballots were not audited. They were not hand counted either.

Official Comments:

Love the new [Electronic Audit] way because there's no human error and it's less expensive. [Less for municipalities. The UConn Audit Station was developed with State funds and foundation grants. It is maintained by UConn and the hardware was purchased by State bonding.]

Audit Background

After the November 2016 Election, Connecticut conducted its 17th large-scale post-election audit.[10,11] This was also the 17th large-scale audit observation for the Connecticut Citizen Election Audit ("Citizen Audit").

The purposes of our observations are to create election integrity, to demonstrate citizen interest in the process, increase citizen involvement in elections, provide feedback to the Secretary of the State and the Connecticut General Assembly on the audit process, and provide the public with the information necessary to determine its confidence in Connecticut's elections.

By law, the Secretary of the State (SOTS) is required, after each primary, to select at random 5%[12] of Connecticut's voting districts to participate in post-election audits. The audit counting sessions were required to be conducted between November 23, 2016 and December 9, 2016. In the random drawing 38 voting districts were selected for audit from the list of districts. The districts audited were located in 28 municipalities.[13]

Citizen Audit volunteer observers invested 31 days observing 25 local counting sessions during this period. Observers frequently attended audits on short notice, observed multiple audits, and accommodated last minute changes to the audit schedule. **Without the service of these volunteers, Connecticut's post-election audits would take place without public observation, and the insights in this report would not be possible.**

[10] In this document we will frequently use the term "audit" when we mean "post-election audit" or "post-election audit counting session." Technically, we believe that the whole process encompassing everything from the preservation of records, random drawings, counting in municipalities, the report by the University of Connecticut, and the evaluation of that report by the Secretary of the State would be the "audit." However, for readability we will usually follow the common practice of using "audit" to refer to parts of the whole.
[11] Connecticut statutes require the Secretary of the State and registrars of voters to conduct audits after every election and primary.
[12] Effective July 1, 2016 the post-election audits were reduced by the General Assembly from 10% to 5% of districts.
[13] SOTS press release after the random drawing:
http://www.sots.ct.gov/sots/lib/sots/releases/2016/11-23-2016_-_presidential_election_audit.pdf

Purpose of Connecticut's Random, Post-Election Audits

As stated in the Office of the Secretary of the State's Post-Election Audit Procedures:[14]

> *The primary purpose of the hand count[15] audit is to assess how well the optical scan voting machines functioned in an actual election and to ensure that votes cast using these machines are counted properly and accurately.*

Good government groups support the "Principles and Best Practices for Post-Election Audits"[16] which includes the following definition and benefits:

> *Well-designed and properly performed post-election audits can significantly mitigate the threat of error, and should be considered integral to any vote counting system. A post-election audit in this document refers to hand counting votes on paper records and comparing those counts to the corresponding vote counts originally reported, as a check on the accuracy of election results, and resolving discrepancies using accurate hand counts of the paper records as the benchmark. Such audits are arguably the most economical component of a quality voting system, adding a very small cost for a large set of benefits.*
>
> *The benefits of such audits include:*
>
> - *Revealing when recounts are necessary to verify election outcomes*
> - *Finding error whether accidental or intentional*
> - *Deterring fraud*
> - *Providing for continuous improvement in the conduct of elections*
> - *Promoting public confidence*

[14] Official Procedures: http://ctelectionaudit.org/AuditProcedureManual2014.pdf
[15] Hand count means the manual counting of ballots and votes without relying on voting machines such as optical scanners.
[16] http://www.electionaudits.org/principles

Citizen Observation: Challenges and Limitations

Through past experience in observing audits, we have continuously improved our forms, training materials, conference call and video training sessions for observers.

We recognize that there may be occasional errors in our raw data derived from observations. However, when taken as a whole, the observations tell a collective story that is quite consistent and provides valuable feedback for the continuing education of elections officials.

Without our volunteer observers willing to invest a day of their time, being available for short-notice scheduling, and observing to the best of their ability, no one except local election officials would know how post-election audits are conducted in Connecticut. Our observers care about democracy and ensuring that measures are in place to protect the integrity of our elections.[17]

[17] Upon request of any registrar of voters participating in the audit, we would be pleased to discuss volunteer observation reports and provide feedback applicable to his or her municipality.

Analysis

We Do Not Question Election Officials' Integrity

This report does not question election officials' integrity. Most elections officials are well motivated and of high integrity, as are other public officials. However, unjustified trust and lack of knowledge can lead to a lack of vigilance that allow errors to be overlooked and the opportunity for the occasional bad actor to manipulate elections and audits.

At a minimum, lack of attention to detail and opportunities for error and fraud leave voters without justified confidence in our election system and election officials.

Citizen Observation Analysis

Volunteer citizen observers observed local counting sessions and reported their observations on Observation Report Forms.[18] Analysis in this section is based on those reports. Appendix A is a table showing the percentage of "yes" responses on all yes/no questions on Observation Report Forms for this audit and several previous audits. Appendix C describes in detail our methodology of observation and analysis.

Even-Year Elections vs. Odd-Year Elections vs. Primary Elections

In several aspects, it is more appropriate to compare even-year elections with even-year elections, odd-year elections with odd-year elections, and primary elections with primary elections. Even-year elections include statewide races and involve more ballots, yet generally are easier to count manually than municipal elections. Odd-year elections are municipal elections. They involve fewer ballots due to lower turnout, yet present more challenging counts of vote-for-multiple races (for example, "Vote for 3 of the 5 candidates"). Primary election audits require counting only a single race, have far fewer ballots, do not involve cross-endorsements or write-ins, and seldom have vote-for-multiple contests.

A. Procedures Are Unenforceable, Current Laws Are Insufficient

As noted in previous reports, discussions with representatives of the Secretary of the State's Office and the State Elections Enforcement Commission (SEEC) indicated that many, if not all, of the post-election audit procedures, including those covering chain-of-custody, are unenforceable. There has been disagreement between past SEEC Directors and some members of the General Assembly regarding the enforceability of regulations, but there is agreement that current post-election audit procedures are not enforceable.[19]

[18] Our latest form used for this observation is available at: http://ctelectionaudit.org/ObservationReportForm.pdf.

[19] In 2015, Public Act 15-224 authorized the Secretary of the State to mark procedures enforceable, yet the audit procedures have not been so marked.

A.1 Ballot Security Laws Are Insufficient for Credible Audits

Laws that govern the post-election sealing of ballots, memory cards, and tabulators are unclear and insufficient. The laws have not been updated to recognize that polling place voting with optical scanners involves paper ballots. Most officials interpret the law to imply that polling place ballots are required only to be sealed until the 14th day after the election, yet the audits do not start until the 15th day after the election. We note that the adherence to prescribed chain-of-custody and ballot security procedures varies widely among audited districts.

Ballots are not uniformly maintained in secure facilities, and access to these storage facilities is not reliably logged or recorded, even though law requires two individuals to be present when these facilities are accessed. In many towns, each registrar could have undetected lone access to the sealed ballots[20] for extended periods. In many towns, several other individuals also have such access. The lack of uniform security of the ballots diminishes confidence in the integrity of the ballots. This diminishes confidence in the integrity of election results.

