0 Connecticut Citizen Election Audit

24 Audits Since 2007 with Little Improvement: Citizen Post-Election Audit Report

Independent Observation and Analysis of Connecticut's Audit of the 2022 General Election Tabulation

February 14, 2023

Government-required post-election vote audit, of the November 2022 elections, failed to meet basic audit standards. Audits should provide voters with justified confidence in elections. Instead, these audits reduce our confidence in election officials:

▼ **The audits were not conducted and reported as required by law. The Secretary of the State's Office continues to fail to take responsibility for that failure by local officials.**

▼ **Human error was still considered an acceptable explanation of differences between machine and manual counts. This defeats the purpose of the audits.**

▼ **Weaknesses in ballot chain-of-custody and security procedures remain. These procedures are necessary for confidence that ballots were not tampered with between the election and the municipal audit counting sessions.**

▼ **The short schedule for audits and dates for electronic audits not announced sufficiently in advance causes both registrars and the Citizen Audit to scramble to conduct and observe audits. – they should be added to the annual election calendar months in advance.**

▼ **At least three municipalities with new registrars who had not performed audits previously. This resulted in various failures to follow procedures and in one case failure to allow transparency required by the procedures.**

We are pleased with the following developments:

▲ **Electronic audits again included random manual verification comparing some paper ballots to Cast Vote Records produced by the audit station.**

▲ **There was a significant reduction in the number of incomplete forms.**

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Introduction

Connecticut statutes require the Secretary of the State and registrars of voters to conduct audits after every election and primary.

After the November 2022 Election, Connecticut conducted its 24th large-scale post-election audit.[1] This was also the 23rd large-scale audit observation[2] 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 15 days observing 15 audit 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 of districts to be audited to the official report of each post-election audit produced by the University of Connecticut Voter Center (UConn).

[2] For the 2020 post-election audit because of COVID we did not solicit citizen observers. We did observe about one-half of the counting sessions (most of those observed were electronic audits). We did not collect sufficient data to make a full report.

Findings

We conclude, based on citizen observations and analysis of official municipal audit reports, post-election vote audits of the November 2022 elections failed to meet basic audit standards. Audits should provide voters with justified confidence in elections. Instead, these audits reduce our confidence in election officials:

▼ **The audits were not conducted and reported as required by law. The Secretary of the State's Office continues to fail to take responsibility for that failure by local officials.**

▼ **Human error was still considered an acceptable explanation of differences between machine and manual counts. This defeats the purpose of the audits.**

▼ **Weaknesses in ballot chain-of-custody and security procedures remain. These procedures are necessary for confidence that ballots were not tampered with between the election and the municipal audit counting sessions.**

▼ **The short schedule for audits and dates for electronic audits not announced sufficiently in advance causes both registrars and the Citizen Audit to scramble to conduct and observe audits. – they should be added to the annual election calendar months in advance.**

▼ **At least three municipalities with new registrars who had not performed audits previously. This resulted in various failures to follow procedures and in one case failure to allow transparency required by the procedures.**

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 scheduled in advance, complete, and publicly verifiable.
Recommendation: The Secretary of the State should provide qualified staff to train and conduct the audits as needed.

We are pleased with the following developments:

▲ **Electronic audits again included random manual verification comparing some paper ballots to Cast Vote Records produced by the audit station.**

▲ **There was a significant reduction in the number of incomplete forms.**

We emphasize that this report does not question any election official's integrity. Most election officials are well motivated and of high integrity, as are other public officials. However, unquestioned 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.

Connecticut Continues Flawed Electronic Audits

Summary

We were pleased that the UConn Voter Center again included random manual verification comparing some paper ballots to Cast Vote Records produced by the audit station.

These manual verifications were improved over the last several years, yet inexplicably removed in the 2021 audits.

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, higher accuracy and greater confidence. They bring us closer to true Risk Limiting Audits.

For complete details on Connecticut's electronic audits and the alternative of Electronically-Assisted Post-Election Audits, see Appendix B.

Audit Background

After the November 2022 Election, Connecticut conducted its 24th large-scale post-election audit.[3,4] This was also the 23rd large-scale audit observation by 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 (SOTS) 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 is required, after each election, to select at random 5%[5] of Connecticut's voting districts to participate in post-election audits. In the random drawing 38 voting districts and no central count absentee locations were selected. The audited districts observed were located in 24 municipalities. The audit counting sessions were required to be conducted between November 23, 2022 and November 30, 2022. The short time period with Thanksgiving included, made it difficult for the Citizen Audit to cover the usual number of local counting sessions.

