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### **Introduction**

Good evening, Chairs and members of the committee. My name is Luther Weeks.

I am here to explain why Connecticut’s post-election audits are Insufficient, Unreliable, and Ineffective; Insufficient, Unreliable, and Ineffective -- when judged by laws being passed by other states and recommendations by respected organizations; Insufficient, Unreliable, and Ineffective – when objectively observed in operation and analyzed by concerned citizens.

In the few minutes I have, I can only touch on some key points. I have and will supply the committee with detailed backup material and recommendations for emergency changes in the law this year and more robust changes in the future

I am a retired Software Engineer, Software Product Manager, and Computer Scientist. I have an undergraduate degree in Mathematics, and Masters Degrees in Computer Science and Business. I have programmed computers since 1966. My career has been spent in building and buying software for a large insurance company, and building and marketing software for small software companies.

For the last four years I have studied voting systems and software. I have testified here and lobbied in Washington for laws proposed by Congressman Rush Holt.

Last year I attended three conferences on voting integrity, including the Post-Election Audit Summit which brought together Advocates, Scientists, Elected Officials and Election Officials to improve Post-Election Audits. Among the other attendees were our Deputy Secretary of the State Lesley Mara, and Deputy SEEC Director Albert Lenge.

(Reference : <http://www.electionaudits.org/> )

Out of that Conference I copied an idea from Minnesota to create the Connecticut Citizen Election Audit Coalition. We organized 51 citizens to observe 31 of the 41 post election audits after the November 2007 election.

## **Issue # 1 Post-Election Audits Unreliable and Ineffective**

I have personally observed 6 post-election audits in Connecticut.

The Coalition findings were far from what I had anticipated. The report concluded that:

(references: <http://www.CTElectionAudit.org> )

( [http://voter.engr.uconn.edu/voter/Reports\\_files/Audit07-h-080130.pdf](http://voter.engr.uconn.edu/voter/Reports_files/Audit07-h-080130.pdf)

HR 811 [www.Thomas.gov](http://www.Thomas.gov) search for HR 811

HR 5036 [www.Thomas.gov](http://www.Thomas.gov) search for HR 5036 audits pp. 10-19)

*The audit statistics and observations leave us without the information necessary to vouch for the accuracy of many of the hand-counting results, whether those results indicated discrepancies or agreement with the counts obtained by the optical scanners. Moreover, many of the audits, as observed, leave us uncertain as to whether an error or fraud would have been detected in an audited race in this election.*

Without going into detail, the basis of these conclusions were:

- The unreliability of the audit process
- The lack of transparency and adherence to procedures
- The lack of physical investigation of the causes of the significant discrepancies found between machine counts and manual counts.

You were all sent copies of the report.

Clearly these audits as conducted were Unreliable, and Ineffective.

## **Issue # 2 Audit Law Insufficient and Ineffective**

Even if the audits were conducted perfectly, our audits would be more reliable but would remain Insufficient and Ineffective.

Our audit law is far from the strongest and toughest in the country. Our audit law falls short of audit laws and procedures in other states such as NJ and CA.

Our law also falls far short of the recommendations of organizations such as the Brennan Center for Justice. Brennan has frequently been consulted by both this committee and the Secretary of the State's Office.

It falls far short of Federal legislation proposed by Congressman Rush Holt co-sponsored by 217 members of the House of Representatives including the entire Connecticut delegation. (if you check, Rep Larson's name is not on the list, however, I have a letter from him confirming that he is a co-sponsor)

(References: NJ Law [http://www.njleg.state.nj.us/2006/Bills/S1000/507\\_R1.PDF](http://www.njleg.state.nj.us/2006/Bills/S1000/507_R1.PDF) )

( CA Procedures: [http://www.sos.ca.gov/elections/voting\\_systems/ttbr/post\\_election\\_req.pdf](http://www.sos.ca.gov/elections/voting_systems/ttbr/post_election_req.pdf) )

( Holt Bill: (p. 10-19)

At least five critical provisions are missing from Connecticut law:

- An Independent Audit Board
- “Hot audits” following quickly after elections
- Clear and strict escalation requirements
- A total audit of all ballots in selected districts
- Levels of confidence based on Statistics

Connecticut falls far short of the recommendations of the Brennan Center for Justice in their report “Post-Election Audits: Restoring Trust In Elections”, authored by Lawrence Norden.

(Reference: [http://brennan.3cdn.net/fl1867ccc368442335b\\_8em6bso3r.pdf](http://brennan.3cdn.net/fl1867ccc368442335b_8em6bso3r.pdf) )

The report states:

*Of the few states that currently require and conduct post-election audits, **none** has adopted audit models that will maximize the likelihood of finding clever and targeted software-based attacks, non-systemic programming errors, and software bugs that could change the outcome of an election...*

Strikingly, these findings were based on an early version of Connecticut’s law that was proposed by Secretary Bysiewicz, but later weakened considerably. We know this because the Brennan report states incorrectly that: “*Connecticut, California, and Illinois check all races on the ballot during a post-election audit*”.