Ballots are the basis for the data reported in audits and in-turn the foundation for the integrity of the audits and elections. Secure, credible chain-of-custody procedures should preclude the opportunity for a single individual to have any unobserved extended access to ballots.

A.2 Write-In Problems Surfaced for the Third Year in a Row

In 2014 we noted several problems with write-in ballots not counted on election night, because the AccuVoteOS did not direct them to the write-in bin. The 2015 audit revealed three cases of human error, in which officials scanned write-in ballots a second time.

This year the audit revealed two additional issues:

- In one town 22 of 33 write-in ballots were not diverted into the write-in bin. The registrars provided a possible explanation.
- In another town, the **Electronic Audit**[21]**,** found several races with write-ins that were not reported by the AccuVoteOS.

[20] While useful, seals offer little protection, especially when used to protect ballots from those who are responsible for applying and checking seal integrity: *Security Theater: Scary! Expert Outlines Physical Security Limitations* http://ctvoterscount.org/security-theater-expert-outlines-physical-security-limitations/

[21] We have highlighted paragraphs of our report that deal with the **Electronic Audit** by those words emboldened and green.

From the official reports:

> *Note that 22 of the 33 write-in ballots (for president) were not diverted to the write-in bin by the deflector (but 11 were diverted). They were found among the regular bin ballots. Most likely the failure of electrical connection between tabulator and ballot box when a ballot jam was cleared and the tabulator reinserted (or vice versa).*
>
> *Tabulator tape did not show write-ins [for U.S. Senate], Computer Audit showed 2. I have no explanation, I have no explanation why write-ins [4] were not counted for State Senate. I have no explanation why write-ins were not counted for State Rep [5] and Registrar of voters [6].* [Note 15 additional write-ins were counted by both the AccuVoteOS and audit computer.]

As we explained in 2014:

When a ballot with write-in bubbles are marked, the scanner counts the other votes on the ballot, counts the number of write-in bubbles by race, and is designed to drop the ballot into the write-in bin, separate from the main ballot bin and the auxiliary bin. After ending the Election Day, the scanner prints on the tape the ballot counts, vote counts, and the number of write-in votes per race. Closing regulations require officials to hand count and report any write-in votes for registered write-in candidates on ballots in the write-in bin and seal them in a separate envelope in the sealed ballot bag.[22]Election procedures assume the AccuVoteOS functions as designed. It does not.

There are flaws in Connecticut's AccuVote-OS scanners, procedures, and the law which let some of those votes go uncounted. The audits are insufficient to determine the rate that write-in votes are undercounted in this way.

- Occasionally the AccuVote-OS and associated ballot box, fail to direct write-in ballots to the write-in bin, dropping them instead into the main bin.
- When write-in ballots are counted on Election night, only those in the write-in bin are counted.
- Although the scanner counts the number of write-in bubbles by race, officials are required to only count the subset of votes for registered write-in candidates.
- There is no requirement in procedures and the law that the number of write-in bubbles per race be reported and compared to the tape counts.
- The audits procedures do not require that write-in bubbles be counted, even when they are and balance with the tape counts, the audit does not distinguish between the ballots that were in the write-in bin and those that were not. Thus, audit counts of write-in bubbles balancing is not an indication that all were subject to hand-count on Election night.

[22] Regulation Sec. 9-242a-23 http://www.sots.ct.gov/sots/lib/sots/regulations/title_09/242a.pdf

A deposit in the incorrect bin is an election equipment problem with procedures inadequate to compensate for that problem. There is a solution. The law and closing procedures should be changed such that the number of write-in bubbles per race in the hand count and on the machine tape should be reported and required to balance.

It also is a failure in some polling places to follow procedures to seal write-ins in a separate envelope. And it's likely a failure in some polling places to count valid write-ins.

Unfortunately, the AccuVote-OS does not provide a count of write-in ballots to balance with the number of ballots in the write-in bin. Only a count race by race of the number of write-in bubbles filled-in would demonstrate that all were accounted for.

The law, closing procedures, and audit procedures should be changed, as follows:

- The law and closing procedures should be changed to require that the number of write-in bubbles be hand counted and compared to the tape, race by race, and compared to those numbers reported in the Moderator's Return. If the counts do not match, officials should be required on Election night to find missing write-in ballots in the main bin and to count any registered write-in votes on those ballots. (This is similar to the requirement that ballot counts should be compared to check-in list counts, with differences noted and researched.)
- The audit procedures should explicitly require that write-in bubbles should be counted and compared to machine tape counts in audited races, and that any write-in ballots found outside of the write-in envelope be reported.

B. Laws and Procedures Are Not Being Followed or Understood

Problems uncovered in this year's observation include: incorrectly completed forms, chain-of-custody concerns, inconsistent counting methods, failure to count all required ballots, and error-prone, confusing totaling processes.

The Official Audit Procedures[23] are still frequently not followed, are not enforced, and, as noted previously, may not be enforceable. Additionally, the procedures still lack detailed guidance in efficient counting methods that would provide accurate and observable results. See Section C below.

Our observations indicate that some towns do a good job of using the procedures in the audit, following each step in order, and enhancing them with effective detailed counting methods. However, in other towns there is no evidence that election officials are referencing or following the procedures. Some who attempt to follow the steps do not seem to understand them and appear to be reading the procedures for the first time at the start of the counting session. Frequently, effective counting procedures are coupled

[23] The latest procedures: http://ctelectionaudit.org/2016/AuditProcedure201605.pdf

with *ad-hoc*, disorganized totaling procedures. This causes inaccuracies and frustration for officials, and makes it difficult to observe the accumulating vote totals from teams and batches to the final totals.

Electronic Audit: The advent of electronic audits conducted at the SOTS Offices added additional concerns with the conduct of the audit, including violations of law and procedures under supervision by that Office. Those included chain-of-custody lapses, incomplete counting, and violations of election night procedures.

B.1 The Law to Separate Write-ins and Hand-Counted Ballots is Not Being Followed

Electronic Audit: The Moderator's Manual and Regulations 9-242a-23 require that Write-In ballots and Hand-Counted ballots from the Auxiliary Bin be separated and enclosed in depository envelopes on Election night. That did not happen in two towns selected for the electronic audit. The write-in and hand-counted ballots were mixed in with all the other ballot. Officials in at least one of those towns expressed no knowledge of the regulations.

B.2 All Required Ballots Were Not Counted in Two Towns

The SOTS Official Audit Procedures require:

> *Only those ballots that were counted by the optical scan voting machine in the district will be included in the audit. That includes: all ballots taken from the machine-read main section of the ballot bin; and all write-in ballots taken from the machine-read, write-in section of the ballot bin.*

Electronic Audit: The Audit Station for some reason is only able to count ballots printed on white stock.[24] Two towns in the electronic audit did not count Absentee and Election Day Registration ballots, using the limitations of the Audit Station as an excuse rather than counting them by hand.