Citizen Audit volunteer observers invested 15 days observing 15 local counting sessions[6] during this period. Observers frequently attended audits on short notice, observed multiple audits, and accommodated last minute changes to the audit schedule.

The short schedule for audits and dates for electronic audits not announced sufficiently in advance caused both registrars and the Citizen Audit to scramble to conduct and observe audits – they should be added to the annual election calendar months in advance. This is the cause of significantly fewer municipalities choosing electronic audits and fewer Citizen Audit observations. With the electronic audits announced just a couple business days in advance, several registrars told us that was why they were not able to participate in them this year.

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.

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[3] 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.

[4] Connecticut statutes require the Secretary of the State and registrars of voters to conduct audits after every election and primary.

[5] Effective July 1, 2016 the post-election audits were reduced by the General Assembly from 10% to 5% of districts.

[6] We were unable to send observers to every audit and we were unable to match some who volunteered with audits on dates they were available, in their areas of the State.

Purpose of Connecticut's Random, Post-Election Audits

As stated in the Office of the Secretary of the State's Post-Election Audit Procedures:[7]

The primary purpose of the hand count[8] 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,"[9] 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*

[7] Official Procedures: http://ctelectionaudit.org/2016/AuditProcedure201605.pdf

[8] Hand count means the manual counting of ballots and votes without relying on voting machines such as optical scanners.

[9] 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 calls, 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 to the public and 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.[10]

[10] 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 their municipality.

Analysis

We Do Not Question Any Election Official's Integrity

This report does not question any election official's integrity. Most elections officials are well motivated and of high integrity, as are other public officials. However, unquestioned trust and lack of knowledge can lead to a lack of vigilance that allows 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.[11] 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 6 of the 12 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.[12]

[11] Our latest forms used for this observation is available at: http://ctelectionaudit.org/Forms/ObservationReportM.pdf and http://ctelectionaudit.org/Forms/ObservationReportE.pdf for the manual and electronic audits, respectively.

[12] In 2015, Public Act 15-224 authorized the Secretary of the State to designate enforceable procedures, yet the audit procedures have not been so designated. There are long-standing manual audit procedures, yet none have been published for electronic audits.

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. After over a decade of optical scanner use, 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 to be sealed only until the 14th day after the election, yet the audits do not start until the 15th day after the election, while the Secretary of the State interprets the law such that ballots must be sealed until they are destroyed after 22 months or 6 months. 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 the 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[13] 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 the foundation for the integrity of elections. Secure, credible chain-of-custody procedures should prevent the opportunity for a single individual to have any unobserved extended access to ballots, providing the opportunity for an individual to substitute or modify ballots.

B. Laws and Procedures Are Not Followed or Understood

Problems uncovered in this year's observation include: incorrectly completed forms, chain-of-custody concerns, inconsistent counting methods, error-prone, confusing totaling processes, and problems with totaling results.

The Official Audit Procedures[14] were frequently not followed, were 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.

Our observations indicate that some municipalities 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 it was clear that election officials were not 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

[13] While useful, ballot bag seals, which are small plastic or plastic and metal numbered devices, supposed to not be reusable, 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/ See a video demonstration of how to compromise such seals here: https://www.youtube.com/watch?time_continue=2&v=ZtzLlfULnbI

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

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

B.1 Write-in Problems Reduced

Unlike past years, this year produced no reports of write-in ballots read through scanners twice on Election Day.

We are pleased with this continuing improvement over the years.

Tracking instances of compliance with the requirement that hand-counted and write-in ballots are sealed in separate envelopes on election night still shows many instances where this law is ignored.

B.2 As in the Past, Official Audit Reports Were Not Sent or Not Tracked by the SOTS Office

We have no reason to believe this has changed. For this audit, as of the date of publication, despite numerous promises, we have not received copies of the official audit report forms from the Secretary of the State's Office. Instead we are using the completed, signed forms collected by observers or obtained by Citizen Audit Freedom of Information requests to individual registrars.

B.3 Twelve Incorrectly Completed Forms, and Incomplete Audit Counting

As in the past, for some reports we can make assumptions and fill in missing data.

We are equally concerned that such reports in the past were 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 and, where necessary, require the audit be repeated.

Without complete reports we cannot analyze or verify the results of the audit. Thus we cannot 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.