Prophetically they anticipated one of the concerns raised after in the Coalition report:

*Jurisdictions must adopt clear procedures for addressing discrepancies between the paper records and electronic tallies when they are found. Without protocols for responding to discrepancies, the detection of fraud or error will not prevent it from successfully altering the outcome of an election...Jurisdictions should conduct a transparent investigation of all machines where the paper records and electronic tallies do not match to try to determine the cause of any discrepancies.*

An earlier Brennan Report by the same Norden team, *The Machinery of Democracy: Voting System Security, Accessibility, Usability, and Cost*, Reviewed 120 potential voting system attacks and found that:

*...attacks involving the insertion of software attack programs or other corrupt software are the least difficult attacks against all electronic systems currently purchased when the goal is to change the outcome of a close statewide election... [All current voting systems including optical scan] “have significant security and reliability vulnerabilities, which pose a real danger to the integrity of national, state, and local elections.*

The Carter-Baker Commission reached a similar conclusion.

Brennan recommends implementation of six security measures. Connecticut falls short in five of the six.

1. *Solid, routine, paper to electronic audits after every election*
2. *Realistic parallel testing of election machines on Election Day*
3. *Ban wireless components*
4. *Transparent random selection for all auditing procedures*
5. *Decentralized programming and administration*
6. *Clear and effective procedures for acting on errors detected*

I question one of the recommendations, the rest are valuable and effective, and several are absolutely necessary. In my opinion, Connecticut falls short in five of six of the criteria. (Connecticut bans wireless communications, and I disagree with the recommendation for realistic parallel testing)

Let me end with a request to the committee. I request that the GAE invite Mr. Norden to review Connecticut's audit law, the University of Connecticut's audit reports, review the Coalition report, and to testify to the committee with regard to the adequacy of our existing laws and procedures.

I believe that the GAE, the Secretary of the State, and I can all agree that the Brennan Center and Mr. Norden are highly credible experts on voting. Mr. Norden has indicated to me his willingness to come to Connecticut and testify.

### **Summary Of Originally Prepared Testimony**

In summary, Connecticut can have Audits that are Sufficient, Reliable, and Effective, in law and in practice.

We can make changes now, to provide integrity and confidence in Connecticut elections.

Lets make decisions based on best practices and the best objective information available.

The Constitution State can be a leader in election integrity and confidence.

Thank you,

### **Issue # 3 UConn Testing Indicates Memory Card Problems**

and

### **Issue # 4 UConn Testing Indicates Procedures Not Followed**

Contrary to the testimony of George Cody, President of the Registrars Of Voters Association Connecticut, the UConn testing did not prove there were no problems with memory cards. It also indicates that procedure are not being followed.

- Pre-Election testing indicated 3.5% of memory cards contained junk data.
  - This indicates extreme quality control problems with the manufacturer
  - This indicates lack of required testing by LHS
- These cards are the tip of the iceberg.
  - They are cards sent to UConn that were not tested at all by registrars.
  - Anecdotal evidence indicates many other cards were bad and replaced by LHS when registrars tested them. The actual rate may be in the range of 10% to 20%
- Only 45% of cards indicated that Registrars complied with procedures for testing
  - The actual failures to follow procedures, in themselves, were not significant security problems
  - Yet, this level of failure to follow procedures indicates that procedures are not being followed at very high levels.
  - Anecdotal evidence and these failures give us no assurance that cards sent to UConn were randomly selected as required by procedures
- Pre-Election testing gives no reason to believe cards were programmed or secured properly. It provides evidence that procedures are not being complied with.
- Post-Election testing was not a random sample. Based on discussions with Lesley Mara and Dr. Shvartsman, the cards tested were the only 100 they could obtain from Registrars that had not been sent back to LHS for reprogramming.
- The Post-Election testing showed an 8% failure rate. Once again, the 8% represents cards that were not properly pre-election tested.

(References: [http://voter.engr.uconn.edu/voter/Reports\\_files/audit07mc.pdf](http://voter.engr.uconn.edu/voter/Reports_files/audit07mc.pdf))  
( [http://voter.engr.uconn.edu/voter/Reports\\_files/audit07mc-post.pdf](http://voter.engr.uconn.edu/voter/Reports_files/audit07mc-post.pdf) )

### **Issue # 5 UConn Testing Not Ongoing**

The UConn testing program was not conducted for the Presidential Primary. According to Dr. Shvartsman, he expects that it will be done again for the November 2008 election. Why not test the cards before each primary, election, referendum, and special election?