B.3 Official Audit Reports Are Not Sent or Not Tracked by the SOTS Office

This was not a problem with this audit. For this audit, forms were received for each of the districts audited. We appreciate the assistance of the Secretary of the State's Office in providing us with copies of the official municipal audit reports.

Electronic Audit: None of the official reports was completed as part of the electronic audit. All but one town filled them out later and sent them to the Secretary of the State. This precludes observers from seeing that the official reports match the data on the original scanner tapes and the data from the electronic audit.

[24] The Audit Station had difficulty reading a ballot with a small crease. After many tries it could not read the ballot even though the small crease was nowhere near the bubbles. Almost all Absentee and all Election Day Registration ballots are folded.

B.4 Missing, Incorrectly Completed Forms, and Incomplete Audit Counting

Several incomplete reports with insufficient data to determine the actual results of local audits, and if and how they were performed. As in the past, there are some reports where we can make assumptions and fill in the missing data. In this audit some reports are so incomplete that we cannot make reasonable assumptions.

We are equally concerned that such reports are accepted by the Secretary of the State's Office and UConn as representing the actual results of the audit. Voters should expect that the SOTS review such reports and return them to local officials to be completed.

Without complete reports we cannot analyze or verify the results of the audit and provide any level of confidence in the optical scanners in those districts, nor in the officials charged with supervising and performing the audits. This, after all, is the statutory purpose of the audits.

Electronic Audit: One town's report consisted of the printed results from the electronic audit, and failed to include any information on the original ballot and vote counts, making it impossible to determine if there were any differences in the counts.

Audit Report

Town Name:_____ Voting District (and polling place name):_____

District Numbers:(Cong_____) (State Senate_____) (Assembly_____)

Ballot Carrying Case Seal Number:_____ Audit Date:_____

Total of tabulator-counted ballots - hand counted at the audit: ☐

Totals ballots counted by tabulator as shown on tabulator tape produced on election night: ☐

Ballot Carrying Case Seal Number (When Resealed After Audit):_____

A	B	C	D	E	F
Office	Candidate	Machine Totals (Tape)	Undisputed Vote Totals	Questionable Vote Totals	Overall Hand Count Totals (D + E)

Explanation of Differences:

Submit completed forms within 48 hours by fax to 1-866-392-4023

Registrar of Voters:_____
(Signed) (Printed)

Registrar of Voters:_____
(Signed) (Printed)

Official Audit Report Form - Figure 1

Reviewing the official district reports submitted to the Secretary of the State, we note that several report forms were not accurately completed. This made it difficult to create comprehensive statistics and to depend on the audits as a vehicle for assessing the voting machines' accuracy and correct programming, the statutory purpose of the audits. See Table 1 on the following page.

Statewide Elections	Nov 2016	Nov 2014	Nov 2012[25]
Number of ballots counted by hand or machine not filled in or filled in incorrectly	1	2	10
Some columns not completed or incorrectly completed	2	6	4
Minor arithmetic/transcription errors	0	6	1
Reports with negative counts of questionable ballots	0	0	2
Fewer races or candidates counted than required by law	0	4	0
Missing reports from SOTS	0	1	4
Differences attributed to questionable votes, but not reported in Col. E	1	0	3
Cross-endorsed candidates not counted as such	5	12	1
Total incorrect or missing reports	9[26]	25[27]	22
Districts selected	38	77	75
Rate of incomplete reports	24%	32%	29%

Errors in Official Report Forms - Table 1

Incomplete data should be taken seriously. The Secretary of the State should not accept incomplete forms, should insist that forms be filled out correctly and that enough races are counted and, where necessary, should perform investigations, including counting ballots or votes again. These investigations should be announced publicly in advance to allow public observation. Every significant difference is an opportunity for an election error or malfeasance to remain undetected. Images of the actual official Audit Report Forms obtained from the Secretary of the State's Office, and our data compiled from those reports, can be viewed at: http://www.CTEectionAudit.org.

We note a continuing trend of improvement in recent years. Yet 24% of officials failing to complete forms completely and the acceptance of those forms by the Secretary of the State is astonishing.

[25] We present several tables in this report from the 2012 and 2014 statewide election audits which are more comparable audits with November 2016 than odd-year municipal elections and primaries.
[26] Some reports contained multiple errors and are counted only once in this total.
[27] Some reports had more than one error, counted only once here.

B.4 "Human Error" Should Not Be Accepted as an Explanation of Differences

	Nov 2016	Nov 2014	Nov 2012
Reports attributing differences in counts to "Human Error"	9	16	19
Rate of "Human Error" excuse in official reports	24%	21%	25%

Official Forms Listing "Human Error" as Cause of Differences - Table 2

Officials routinely attribute differences in counts to "Human Error." Accepting that as the reason or excuse completely negates the purpose of the audit. Without reliable, accurate counting in the audit it is impossible to attribute errors to either machines or humans. Even hand counts which are inaccurate do not imply that machine counts were accurate.

The submitting by registrars and accepting by the SOTS Office of reports with "Human Error" as an explanation are also contradictory to the published procedures, which state:

> *Small differences of one or two unexplained votes can often occur, but such differences should be verified by at least two counts. It is your responsibility to be thorough and comfortable that your counts of the ballots are accurate. If you are not confident in your counts then you should continue counting and recounting until you are satisfied that your hand count result is accurate.*
>
> *If the results of the audit reveal any unexplained deviations or errors, The University of Connecticut (UConn VoTeR Center), at the request of the Registrars of Voters or Secretary of the State, shall examine the machines that apparently produced incorrect results to determine if such errors were caused by the optical scan voting machine.*

Differences excused by "Human Error" should not be accepted by the SOTS Office nor by the University of Connecticut in their reporting of scanner accuracy. They should be investigated, determined, and reported accurately.

B.5 Multiple Chain-of-Custody Concerns

In several observations,[28] observers expressed concerns with chain-of-custody and ballot security.

Question % Yes:	Nov[29] 2016	Manual[30] Nov 2016	Nov 2014	Yes 2012
Do you have any concerns with the chain of custody?	33%	18%	25%	27%
A single individual can access ballot containers in storage.	27%	31%	46%	62%

Municipalities Where Observers Noted Chain of Custody Concerns - Table 3

Single officials deliver ballots, single individuals were left with ballots, and ballots were left alone with observers. In other cases, seals were improperly applied, were open, or were not used.

A larger concern is that, in many towns, single individuals may access the ballots undetected for extended periods of time. In 27% of towns surveyed in this audit, a single individual can access the ballot storage. In other towns, even though policies require more than one person to access ballots, there are few or no protections in place to prevent a single person from accessing the ballots.[31] This is a serious problem, since single individuals could change the ballots and be undetected. At minimum it destroys the credibility of audits and elections. We note an ongoing decline in towns where single individuals are allowed access to ballots.

Electronic Audit: Multiple officials came to the Electronic Audit without seals to reseal the ballots.