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

	2022	2018	2016	2014[15]
Number of ballots counted by hand or machine not filled in or filled in incorrectly	1	11	1	2
Some columns not completed and/or incorrectly completed	1	2	2	6
Minor arithmetic/transcription errors	2	5	0	6
Reports with negative counts of questionable ballots	0	0	0	0
Fewer races or candidates counted than required by law	0	0	0	4
Missing reports from SOTS	N/A	N/A	0	1
Differences attributed to questionable votes, but not reported in Col. E. Or not enough reported.	0	2	1	0
Cross-endorsed candidates not counted as such	9	1	5	12
Total incorrect or missing reports	12[16]	15	9	25
Districts selected	38	38	38	77
Rate of incomplete reports	32%	39%	24%	32%

Errors in Official Report Forms - Table 1

Incomplete data should be taken seriously. The Secretary of the State should not accept incomplete forms. They should insist that forms be filled out. Where necessary, SOTS should perform investigations, including recounting ballots or votes. 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 and our data compiled from those reports can be viewed at: http://www.CTEectionAudit.org

In recent years, we noted a continuing trend of improvement. Especially this time there were fewer reports missing data. Reports missing data can make it impossible to interpret the results of the audit.

From officials:

Secretary of State Audit Report form instructs submission by facsimile to a dead phone number. Submission instructions on the Audit Report form needs to be updated.

Talking to the registrars before the audit started, they expressed some concern that the SOTS did not provide enough relevant training going into the process. They also felt that towns should not audit themselves, but there should be an independent auditor (as there routinely is for financial audits). [From one of the Municipalities with two new registrars[17]]

[15] We present several tables in this report from the 2018, 2016, and 2014 audits. Even-year, State and Federal elections are more comparable than odd-year elections and the elections for Governor every four years are even more comparable.
[16] Some district reports had more than one error, counted only once in this total.
[17] All comments from observers and officials are edited for clarity and grammar. Comments by the Citizen Audit are in brackets[].

The registrars recommended that the audit be conducted by SOTS as an independent and professional process, rather than by town officials. In discussion about the Electronic Audit, it was recommended that the capability be provided in each region so that towns can more conveniently utilize the system.

[The Citizen Audit concurs with these comments]

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

	2022	2018	2016	2014
Reports attributing differences in counts to "Human Error"	**4**[18]	**5**	9	16
Rate of "Human Error" excuse in official reports	**10.5%**	**13%**	24%	21%

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. Hand counts which are inaccurate do not imply that machine counts were accurate.

[18] Counts are significantly reduced, because the audit was reduced to 5% of districts from 10% of districts prior to 2016. Also, "Human Error" is not a reasonable explanation for electronic audits.

Registrars submitting and the SOTS Office accepting reports with "Human Error" as explanations 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.

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, evaluated, and reported accurately.

B.5 Multiple Chain-of-Custody Concerns

In several municipalities,[19] observers expressed concerns with chain-of-custody and ballot security.

Question % Yes:	2022	2018	2016	2014
Do you have any concerns with the chain of custody?	**42%**	**22%**	33%	35%
A single individual can access ballot containers in storage.	**78%**[20]	**63%**	27%	46%

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, numbered 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 78% 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.[21] 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.**

From observers:

[19] We did not observe every characteristic of every audit counting session that we attended. Some questions did not apply; in some cases observers could not fully observe audits that continued beyond one day, etc.
[20] Rates cannot be compared year to year, as the question was changed in 2018 to more accurately reflect physical security. Previous questions accepted two-person security based only upon an *honor system*.
[21] 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

Each polling site had a safe where ballots were placed on election night, and the one for the audited district was in the ROV office, locked, when the group arrived in the morning. Within the safe, the ballots were stored in bags that were not sealed.

Ballot bags are kept in locked storage cabinets in the room of the audit. The one fellow that I thought was a supervisor (turns out not to be) reported that he had taken the bags out and waited for two supervisors to open them.

Ballots were sealed in a bag, then one Registrar took the ballot bag back to the office alone to lockit in the cabinet.

One Registrar put the ballots in cardboard boxes, sealed them with tape, put them on top of the ballot lock box, and rolled them out of the room to storage. The ballots were not returned to the ballot bags and resealed, even though seals were on the table ready to go. It seemed the Registrar did not want to be bothered with it.

Opened before scheduled start time.

C. Training and Attention to Counting Procedures Are Inadequate and Inconsistently 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 Manual Audit %Yes:	2022	2018	2016	2014
Do you have any concerns that the auditing was not well-organized?	33%	33%	38%	31%
Do you have any concerns that the manual count was inaccurate?	36%	21%	33%	41%
Do you have any concerns that the officially reported information is inaccurate?	10%	14%	13%	26%
Do you have any concerns with the transparency/observability of the process?	25%	0%	6%	6%

Municipalities Where Observers Noted Procedural Concerns Manual Audit - Table 4

There were at least three municipalities with new registrars, none of which had previously performed audits. This resulted in various failures to follow procedures and in one case failure to allow transparency required by the procedures. It shows in the statistics above and in the observer comments.