### **Issue # 6 Recommendations For Memory Card Programming**

Unlike Connecticut, in many states have a county structure for election management. In general, in larger counties election officials program memory cards for their elections, while smaller counties outsource election programming to either other larger counties or to a vendor.

The problem with procedures is that they cannot be enforced – only laws can be enforced and penalized.

Rather than procedures that are difficult for registrars to follow and difficult for anyone to observe, we need failsafe procedures in the law.

Obviously, memory card programming in Connecticut, by election officials or state employees is no guarantee of integrity. Perfect memory card programming can also still be defeated by later card substitution.

However, we can make a much more reliable and safe system that can be more responsive to the needs of Registrars, while being closer to failsafe and more easily observed.

An outline of a possible system for Connecticut:

- Take delivery of the two systems (Diebold GEMS) for programming memory cards we have paid for in our contract.
- Program memory cards in a facility in Hartford, by sworn election officials, under the supervision of the Secretary of the State or the Department of Information Technology.
- Have at least two election officials of different parties programming the cards sitting at each workstation whenever they are programming them.
- Video the entire programming process, including the GEMS screen and placing visibly numbered cards in sealed containers; with the video available live and archived on the web.
- Ship the cards within Hartford to another facility under the supervision of SEEC or an Independent Election Audit Board. That facility would not be able to change cards, but use the UConn program to test the cards for problems. They would also verify the cards match the candidates and ballot, to reduce the chance that Registrars get cards that need to be corrected.
- Once again that whole process on video available on the web.
- Cards would be delivered to Registrars via at least two individuals with at least the same level of chain-of-custody that state police use for protection and delivery of evidence.
- Cards should be engraved with serial numbers in addition to the stickers currently employed.
- The card programming should be organized to provide same day service for programming and delivery of cards which are found defective by Registrars or in cases where the ballot changes close to election day.

Obviously, programming in Connecticut, by election officials or state employees is no guarantee of integrity. Perfect memory card programming can also still be defeated by later breeches of custody.

However, we can make a much more reliable and safe system that can be more responsive to the needs of Registrars, while being closer to failsafe and more easily observed.

## **Issue # 7 Why Audit Via An Independent Audit Board**

This issue seems too simple, however, let me state what seems, to me, to be obvious:

- In business and in government the term “Audit” would by its definition almost imply that it must be done by an independent party. Audits of government agencies and business are conducted by both inside and outside auditors. Even inside audits are conducted by independent individuals and chains of command.

- We do not leave building inspection to the contractor. We should not leave highway inspection to the construction company. We should not leave toy inspection to the manufacturer. Even still we see that is not always sufficient.
- The responsibility for selection equipment is the responsibility of the Secretary of the State. Conducting elections of integrity is the responsibility of the Secretary of the State and Registrars.
- Audit Boards are usually expected to consist of individuals with experience and credentials in auditing and statistics – neither of which are required of candidates for Secretary of the State, nor now available in the Secretary of the State’s Office.

This is the first requirement for auditing in the new NJ bill and in HR 811 sponsored by Representative Rush Holt and supported by our entire congressional delegation.

### **Issue # 8 Why Audit All The Paper In Selected Districts – “Total Audit”**

The current audit law PA 07-194 has several gaps that preclude a complete audit. Most strikingly the audit only covers votes counted by precinct based optical scanners. We should audit all the paper in all districts selected, and no districts or elections should be exempt from the audit.

Changes in the law required to eliminate loopholes and perform a complete audit:

- Districts subject to recount or contest should not be exempt from auditing. A statewide recount would eliminate audits in an entire election. A candidate or party can block audits by contesting one election in a district or even statewide.
- Recounted races should not be exempt from audit, unless the recount law is changed to provide that the recount be also treated as an audit for the purpose of investigation by the Secretary of the State or Independent Audit Board. (The Secretary of the State’s Office has indicated they have no authority to investigate discrepancies found in recounts)
- All elections, races, and questions should be subject to audits: Elections, Primaries, Special Elections, Referendums, and Questions.
- While it is good to see if the machines are performing properly, but it is at least equally important to assure that the election “system” closely follows the voters’ intent.
- All ballots should be audited not just those centrally counted and not just those counted by machine.
  - Registrars and others in Connecticut admit that they have problems counting ballots by hand accurately.
  - We have just had a primary where a significant number of ballots were not counted by machine in a significant number of towns
  - I agree that counting by hand can be a challenge, especially unexpectedly on election night. This is a strong reason to audit hand counted ballots
  - Central count optical scanners are just as subject to errors or fraud as precinct based scanners – we deserve to have them audited as well
  - Many errors can occur in hand counting based on mix ups between which ballots were counted by machine and which by hand. Counting all the ballots would eliminate any question about which ballots should have been counted and eliminate another possible explanation for discrepancies.