The following are selected observer comments, with our editorial comments in brackets[]:

> *The ballots were not delivered to the site inside sealed ballot bags. They were delivered to the site still inside the locked black voting bins.*
>
> *Registrar altered Moderators return to match actual seal number that was on the ballot bag.*
>
> *One registrar was left alone in the room with the ballots at the end.*
>
> *Ballots in unlocked registrars' office. Anyone could have access.*
>
> *Only one individual brought all the ballots on a cart to another room to photocopy each stack's cover sheet of counts. Ballots were then brought back to counting room. The two officials walked out of room, leaving just meand the ballots.*

[28] We did not observe every characteristic of every audit counting session that we attended. Some questions did not apply; in some audits observers could not fully observe audits that continued beyond one day, etc.
[29] Includes reports for all districts observed.
[30] Includes only manually counted districts which were observed.
[31] Numbered tamper-evident seals are a useful protection, but without extensive procedures for their verification and other strong ballot protections, at best they provide a few seconds of protection from possible compromise. For examples, see: http://www.cs.princeton.edu/~appel/voting/SealsOnVotingMachines.pdf and http://www.cs.princeton.edu/~appel/voting/Johnston-AnalysisOfNJSeals.pdf

C. Training and Attention to Counting Procedures Are Inadequate andInconsistently Followed

C.1 Audit Organization and Counting Procedures:

Observers expressed concerns that many of the audits were not well organized. Observers noted the following concerns, which frequently occurred within the same municipalities:

Question %Yes:	Nov 2016	Manual Nov 2016	Nov 2014	Nov 2012
Do you have any concerns that the auditing was not well-organized?	21%	29%	31%	17%
Do you have any concerns with the integrity of the counting and totaling process?	21%	12%	33%	17%
Do you have any concerns that the manual count was inaccurate?	41%	41%	42%	20%
Do you have any concerns that the officially reported information is inaccurate?	14%	13%	26%	10%
Do you have any concerns with the transparency/observability of the process?	33%	6%	14%	5%

Municipalities Where Observers Noted Procedural Concerns - Table 4

The levels of concerns these areas are generally comparable the level of concerns in election audits in recent years.

Electronic Audits: The concerns with transparency and observability rose significantly because of the impossibility of observing the counting of ballots for the Electronic Audits.

Based on observer comments, it is clear that these are substantial concerns:

> *Only 2 people, both registrars, performed the audit. One registrar thoroughly explained the process to me. There were no real "counting teams."*
>
> *Hashmark tally sheets were handed out to counting teams, but no further information about procedures was shared.*
>
> *Registrars handed out SOTS booklet to everyone to read as they waited. Explained each step in the process as it began, often to each team separately. They did correct the teams when there were mistakes in the techniques.*
>
> *One ROV was experienced and the other brand new. The experienced ROV emphasized that the purpose of the audit is to see whether voting machines counted the ballots accurately, not to try to match them up with the machine tally.*
>
> *There were discrepancies regarding all candidates, but a huge one regarding Blumenthal. The counters reviewed his numbers and found some errors. But there were single-digit discrepancies for virtually every*

candidate except for the minor-party candidates. Recounts were not done for any race other than Blumenthal's.

Targeted recounts were done on races where supervisors suspected an error might have occurred. Eventually any remaining mismatches were attributed as counting error and not reconciled .

Decided that they were not off by much, and it was likely human error. For example, they were off by 4 across the Dem Party, off by 1 across the R, off by 1 across the Green. No recount done.

There was confusion about the counting of "unknown" votes for Courtney, as he appeared on both the D and WF lines. Tapes indicated 7 unknowns, but some of the counting teams randomly assigned the single vote to one or the other party line. It is unclear to me whether the vote total was impacted by the misunderstanding of how to record those votes.

It was chaotic. They were instructed to count each race separately within a district but some counted all races at the same time. When teams were finished they talked to one another creating a noisier environment while other teams finished. At times no one seemed in charge.

The counters were cramped and had little space to put their stacks. The supervisor gave a general overview of the audit, but each team counted as they pleased. They forgot which was in which stack (no sticky notes available) and had to re-recount their own stacks. They wrote tally numbers on ballots (no sticky notes available) and then erased them. They did a lot of bargaining to match the tape counts. They became tired.

The audit began with 9 ballots more than the tabulator tape produced, which in my mind could explain the total count results.

Experienced observers were complimentary of the work in other towns:

Very well organized. Overall best counting teams I've seen. Smart and efficient. Registrars were great.

Registrar was very firm in having people recount if their vote totals did not match # of ballots in batch.

C.2 Need for Dual Verification

Observers noted that audit counting procedures requiring "two eyes," i.e., dual verification of counts, were frequently ignored. When a large number of ballots are counted by a single individual, miscounts can require tiring recounts and unnecessary investigation. When single individuals count hundreds of ballots or votes, errors are almost inevitable.

Question % Yes:	Nov 2017	Manual Nov 2016	Nov 2014	Nov 2012
Were the ballots counted by each team such that a second election official verified each count?	56%	60%	65%	77%
IF HASH MARKING USED: Did a second official observe that each vote was read accurately?	28%	42%	56%	45%
IF HASH MARKING USED: Did a second official make duplicate hash marks observe that each hash mark was recorded accurately?	24%	36%	59%	36%
IF STACKING/PILES USED: Was the vote counting process such that two election officials verified that each vote was stacked as marked?	42%	83%	58%	64%
IF STACKING/PILES USED: Were the stacks of ballots counted such that two election officials verified that each stack was counted accurately?	54%	100%	56%	54%

Municipalities Audited Where Observers Noted Dual Verification Concerns - Table 5

Comparing only the manual count statistics, over time the double checking in towns that use the hash marking method continues to decline, while the double checking in towns that use the stacking method increased significantly in this audit.

Electronic Audits: In the Electronic Audits, the system prevented the observation of actual ballots being counted. Observers judged that many ballot images displayed were not observed by two officials, and in most cases where two individuals observed ballot images, they could not actually have been verified in the one to three seconds they were displayed.

From observers:

> *For ballot counting, they did double check each stack of 10. They used the stack-by-party method for vote counting. All officials did not double check their stacks, and I believe that's where their mistakes were made.*
>
> *One race was 10 off for the Working Families Party. The counting teams were told this and were asked to recount their hash marks and check their math. It was never resolved.*

C.3 The Importance of Blind Counting

Blind counting is a method of counting without pre-conceived knowledge of the expected outcome. When counting teams know the machine totals or know the differences between their counts and the machine totals, there is a natural human tendency to make the hand count match the machine count. This risks taking shortcuts and seeking unjustified explanations for discrepancies which, in turn, lowers the credibility of the process and undermines confidence in the audit results.

When counters know the election totals or the differences between manual and machine counts, there is a tendency to accept any explanation or any new count that reduces the difference without any additional verification.

Question % Yes:	Nov 2017	Manual Nov 2016	Nov 2014	Nov 2012
Were counters kept unaware of the election totals for the ballots or races they were counting until counting and recounting each race was finally complete?	75%	65%	72%	73%
If initial counts were off, were counters kept unaware of the exact and approximate level of difference?	55%	38%	40%	52%

Municipalities Where Observers Noted Blind Counting Concerns - Table 6

In November 2016 manual counts, when counts were off, 38% of the time counters were informed of the exact or approximate level of difference, while 65% had the counts otherwise available. This continues a slightly improving trend for the better. Yet the wide-spread lack of blind counting greatly reduces the credibility of the audit.