From observers:

There was a table at the entrance to the room designated "Observation Area". I was not permitted to advance from the table. There was barely any communication between me and the Supervisors whose backs were to me. The only observations that I could make were too far away to be anything other than speculation… I do believe in the integrity of the persons involved. I do believe that the casual and uninformed approach to the process could lead to unintended errors and certainly opens wide the door to speculation. Again, I do not believe that there was any reason to doubt the genuine desire to honestly complete the audit, I'm not comfortable with being kept away and having little interaction with the supervisors or the counting teams

Everyone seemed to have a copy of the Audit Procedure Manual, but the Moderator ignored it for the most part and was making it up as she went along… The Moderator ran things. She started out instructing they count ballots and votes at the same time, but did give up on that idea after it turned into chaos. There were no prepared tally sheets. The counters were told to make their own until they figured out that was not working well either. There was only one tally sheet per team. There was very little room at the one table and counted/uncounted ballots were getting mixed up.

[One registrar] said I was not supposed to ask him questions – I disputed.

What a mess. There was no preparation or organization. The Registrars delegated all responsibility to one Deputy Registrar who had only been on the job a couple weeks and to a Moderator. Note the Moderator who was running the audit, had an accident a few days before and was limping around the room with one brace on her leg and one brace around a broken hand/fingers. The failures are noted all through this report. The group frustration grew; it started out bad and just got worse as the day went on, until they all just gave up. Tally paper was flying everywhere and disorganized… They were all using calculators with no print-out. I was told to stop looking over their shoulder because it made them nervous and caused errors.

Too many times people were standing around with nothing to do. No post-it notes to keep track of what had been done to each batch, though the way it was organized you didn't really need it as they kept it going in a certain order. I'm sure the discrepancies between the machine and manual counts was due to human error because of the lack of double-checking.

One municipality did an exemplary job:

There were 3 teams of two persons counting ballots at separate tables. The counters were provided Audit Tally Sheets designed specifically by the Registrars for the purpose of the audit. The two Registrars sat nearby at the main conference room table with a laptop, and together entered the accumulation of batch tally sheet counts into a spreadsheet predesigned for the purpose of the audit. The live spreadsheet was projected onto a screen behind the registrars so all could observe.

C.2 Need for Dual Verification

Observers noted that audit counting procedures requiring "two eyes," i.e., dual verification of the count of each individual ballot, 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 Manual Audit %Yes:	2022	2018	2016	2014
Were the ballots counted by each team such that a second election official verified each count? [Two eyes]	**33%**	**60%**	60%	65%
IF HASHMARKING USED: Did a second official observe that each vote was read accurately? [Two eyes]	**63%**	**64%**	42%	56%
IF HASHMARKING USED: Did a second official make duplicate hashmarks observe that each hashmark was recorded accurately?	**75%**	**50%**	36%	59%
IF STACKING/PILES USED: Was the vote counting process such that two election officials verified that each vote was stacked as marked? [Two eyes]	**50%**	**50%**	83%	58%
IF STACKING/PILES USED: Were the stacks of ballots counted such that two election officials verified that each stack was counted accurately? [Two eyes]	**50%**	**50%**	100%	56%

Municipalities Audited Manually Where Observers Noted Dual Verification Concerns - Table 5

Comparing only the manual count statistics over time, the use of double checking continues to vary.

From observers:

Each individual counted on her own, at her own pace.

Informed counters of the races they were counting, use of hashmarks but no mention of double-checking, and who does what.

Question Electronic Audit %Yes:	2022	2018	2017
While you were observing, in your judgment, did two local election officials focus their attention on each ballot?	**40%**	**50%**	88%
While you were observing, in your judgment, did local officials have enough time to confirm that the Audit Station correctly classified each bubble on a ballot for 90% of the ballots?	**67%**	**50%**	13%
While you were observing, in your judgment, did local officials have enough time to confirm that the Audit Station correctly counted each vote on each ballot, in the columns on the right for 90% of the ballots?	**0%**[22]	**0%**	0%

Electronic Audit Concerns - Table 6

Electronic Audit: The system prevented the observation of actual ballots being counted. Yet in some instances all ballots were not observed or scrolled through by either official. Observers judged that most ballot images displayed were observed by two officials. Yet, when two individuals observed ballot images, they could not actually have verified the counts on the right in the one to three seconds the ballot images were displayed - especially since, as in 2017, all count results were not displayed on the screen because of Audit Station limitations and the large number of candidates and races.

There have been significant improvements in the use of the Audit Station bringing it closer to the promise of Electronically-Assisted Post-Election Audits.

For complete details on the shortcomings of Connecticut's electronic audits and the alternative of Electronically-Assisted Post-Election Audits, see Appendix B.