Electronic Audit: One advantage of the Electronic Audit is that knowledge of results by local election officials cannot change the machine result. Yet, we note that without an audit of actual ballots against the machine results, there is no way of confirming that the reported machine results accurately reflect the ballot and vote totals.

From observers:

> *The counters were made aware that the count was off when all of the votes were tallied. Everyone knew what the discrepancies were for allthe candidates.*
>
> *When the first ballot count was off, the supervisor informed the counters that they were off by 3. When the presidential race results were off, the supervisor informed the counters how much they were off.*

C.4 Lack of Written Electronic Auditing Procedures

Electronic Audits: There were no written procedures for the Electronic Audit. There was effective training by the staff of the University of Connecticut, who also assisted the election officials and answered their questions.

The law passed in 2015 authorized Electronic Audits:

> *...provided (1) the Secretary of the State prescribes specifications for (A) the testing, set-up and operation of such equipment, and (B) the training of election officials in the use of such equipment...*

Without written procedures, it is difficult to determine if the Secretary of the State in fact authorized the procedures employed and impossible to assess if authorized procedures were uniformly followed.

Official Audit Report Data Analysis

After the local counting sessions, officials complete and submit the Official Audit Report Forms to the SOTS. Where possible, observers collect copies of the forms at the counting session. We also receive official copies of the forms from the SOTS Office.

The statistics in this section were produced from the official forms. The images of those forms and our detailed data compiled from those forms are available at http://CTElectionAudit.org.

As stated earlier: Without complete reports we cannot analyze and verify the results of the audit, or provide any level of confidence in the optical scanners in those districts, nor in the officials charged with supervising and performing the audits.

Ballot Count Accuracy

Any unexplained difference greater than or approaching the automatic recanvass trigger of 0.5% should be a concern.[32]

Unlike vote counts (discussed later) there can be no "questionable" ballot counts. Any difference in ballot counts must be due to optical scanner or human error. Human errors are not limited to audit hand counts. Scanners or ballots could have been mishandled and incorrectly counted on Election Day, read through the scanner twice, misplaced on Election Day, or subsequently misplaced.

[32] In state-wide contests the margin is much less. in state-wide races, the recanvass trigger is 2000 votes which in a presidential election is approximately 0.12%.

Machine Totals (Tape)	Audit Count	Difference	Percent Difference
2912	2921	-9	-0.3%
1965	1961	4	0.2%
1685	1681	4	0.2%
2061	2064	-3	-0.1%
2845	2848	-3	-0.1%
1431	1429	2	0.1%
385	387	-2	-0.5%
1496	1494	2	0.1%
1013	1014	-1	-0.1%
4075	4074	1	0.0%
3274	3273	1	0.0%
3004	3003	1	0.0%

All Ballot Count Differences in the Audit - Table 7

Based on observer reports, we do not believe that all of the hand counts are accurate because of the questionable counting methods observed. Because of these differences and incorrectly completed reports, we also have no basis to conclude that the scanners counted all ballots accurately, which is the purpose of the audit.

Based on our observations and analysis for this audit, we conclude that the scanners in the primary and manual counters in the audit were both at least generally accurate in counting ballots in those municipalities which provided complete reports.

Most likely some of those incomplete reports are due to lack of attention to detail and a lack of motivation by officials, yet we have no basis to conclude that some of them do not hide errors or intentional fraud. The integrity of the audit depends on complete, accurate work and oversight.

Vote Count Accuracy

Col C Machine Totals (Tape)	Col D Undisputed Vote Totals	Col E Questionable	Col F Total Hand Count (D + E)	Difference (F -D or E - D)	Percent Difference
1110	1084	0	1084	26	2.30%
1263	1287	0	1287	-24	-1.90%
654	646	0	646	8	1.20%
1376	1355	13	1368	8	0.60%
1275	1281	0	1281	-6	-0.50%
1748	1753	0	1753	-5	-0.30%
43	38	0	38	5	11.60%
1481	1464	12	1476	5	0.30%
882	887	5	892	-5	-0.60%
1861	1866	0	1866	-5	-0.30%
1642	1616	21	1637	5	0.30%
0[33]	6	0	6	-6	100.00%
682	677	0	677	5	0.70%
1600	1595	0	1595	5	0.30%
0	5	0	5	5	100.00%
394	387	3	390	4	1.00%
82	86	0	86	-4	-4.90%
0	4	0	4	4	100.00%
665	661	0	661	4	0.60%
1865	1852	9	1861	4	0.20%
425	421	0	421	4	0.90%

Candidate Count Differences 4 or Greater in the Audit- Table 9

The table above presents, by number and percentage, vote differences greater than three between hand-counted votes and machine-counted votes, when all ballots with questionable votes are considered and all votes for cross-endorsed candidates are totaled.

Based on observer reports, **we do not believe that all of the hand counts of votes are accurate**. **Yet there is no way to judge the accuracy of the optical scanners in these districts, leaving little to provide trust in the election results and confidence in officials' abilities to perform their duties.**

[33] This is a write-in count in a district audited by machine. There were three races with write-ins in the audit that were not counted by the AccuVoteOS,

The following tables show the number of candidate counts with various levels of count differences between the optical scanners and the hand counts, after considering that questionable votes may or may not have been countedby the scanners:[34]

Candidate Vote Count Difference Range	Number of Differences in Range	% of All Candidate Counts
0	1243	90.1%
1-3	117	8.5%
4-6	16	1.2%
7-9	2	0.1%
>9	2	0.1%
Average Difference in Votes:	0.23	

Summary of Vote Count Differences-Table 10

Once again, without credible audit reports, the data in this table are of little use in evaluating accuracy or comparing results to earlier elections and primaries.

[34] We give the maximum benefit of any doubt to the scanners, counting a difference only when a scanner counted more votes than the sum of questionable votes and undisputed votes, or when a scanner counted less than the number of undisputed votes.

"Questionable" Votes

Observations and comments from election officials indicate confusion about classifying "undisputed ballots" and about counting "questionable votes." An undisputed ballot is a ballot with no apparent problem or questionable votes on it. A questionable vote is a mark on a ballot that may not have been read properly by the optical scanner. Based on observations, counting teams and registrars demonstrated a variety of interpretations of what constitutes "undisputed" and "ballots with questionable votes." Audit statistics confirm these observations.