[22] In 2022, 2018, and 2017 several of the contest results did not fit on the screen.

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, lower the credibility of the process and undermines confidence in the audit results.

Question Manual Audit %Yes:	2022	2018	2016	2014
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?	**38%**	**73%**	65%	72%
If initial counts were off, were counters kept unaware of the exact and approximate level of difference?	**13%**	**38%**	38%	49%

Municipalities Where Observers Noted Blind Counting Concerns - Table 7

In November 2022 when manual counts were off, 87% of the time counters were informed of the exact or approximate number of discrepancies. 38% percent of the time the scanner counts were available. This wide-spread lack of blind counting greatly reduces the credibility of the audit. This is a trend in the wrong direction from past years.

From observers:

> *They were kept unaware of the ballot total and the count matched on the first count. They were kept unaware of the vote totals until one race was off by six votes. Then the difference was disclosed and all counters were instructed to hunt down the six votes.*

Electronic Audit: One advantage of the Electronic Audit is that knowledge of results by local election officials cannot change the machine results. Yet we note that with a manual audit of actual ballots against the Audit Station results, like this year, there is evidence to confirm that the reported electronic audit results accurately reflect the cast ballot and vote totals.

C.4 Lack of Written Electronic Auditing Procedures

Electronic Audit: There were no written procedures for the Electronic Audit. There was some training by University of Connecticut staff, 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, if any, were uniformly followed.

From observers:

> *Electronic Audits: Same trainer, but instructions varied from municipality to municipality.*

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. The Citizen Audit obtained most of the rest of the official forms by Freedom of Information Act requests of registrars.

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.[23]

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, or both. Human errors[24] 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.

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

[24] Ultimately, almost all errors are human errors in counting, software programming, election setup, or failing to follow procedures. Exceptions would include hardware errors or fraud.

Machine Totals (Tape)	Audit Count	Difference	Percent Difference
997	992	5	0.5 %
549	551	-2	-0.4 %
2208	2209	-1	0.0 %
1155	1156	-1	-0.1 %
1906	1907	-1	-0.1 %
2460	2459	1	0.0 %

All Ballot Count Differences in the Audit - Table 8

Not included in this table is the single district where the report neglected to include ballot counts for both columns.

In these districts it is unlikely that a significant number, if any, of write-in ballots were fed twice into the scanner. This aspect of the elections is likely being conducted better, perhaps because of our efforts in identifying the problem in earlier audits. We note that such continuous improvement is one of the benefits of conducting audits.

We conclude that the scanners in the election and manual counters in the audit were both at least generally accurate in counting ballots in those municipalities which provided complete reports.

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
30	11	0	11	19	63.3 %
891	904	0	904	-13	-1.5 %
708	692	4	696	12	1.7 %
769	757	2	759	10	1.3 %
996	1005	0	1005	-9	-0.9 %
729	720	2	722	7	1.0 %
30	23	0	23	7	23.3 %
1161	1154	0	1154	7	0.6 %
881	888	0	888	-7	-0.8 %
815	804	4	808	7	0.9 %
950	943	1	944	6	0.6 %
449	443	0	443	6	1.3 %
715	705	4	709	6	0.8 %
459	425	28	453	6	1.3 %
415	410	0	410	5	1.2 %
1118	1113	0	1113	5	0.4 %
533	538	5	543	-5	-0.9 %
908	903	0	903	5	0.6 %
908	903	0	903	5	0.6 %
397	393	0	393	4	1.0 %

674	678	0	678	-4	-0.6 %
397	393	0	393	4	1.0 %
1210	1214	0	1214	-4	-0.3 %
916	912	0	912	4	0.4 %
200	204	0	204	-4	-2.0 %
1039	1027	8	1035	4	0.4 %

Candidate Count Differences Greater than 3 in the Audit- Table 9

The table above and on the previous page presents, by number and percentage, vote differences greater than three between hand-counted votes and machine-counted votes, after 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**, t**here 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.**

The following tables show the number of candidate counts, with varying count differences between the optical scanners and the hand counts, after considering that so called questionable votes may or may not have been counted by the scanners:[25]

Candidate Vote Count Difference Range	Number of Differences in Range	% of All Candidate Counts 2022	2018	2016	2014
0	191	70.0%	64.6%	90.1%	66.2%
1-3	56	20.5%	15.5%	8.5%	26.3%
4-6	16	5.9%	4.4%	1.2%	4.1%
7-9	6	2.2%	0.6%	0.1	1.2%
>9	4	1.5%	5.0%	0.1	2.2%
Average Difference in Votes:		0.92	1.76	0.23	1.86

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 of the scanners or comparing results to earlier elections and primaries.