Col C Machine Totals (Tape)	Col D Undisputed Vote Totals	Col E Questionable	Col F Total Hand Count (D + E)	Difference (F-D or E-D)	Percent Questionable
1642	1616	21	1637	5	1.3 %
1500	1477	21	1498	2	1.4 %
671	656	16	672	0	2.4 %
2309	2295	16	2311	0	0.7 %
1456	1440	15	1455	1	1.0 %
1436	1425	15	1440	0	1.0 %
20	6	14	20	0	70.0 %
1394	1380	14	1394	0	1.0 %
1229	1217	14	1231	0	1.1 %
1714	1701	14	1715	0	0.8 %
2084	2068	14	2082	2	0.7 %
679	666	13	679	0	1.9 %
1376	1355	13	1368	8	0.9 %
1136	1125	12	1137	0	1.1 %
1481	1464	12	1476	5	0.8 %
1050	1040	12	1052	0	1.1 %
2303	2295	12	2307	0	0.5 %
655	644	11	655	0	1.7 %
1937	1929	11	1940	0	0.6 %
1089	1076	11	1087	2	1.0 %
1118	1108	11	1119	0	1.0 %
910	902	11	913	0	1.2 %
836	829	10	839	0	1.2 %
1447	1434	10	1444	3	0.7 %
1961	1959	10	1969	0	0.5 %
891	881	9	890	1	1.0 %

Col C Machine Totals (Tape)	Col D Undisputed Vote Totals	Col E Questionable	Col F Total Hand Count (D + E)	Difference (F-D or E-D)	Percent Questionable
1033	1026	9	1035	0	0.9 %
1865	1852	9	1861	4	0.5 %
805	799	9	808	0	1.1 %
982	972	9	981	1	0.9 %
1374	1365	9	1374	0	0.7 %
1508	1500	8	1508	0	0.5 %
1014	1007	8	1015	0	0.8 %
889	879	8	887	2	0.9 %
1244	1234	8	1242	2	0.6 %
696	689	7	696	0	1.0 %
936	927	7	934	2	0.7 %
1142	1136	7	1143	0	0.6 %
572	567	7	574	0	1.2 %
920	913	7	920	0	0.8 %
1776	1769	7	1776	0	0.4 %
1746	1737	7	1744	2	0.4 %
568	560	7	567	1	1.2 %
2350	2344	6	2350	0	0.3 %
515	509	6	515	0	1.2 %
2237	2231	6	2237	0	0.3 %
1658	1653	6	1659	0	0.4 %
790	782	6	788	2	0.8 %
1168	1161	6	1167	1	0.5 %
2163	2157	6	2163	0	0.3 %
1551	1547	5	1552	0	0.3 %
798	794	5	799	0	0.6 %
103	96	5	101	2	4.9 %
2136	2131	5	2136	0	0.2 %
882	887	5	892	-5	0.6 %
839	832	5	837	2	0.6 %
1729	1722	5	1727	2	0.3 %
358	356	5	361	0	1.4 %
2044	2038	5	2043	1	0.2 %
1624	1622	5	1627	0	0.3 %
142	138	5	143	0	3.5 %

Col C Machine Totals (Tape)	Col D Undisputed Vote Totals	Col E Questionable	Col F Total Hand Count (D + E)	Difference (F-D or E-D)	Percent Questionable
1085	1081	5	1086	0	0.5 %
2008	2003	5	2008	0	0.2 %
1177	1174	5	1179	0	0.4 %
1227	1223	5	1228	0	0.4 %
1850	1845	5	1850	0	0.3 %
1753	1748	5	1753	0	0.3 %
1307	1306	4	1310	0	0.3 %
1863	1859	4	1863	0	0.2 %
1848	1844	4	1848	0	0.2 %
1751	1752	4	1756	-1	0.2 %
1806	1803	4	1807	0	0.2 %
1771	1767	4	1771	0	0.2 %
376	372	4	376	0	1.1 %
1004	1000	4	1004	0	0.4 %
818	812	4	816	2	0.5 %
459	455	4	459	0	0.9 %
1633	1630	4	1634	0	0.2 %
1597	1593	4	1597	0	0.3 %
128	124	4	128	0	3.1 %
1554	1555	4	1559	-1	0.3 %

Questionable Votes Over 4 - Table 13

About the Citizen Audit

The Connecticut Citizen Election Audit ("Citizen Audit")

Our purpose is to increase integrity and confidence in elections, for the benefit of the voters of Connecticut. We provide independent audit observations, independent audits, and independent reports focusing on the integrity of elections and election administration. We are non-partisan and strive for objectivity and integrity in our work. The Citizen Audit has observed and reported on every general primary and election since the statewide implementation of optical scan voting in Connecticut in 2007.

EXECUTIVE DIRECTOR/BOARD

Significant decisions and reports are approved by majority vote of the Board. Members of the Board are experienced volunteer observers, with diverse skills, political affiliation, and geographic representation. Current members of the Board are:

- Luther Weeks, Executive Director
- Kathleen Burgweger, Jean de Smet, Aaron Goode, Julie Lewin, Tessa Marquis, Jan-Maya Schold, Douglas Sutherland, and Victoria Usher

CITIZEN-POWERED

The Citizen Audit is an entirely volunteer, citizen-powered organization. We appreciate every Citizen Audit volunteer. Without scores of volunteers spending days and hours on each election objectively observing, auditing, and reporting, the promise of publicly verifiable elections could not be pursued and will never be attained.

Acknowledgments

Coordination and editing for this project by Luther Weeks with data entry and verification by Kathleen Burgweger, Nancy Matyasovsky, and Vicki Usher, with editing by Julie Lewin.

We appreciate the responsive and cordial replies to our requests for information from the SOTS Office and from registrars of voters across Connecticut.

Contact/Additional Information

Luther Weeks, Executive Director, Luther@CTElectionAudit.org, 860-918-2115. All reports and additional supporting data are available at http://www.CTElectionAudit.org.

Appendix A. Observation Report Statistics

Question % Yes:	Nov 2016	Manual Nov 2016	Nov 2014	YNov 2012
Were the ballots delivered to the site by at least two individuals?	100%	100%	100%	88%
Were you permitted to observe that ballot container seals were not tampered with?	95%	93%	94%	95%
Were the ballot container seals intact?	100%	100%	91%	97%
Were you able to see the seals and the seal numbers on the Moderator's Return?	90%	100%	72%	86%
Did the supervisor review the state audit procedures with the counting team?	55%	71%	81%	73%
Did the supervisor clarify procedures for everyone before beginning to count ballots?	80%	86%	85%	79%
Did the supervisor review the ballot and vote counting procedures in detail with the counting teams?	75%	71%	79%	78%
Was the total number of BALLOTS counted before the VOTES were counted for races?	67%	93%	89%	70%
Were the BALLOTS counted by each team such that a seco 2nd election official verified each count?	56%	60%	65%	77%
If multiple teams counted BALLOTS, was the totaling independently verified by a second election official?	73%	79%	74%	81%
IF HASH MARKING USED: Did a second official observe that each vote was read accurately?	28%	42%	56%	45%
IF HASH MARKING USED: Did a second official make duplicate hash marks OR observe that each hashmark was recorded accurately?	24%	36%	59%	36%
IF STACKING/PILES USED: Was the vote counting process such that two election officials verified each vote was stacked as marked?	42%	83%	58%	64%
IF STACKING/PILES USED: Were the stacks of ballots counted such that two election officials verified that each stack was counted accurately?	54%	100%	56%	54%
IF HASH MARKING USED: Were you permitted to see that each vote was read accurately?	67%	100%	97%	100%
IF HASH MARKING USED:Were you permitted to see that each hash mark was recorded accurately?	67%	100%	97%	100%
IF STACKING/PILES USED: Were you permitted to see that each vote was placed in a correct stack?	50%	100%	100%	93%