[25] The maximum benefit of any doubt is given to the scanners, counting a difference only when a scanner counted more votes than the sum of questionable 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. The following chart extends over multiple pages.

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
479	445	38	483	0	7.9 %
470	461	36	497	0	7.7 %
464	427	35	462	2	7.5 %
478	445	32	477	1	6.7 %
499	467	32	499	0	6.4 %
459	425	28	453	6	6.1 %
863	838	27	865	0	3.1 %
879	854	25	879	0	2.8 %
1665	1666	14	1680	-1	0.8 %
1102	1092	10	1102	0	0.9 %
919	911	10	921	0	1.1 %
858	849	9	858	0	1.0 %
1033	1028	9	1037	0	0.9 %
524	515	9	524	0	1.7 %
809	805	9	814	0	1.1 %
802	795	9	804	0	1.1 %

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
627	618	9	627	**0**	1.4 %
834	826	8	834	**0**	1.0 %
679	674	8	682	**0**	1.2 %
1485	1478	8	1486	**0**	0.5 %
744	736	8	744	**0**	1.1 %
622	614	8	622	**0**	1.3 %
1039	1027	8	1035	**4**	0.8 %
844	836	8	844	**0**	0.9 %
292	292	7	299	**0**	2.4 %
810	802	7	809	**1**	0.9 %
839	830	7	837	**2**	0.8 %
487	481	6	487	**0**	1.2 %
629	623	6	629	**0**	1.0 %
291	285	6	291	**0**	2.1 %
762	758	6	764	**0**	0.8 %
882	875	6	881	**1**	0.7 %
762	762	6	768	**0**	0.8 %
1514	1514	5	1519	**0**	0.3 %
533	538	5	543	**-5**	0.9 %
340	340	5	345	**0**	1.5 %

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
752	748	5	753	**0**	0.7 %
690	687	5	692	**0**	0.7 %
643	640	5	645	**0**	0.8 %
994	989	5	994	**0**	0.5 %
449	445	5	450	**0**	1.1 %
815	804	4	808	**7**	0.5 %
600	596	4	600	**0**	0.7 %
386	382	4	386	**0**	1.0 %
937	934	4	938	**0**	0.4 %
1027	1022	4	1026	**1**	0.4 %
675	670	4	674	**1**	0.6 %
616	611	4	615	**1**	0.6 %
1027	1023	4	1027	**0**	0.4 %
329	328	4	332	**0**	1.2 %
708	692	4	696	**12**	0.6 %
715	705	4	709	**6**	0.6 %

Questionable Votes Over 3 - Table 12

	2022	2018	2016	2014
Overall % Questionables	0.49%	0.59%	0.31%	1.37%
Counts over 12 Questionables	9	23	11[26]	45

Trend in Questionable Votes -Table 13

[26] Starting in 2016 the audit was 5% of districts, so compared to 10% audits in previous years, such as 2014 would be about double the number for the same percentage.

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, except for 2020.

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, Mary Rydingsward, Douglas Sutherland, and Victoria Usher

CITIZEN-POWERED

The Citizen Audit is an entirely volunteer, citizen-powered organization. We appreciate every Citizen Audit volunteer. Without dozens 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 for this project by Luther Weeks.

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

Contact/Additional Information

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

Appendix A. Observation Report Statistics

Percentage answer Yes:	Manual Nov 2022	Manual Nov 2018	Manual Nov 2016	Elec Nov 2022	Elec Nov 2018	Elec Nov 2016
Did the supervisor review the audit procedures with the counting team?	50%	77%	71%	100%	50%	17%
Did the supervisor clarify procedures for everyone before beginning to count ballots?	67%	86%	86%		0%	67%
Did the supervisor explain that two individuals should observe each ballot on the screen and verify that bubbles are correctly classified by the Audit Station?				100%	43%	
Did the supervisor explain that two individuals should verify the counts on the right of the screen match the bubbles on each ballot?				0%	0%	
Did the supervisor explain the ballot and vote counting procedures in detail with the counting teams?	44%	77%	71%			
Were the ballots delivered to the site by at least two individuals?	100%	100%	100%	100%	100%	100%
Were you permitted to observe that the ballot seals were not tampered with?	100%	100%	93%	100%	100%	100%
Were the ballot seals intact?	100%	100%	100%	100%	100%	100%
Was there a separate envelope for hand counted ballots in the ballot container?	14%[27]	50%			100%	
Was there a separate envelope for write-in ballots in the ballot container?	11%	33%			75%	
Was the total number of ballots counted before the votes were counted for races?	78%	80%	97%			
Were the ballots counted by each team such that a 2nd official verified each count?	33%	60%	60%			

[27] For 2022 statistics appearing only in the Manual column represent the % for the year for manual and electronic audits.