Question % Yes:	Nov 2016	Manual Nov 2016	Nov 2014	YNov 2012
IF STACKING/PILES USED: Were you permitted to see that the count of ballots in piles was accurate?	50%	100%	100%	88%
Were counters kept unaware of the election totals for the ballots or races they were counting until counting and recounting each race was finally complete?	75%	65%	72%	73%
If initial counts were off, were counters kept unaware of the exact and approximate level of difference?	55%	38%	40%	52%
Were votes on questionable ballots ruled upon separately race by race for reporting as questionable votes in the Audit Report?	83%	82%	74%	79%
Were votes on such ballots ruled upon prior to the tallying of votes for each race AND counts not adjusted based on knowledge of the results of the total count for each race?	88%	82%	79%	77%
Did elections officials find a match between machine counts and manual counts at the end of the initial count of each races?	30%	13%	12%	10%
Did elections officials try to resolve mismatched counts by counting again?	83%	88%	61%	79%
Did elections officials try to resolve mismatched counts by changing counting teams?	56%	60%	34%	43%
Did elections officials resolve mismatched counts by the end of the audit?	29%	31%	32%	35%
Were you able to confirm that hashmarks for each team and batch were tallied accurately? (i.e You could confirm that the number of hashmarks matched the total for each group of hash marks.)	42%	67%	77%	97%
Were you able to confirm that the number of ballots from multiple teams/batches was tallied accurately?	55%	80%	76%	90%
Were you able to confirm that the number of votes from multiple teams/batches was tallied accurately?	50%	71%	71%	89%
Did elections officials record counts, including unresolved discrepancies if any, on official forms by the end of the audit?	57%	81%	84%	97%
Were you given an opportunity to have a copy or make a copy of the official forms?	60%	75%	81%	86%
Did the BALLOT counts on the optical scanner tape(s) printed on Electionnight match the tabulator tape ballot count transcribed on the audit report form(s)?	65%	64%	85%	81%
Did the RACE counts on the optical scanner tape(s) printed on election-day match the machine tape race counts transcribed IN COLUMN 'C' on the audit report form(s)	53%	50%	76%	72%
Were the ballots under the observation of at least two individuals at all times during the observation?	83%	88%	97%	85%

Question % Yes:	Nov 2016	Manual Nov 2016	Nov 2014	YNov 2012
Could you confirm that ballots were returned to their proper containers?	96%	94%	94%	97%
Were the ballot containers resealed?	83%	100%	93%	89%
Were seal numbers recorded correctly on forms?	94%	100%	96%	91%
Do you have any concerns over the way the room was laid out?	21%	24%	11%	7%
Do you have any concerns that the auditing was not well-organized?	21%	29%	31%	17%
Do you have any concerns with the integrity of the counting and totaling process?	21%	12%	33%	17%
Do you have any concerns that the manual count was inaccurate?	41%	41%	42%	20%
Do you have any concerns that the officially reported information is inaccurate?	14%	13%	26%	10%
Do you have any concerns with the transparency/observability of the process?	33%	6%	14%	5%
Do you have any concerns with the chain-of-custody?	33%	18%	25%	27%
How many people are required to access ballots? One	27%	31%	46%	62%
Were there any memory card problems in pre-election testing or on Election Day?	25%	29%	40%	63%
Were there any problems with the IVS voting system for persons with disabilities? Or were some not set up?	10%	13%	9%	5%
Were there any other significant events, ballot problems, scanner problems or occurrences before, during, or after the Election?	24%	27%	38%	13%

Observation Report Statistics -Table 15

Appendix B. Our Standing Recommendations

Each of our previous reports included recommendations for the General Assembly and the Secretary of the State. Each year, based on our observation reports and developments in laws and procedures, we consider updating our recommendations. For this report, there are no changes to our standing recommendations, repeated below:

Recommendations

I. Independent Audits

The current system of the conduct of audits by individual towns lacks accuracy, consistency, and professionalism. A nonpartisan, independent audit board or professional team of independent auditors should conduct the audits.

However, if audits continue to be conducted by local officials, we recommend the measures below to improve the security and integrity of Connecticut's election outcomes. Many of these same recommendations would apply if an independent audit board were established, with the board performing many of the audit functions now performed or recommended by the Secretary of the State.

II. Audit Selection, Notification and Reporting

A. Amend PA 07-194 on selection and notification to provide:

1. In elections where federal and/or constitutional statewide offices appear on the ballot, require the Secretary of the State to randomly select the races to be audited during the same public event as the random selection of districts. At least one such race should be randomly selected from those federal races on the ballot and one race selected from statewide races on the ballot.

2. For municipal elections and primaries, require that races randomly selected for audit be chosen by the Secretary of the State for all districts, or at least require that the local drawing of races be announced and held publicly in each selected municipality.

3. Require that towns selected for audit be officially notified of their selection in a legally acceptable form, including an immediate posting of the list of audit sites on the Secretary of the State's website.

4. Require that towns provide ample notice of the scheduling and location of post-election audits to the Secretary of the State and on their municipal websites or local newspapers. We urge the Secretary of the State's office to review how other states are establishing and publicizing the schedule of audits and race selection to ensure maximum public notice and transparency.

B. Amend PA 07-194 to mandate deadlines for:

1. Random selection of audit locations
2. Completion of audits
3. Municipalities' reports of audit results to be sent to the Secretary of the State's office

C. Amend PA 07-194 on reporting to:

1. Mandate a deadline for completion of required reports from UConn. Require that those reports include statistical data on deviations from the standards set in the audit law and reports on any incomplete or missing audit data.
2. Mandate timely publication of a final comprehensive report of each statewide audit. Require that the report include local statistics and analysis from local audit report forms, elections officials' and observers' (if any) comments, and conclusions regarding the effectiveness of the audit. The report should be readily available to the public online.

D. Amend PA 07-194 on reporting to:

1. Require that audit reports be compared to the machine tapes and final election results (including amended results, if applicable) to assure that the correct machine tape counts are recorded.
2. Require that all machine counted ballots be counted in the audit, i.e. including machine counted absentee ballots and Election Day registration ballots.
3. Require that all ballots, including originally hand-counted ballots, be subject to selection for audit.

III. General Provisions

A. Procedures that will yield trusted audits must be specified in law or regulation and must be made enforceable by the State Elections Enforcement Commission. Procedures should also provide a mechanism for the Secretary of State's office to report irregularities to appropriate authorities such as the State Elections Enforcement Commission.

B. The Secretary of State's Office should:

1. Establish mechanisms and controls to audit the audits (log, detect and take action on errors) to assure that prescribed methods are followed. Audit reports that are incomplete or contain obvious or unexplained discrepancies should be rejected by the Secretary of the State's office and corrective action taken by election officials.
2. Increase competency of registrars and election officials in election audits through mandatory educational programs that include ballot security, audit organization, and conduct; the steps and details of the audit procedures; counting methods; and organizing and supervising the audit teams.