If multiple teams ballots, was the totaling independently verified by a 2nd official?	29%	73%	79%			
If you concentrated could you confirm that the Audit Station correctly classified each bubble on each ballot?				100%	25%	
If you concentrated could you confirm that the Audit Station correctly counted each vote on each ballot, in the columns on the right of the screen?				0%	0%	
While you were observing, in your judgement, did two local election officials focus their attention on each ballot?				67%	50%	
While you were observing, did one of the officials ask to slow down or to go back to review previous ballots?				100%	88%	
While you were observing, in your judgment, did local officials have enough time to confirm that the Audit Station correctly classified each bubble on a ballot for 90% of the ballots?				100%	50%	
While you were observing, in your judgment, did local officials have enough time to confirm that the Audit Station correctly counted each vote on each ballot, in the columns on the right for 90% of the ballots?				0%	0%	
If hashmarking was used: Did a 2nd official observe that each vote was read accurately?	63%	64%	42%			
If hashmarking was used: Did a 2nd official make duplicate hashmarks OR observe that each hashmark was recorded accurately	75%	50%	36%			
If sorting and stacking was used: Was the vote counting such that a 2nd official verified that each vote was stacked as marked?	50%	50%	83%			
If sorting and stacking was used: Were the stacks of ballots counted such that a 2nd official verified that each stack was counted accurately?	50%	50%	100%			

Did the Audit Station have problems reading ballots on colored/tinted stock?				0%	0%	
Did the Audit Station have problems reading folded or creased ballots?				0%	33%	
Did the Audit Station have problems reading absentee or Election Day Registration ballots?				0%	0%	
Did the Audit Station have equipment/hardware problems with the scanner, computer, or projector?				0%	33%	
Did the Audit Station have problems that required reprogramming/relearning the Audit Station district ballot format?				0%	17%	
Did the Audit Station have other software problems with the scanner or computer?				33%	17%	
If hashmarking was used: Were you permitted to observe that each vote was read Accurately?	89%	100%	100%			
If hashmarking was used: Were you permitted to observe that each hashmark was recorded accurately?	89%	100%	100%			
If sorting and stacking was used: Were you permitted to observe that each vote was placed in the correct stack?	50%	100%	100%			
If sorting and stacking was used: Were you permitted to see that the count of ballots in piles for each race was accurate?	50%	100%	100%			
Were counters kept unaware of the tabulator totals for the ballots or races they were counting until counting and recounting each race was finally complete?	38%	73%	65%			100%

If initial counts were off, were counters kept unaware of the exact and approximate level of differences? I.e. No indication was given of the amount a count was off.	13%	38%	38%			100%
Were questionable votes on ballots ruled upon separately, vote by vote, rather than all votes on such ballots all classified as questionable, when some were not questionable?	63%	86%	82%			86%
Were questionable votes ruled on prior to the tallying of votes for each race AND counts not adjusted based on knowledge of the results of the differences in counts for each race?	67%	92%	82%			100%
Did officials find a match between machine counts and manual counts at the end of the initial count of each race?	14%	21%	13%			71%
Did officials try to resolve mismatched counts by counting again?	71%	58%	88%			50%
Did officials try to resolve mismatched counts by changing counting teams?	43%	8%	60%			
Did officials resolve mismatched counts by the end of the audit?	50%	55%	31%			
Were you able to observe that hashmarks and totals of batches for each team were tallied accurately?	78%	100%	67%			
Were you able to observe that the number of ballots from multiple teams and batches were totaled accurately?	75%	85%	80%			
Were you able to observe that the number of votes from multiple teams and batches were totaled accurately?	67%	100%	71%			
Did elections officials record counts, including unresolved discrepancies, if any, on the Official Audit Report Form by the end of the audit?	100%	92%	81%		75%	

Were you given an opportunity to have/make a copy of the Audit Report Form?	100%	92%	75%		100%	0%
Did the ballot counts on the optical scanner tape(s) printed on election night match the 100%tabulator tape ballot count transcribed on the official audit report form(s)?	100%	91%	64%		80%	67%
Did the race counts on the optical scanner tape(s) printed on election night match the tabulator tape counts transcribed to Column 'C' on the official audit report form(s)?	100%	90%	50%		100%	67%
Were the ballots under the observation of at least two officials at all times?	83%	62%	88%		57%	71%
Could you confirm that the ballots were returned to their proper containers?	90%	92%	94%		100%	100%
Were the ballot containers resealed?	80%	92%	100%		100%	43%
Were seal numbers recorded correctly on the official report forms?	89%	100%	100%		100%	75%
Do you have concerns with the way the room was laid out?	22%	7%	24%	0%	0%	14%
Do you have concerns that the audit was not well-organized?	44%	33%	29%	0%	57%	0%
Do you have concerns with the counting and totaling process?	67%	67%	12%	0%	0%	100%
Do you have any concerns that the counts were inaccurate?	50%	21%	41%	0%	0%	0%