C. Amend PA 07-194 to:

1. Mandate investigation and independent analysis of data discrepancies over legally defined limits which are not thoroughly and reasonably explained.

2. Require that copies of the Moderators' Returns and machine tapes be present at the audit for review.

3. Mandate that all ballots in all elections remain sealed until thirty days after all audits and audit investigations are complete. They should be allowed to be unsealed only after the Secretary of the State's notification in writing that the audit and investigations are complete. During that period ballots should only be unsealed temporarily for the purpose of recounts, audits, and state investigations – and resealed whenever audits, recounts, and investigations are complete or continued.

4. Resolve the conflicting demands for any extended audit investigations with the need for re-programming of memory cards in preparation for new elections or referenda.

5. Limit the role that candidates can perform in the post-election audit process. Opposed candidates, even if they are sitting registrars, should not supervise or have official roles in post-election audits. The Secretary of the State's office should develop procedures to identify who will supervise and have an official role in audits in cases of this kind of conflict.

6. Set forth specific and enforceable criteria for chain-of-custody, access logs, and secure storage facilities for ballots, memory cards, and machines.

7. The Secretary of the State's office should establish a system of random unannounced inspections of storage facilities and access logs.

D. Amend PA 15-224, Section 9-307:

When ballots and materials are sealed on election night without completing the closing process, require workable means of notifying the candidates and the public when ballots will be unsealed and counting resumed.

IV. Audit Procedures

A. The Secretary of the State should provide detailed guidance on methods of auditing that are efficient, transparent, specific, and accurate. National efforts should be reviewed, such as California's recently adopted audit procedures, Minnesota's audit practices, recommendations of the Brennan Center, and the *Principles and Best Practices for Post Election Audits*.[35]

[35] http://www.electionaudits.org/principles

B. The Secretary of the State should amend procedures to:

1. Remove the subjectivity associated with the identification of what constitutes an undisputed ballot and a ballot containing a questionable vote.

2. Require all tallies to be performed in public, and audit reports to be filled out as part of the actual public audit and displayed publicly at the end of the audit with the tally sheets.

3. Revise the audit procedures to more clearly require the counting and reporting of all votes for candidates by party, by party unknown, and to count and report write-in bubbles in audited races, and any write-in votes found outside of write-in envelopes.

V. Public Involvement

Observers' rights should be established in law. As long as observers don't interfere with the hand counting process, the public should be allowed to observe and verify all phases of the election audit from district and race selection through any follow-up investigation.

VI. Random District Selection Integrity

So that the random district selection is publicly verifiable and more accurate, with mechanisms for re-establishing audit integrity in the case of errors discovered:

A. Amend Sec. 9-50b to:

> Require registrars to maintain an accurate list of districts with the Secretary of the State for inclusion in the Central Voter Registration System (CVRS), with each district identified by a unique district number for the municipality.

B. Amend Sec 9-314 to:

1. Require the Head Moderator to submit to the Secretary of the State copies of each district Moderator's Return and all closing scanner tapes from the election or primary with the Head Moderator's Return shortly after the election or primary. Provisions for later amended returns should also be included. Each district should be identified by unique district number for the municipality as listed in the CVRS.

2. Require the Secretary of the State to make available copies of the District Moderators' Reports and Head Moderators' Reports for public review.

C. Amend PA 07-194 to:

1. Require the Secretary of the State to make available a copy of an extract of districts from the CVRS for public review at the random district drawing.

2. Require that each district in the drawing be identified by municipality and by the unique district number listed in the CVRS and the district reports.

3. In the case of errors discovered after the drawing or in the list of districts for random selection (omissions, non-existent districts, or ambiguities), require that they must be, by law, resolved in

a way that restores the integrity of the audit. For example, when selected districts are ambiguous, audit integrity could be restored by clarifying the ambiguity. When districts are omitted from the drawing, integrity could be restored by auditing those districts.

VII. Election Law and Procedure Changes to Count All Write-Ins

1. Change the law and closing procedures to require that write-in bubbles be hand counted and compared to the tape, race by race, and that both numbers be reported in the Moderator's Return. If the counts do not match, officials should be required on election night to find missing write-in ballots in the main bin and to count any registered write-in votes on those ballots.

2. Change audit procedures to require that the audit count write-in bubbles[36] in races audited on ballots in the write-in envelope report those numbers on the audit report, and to report any write-in ballots found outside of the write-in envelope.

[36] Write-in bubbles are counted by scanners. They result in write-in ballots which are placed in a separate bin in the scanner. The purpose of the bin is to accumulate those ballots so that write-in votes can be counted by election officials. Write-in votes are votes writtenin by the voter for registered write-in candidates. Many write-in bubbles and write-in ballots do not result in actual write-in votes.

Appendix C. Methodology

The following activities were performed in the course of the project to organize observers, collect data, and analyze data for the report. They are in approximate time sequence:

- Just prior to the election, we emailed past observers an invitation to sign up on the web to observe local counting sessions specifying the dates they were available to observe and the distance they were willing to travel to an observation. Observers were encouraged to provide at least three availability dates and volunteer to travel at least 35 miles. Observers were also instructed to sign up for a conference call training session and were emailed training materials, including access to video training.
- Our observers attended and participated in the random drawing of districts to be audited. After the drawing, the SOTS Office issued a press release with the list of selected districts and selected alternate districts.
- Municipalities and districts in the drawing were recorded in our Audit Database. We sent emails, made calls, and left voice mails with registrars of voters of the selected municipalities, to learn the dates and times of their local audit counting sessions.
- Observers participated in conference call and web video trainings in the days prior to the start date of the local audit counting sessions, which began 15days after the election.
- Starting shortly after the drawing and extending through the audit period, as the audit dates were obtained from local officials, observers were matched and tentatively scheduled for upcoming local audit counting sessions. Some audit dates were forwarded to us from the SOTS Office as that office was informed of dates by local officials. Often schedule changes were made when observers were unable to observe a tentatively scheduled audit. Some observers signed up for additional dates. Others volunteered to observe additional audits.
- **Electronic Audits:** One-half business day before the Electronic Audits, the Secretary of the State's Office provided us with the tentative schedule of the Electronic Audits.
- Observers attended audits, completed paper Observation Report Forms,[37] and, where possible, collected draft or final copies of the official SOTS Audit Report Forms found on the last page of the Official Audit Procedures. Copies of some Audit Report Forms were mailed or scanned by observers for early data entry. Observers submitted most Observation Report Forms, using the SurveyMonkey tool, while some mailed or emailed paper forms for data entry by the Citizen Audit.
- **Electronic Audits:** Three Citizen Audit volunteers observed, videotaped, and reported on the electronic audits which were held in the at the Secretary's offices at 30 Trinity Street, Harford.
- We reviewed Observation Reports and consolidated multiple reports from the same municipality.

[37] http://ctelectionaudit.org/ObservationReportForm.pdf

- The SOTS Office provided copies of received Official Audit Report Forms to us on February 23, 2017.
- We completed data entry of all Official Audit Report Forms based on the official data.
- Data and Observation Reports were analyzed and compared with past results, and this report was created.