Do you have any concerns that the officially reported information is inaccurate?	14%	15%	13%	0%	0%	14%
Do you have any concerns with the transparency/observability of the process?	33%	0%	6%	0%	0%	100%
Do you have any concerns with the chain-of-custody?	44%	20%	18%	33%	25%	71%
How many people are required to access ballot storage? Responding "one"	75%	42%	31%		100%	17%
Were there any memory card problems in pre-election testing or on Election Day?	10%[28]	7%	29%		0%	17%
Were there any problems with the IVS voting system?	10%	0%	13%		0%	0%
Were there any other significant events, such as ballot problems, scanner problems, or occurrences before, during, or after Election Day?	36%	47%	27%		29%	17%

Observation Report Statistics -Table 14

[28] For this and the subsequent two questions the % does not reflect the actual % of problems, it reflects the municipalities with problems. For instance, West Haven had one bad memory card out of eleven, where Milford had three problems with rollers out of eleven.

Appendix B. Electronic Audit Details

This appendix presents in detail the electronic audit methods employed by election officials and a better alternative. It is adapted from the November 2016 Post-Election Audit Report.

The Verifiable Methods Now Used for the Electronic Audits

The electronic audits were conducted using the UConn Audit Station. UConn developed the Audit Station over the last few years by the UConn Voter Center.[29] The audits generally followed the methods and claims made in a 2013 paper authored by UConn and the SOTS Office:[30]

- Ballots are rescanned, analyzed, and recounted by the Audit Station in batches.
- Simultaneously projected on a screen are the scanner ballot images, the system's interpretation of marks on the image, and how the votes were counted for each image are displayed publicly.
- Two local election officials usually 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 by the Audit Station, this report is used to create the Official Audit Report.
- **This year, at the end of each district counted, ballots were randomly selected and compared to the Cast Vote Record created by the Audit Station, demonstrating the accuracy of the Audit Station in counting votes on that random sample of ballots. We applaud the UConn Voter Center for providing this manual verification.**

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:[31]

- 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 faithfully review hundreds or thousands of individual images, the system's interpretation, and the system's associated vote counts.

[29] University of Connecticut, School of Engineering, Center for Voting Technology Research: https://voter.engr.uconn.edu/voter/

[30] https://voter.engr.uconn.edu/voter/2013/06/computer-assisted-post-election-audits/

[31] statistics.berkeley.edu/~stark/Preprints/retabNotAudit13.pdf

Note: Such claims 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% (the legal recount threshold) affecting a single candidate in an election with many races, while reviewing thousands of ballots for a voting district.

- 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 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.

Note. As we said earlier, this year, at the end of each district counted, ballots were randomly selected and compared to the Cast Vote Record created by the Audit Station, demonstrating the accuracy of the Audit Station in counting votes on that random sample of ballots. We applaud the UConn Voter Center for providing this manual verification.

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

As stated earlier the manual random verification of some ballots brings us closer to a transparent proof and trust in the Audit Station. What also would be needed is the release of the full Cast Vote Records (CVRs) for each district, so that observers and others can independently verify the totals. Such release must occur prior to the random selection and manual verification of paper ballots to the associated CVRs.

For more details, see the full explanation below:

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[32] points the way to performing such a manual audit of an electronic audit:

- As each ballot is interpreted by the system, a "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.
- 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[33]. Such counting could use software trusted by observers and, if necessary, verified by a hand count of each CVR.
- A relatively small number of 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.

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

[33] 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.

Appendix C. Methodology

The following activities were performed in the course of the project to organize observers and collect 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 15 days 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.
- Observers attended audits, completed paper Observation Report Forms,[34] and, where possible, collected draft or final copies of the official SOTS Audit Report. Copies of Audit Report Forms were mailed or scanned by observers to us for early data entry. Observers submitted most Observation Report Forms, using the LimeSurvey tool, while some mailed or emailed paper forms for data entry by the Citizen Audit.
- Three Citizen Audit volunteers observed and reported on the electronic audits which were held in the at the Secretary's offices at 165 Capitol Ave, Hartford. A newly revised Electronic Observation Report Form was used.
- When official Audit Report Forms were not observed or obtained, the Citizen Audit sent FOI requests to the appropriate Registrars..
- 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.

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