Once again, auditing all the paper is becoming the standard in proposed and passed legislation.

## Issue # 9 The Cost Of Audits Vs. The Cost Of Conducting Elections

We have said that the cost of a sufficient audit would be in the range of \$0.25 to \$0.50 per ballot cast. That is a generous estimate, even for most elections but for the most challenging to audit, large municipal elections like the one held in November 2007. To audit all races and questions in such an election is above the average election expense.

Anthony Stevens, Assistant Secretary of the State on New Hampshire presented a very detailed approach to hand counting with an estimate of \$0.07 per individual vote counted. We will use \$0.10 per vote counted in our calculations, to provide a margin error and for cost of living in Connecticut.

(Reference: [http://www.democracyfornewhampshire.com/files/Hand\\_count\\_training\\_D-fest\\_July\\_5\\_2007.pdf](http://www.democracyfornewhampshire.com/files/Hand_count_training_D-fest_July_5_2007.pdf) )

Note: The examples in this section represent rough estimates of costs and rough estimates of the number of candidate counts involved in typical elections in Connecticut.

### **Example #1 Connecticut Presidential Primary**

The recent Connecticut Presidential Primary is an example of the low end of costs for auditing per ballot. It also is an example of the high end for cost of conducting the election per ballot cast

Audit Expense Per Ballot Cast – Total and Sufficient Audit as defined by CTVotersCount.org:

\$0.01 – One tenth of a cent per ballot cast. The calculations are:

Two primary races audited, one vote per ballot cast = \$0.10 per ballot counted. 10% of ballots audited (presuming we do a total audit of all votes originally counted by machine and by hand), yields a cost of: \$0.01 per ballot cast = 10% x \$0.10

Election Cost Per Ballot Cast:

\$10.00 - \$25.00 – This a relatively expensive election based on low voter turnout and the eligibility of only Democratic and Republican party members.

We do not have exact figures, however, this article from the Stamford Advocate covering costs in Greenwich indicates costs around \$20.00 per voter.

<http://www.CTVotersCount.org/CTVCdata/200801/SAdvocate20080121.mht>. Calculations are not exact but one from the article, Greenwich spent \$65,000 (\$90,000-\$25,000) in a past primary for 3,000 votes. This time it might be a bit more for the combined Presidential Primary which is estimated at \$90,000 which does not include most of the costs of optical scan which are being paid by Federal Funds.

In addition such costs may be normal. An article in the NY Daily News

<http://www.CTVotersCount.org/CTVCdata/200801/NYDailyNews20080121.mht>

indicates \$22-25 million for the NYC primary, 3 million voters, if they turn out at 50% we have about \$15 per ballot cast.

Costs could be reduced: If instead of a 10% audit, if Connecticut mandated 99% statistical confidence then a 6.5% audit would suffice for the Democratic Primary with a reported margin of 4%. And a 1.5% audit would suffice for the Republican Primary with a reported margin of 19%.

### **Example #2 Connecticut Municipal Election**

A Connecticut Municipal Election, like the one in November 2007, is an example of the high end of audit costs, because of the need audit many local races. It represents the middle type of election for election costs, because on turnout is greater than a primary but typically less than a Federal election.

#### **Audit Expense Per Ballot Cast Total Audit, Sufficient Audit as defined by CTVotersCount.org**

\$0.45 – per vote cast. Assuming about 15 positions voted per voter in a typical municipal election, results in \$1.50 per ballot audited (\$0.10 x 15). But here we have, based on generally accepted statistical research, recommended random selection of one district per municipality plus 10%, which results in about a 30% audit.

#### **Audit Expense Per Ballot Cast, Current PA 07-194**

\$0.06 - \$0.10 – Based on 10% audit of estimated 40% of average ballot audited

#### **Election Cost Per Ballot Cast:**

\$7.00 - \$12.00 – A middle of the cost spectrum – more voters than a Primary and less than a Federal election.

Finally, we must remember that the entire cost of an election includes campaign contributions, state clean election funds, federal matching funds, voters time and fuel to vote, and election expenses not included here such as voter registration systems, Registrars salaries, etc.

## **A Final Word On Practicality, Long Term Efficiency, And Timeframes**

We cannot do everything in 2008. I recommend looking at legislation and research in three timeframes. The history of U.S. elections is one of problems followed by knee-jerk reactions, resulting in more or different problems. We are in that situation now, based on the HAVA act of 2002 as a reaction to perceived problems and their causes in the 2000 election in Florida. Let us not continue down the road of over reaction

#### **2008 Changes – Emergency Legislation to protect Presidential Election and to start the ball rolling forward:**

- Initiate an Independent Audit Board
- Total Audit – audit all the paper in the districts selected
- Eliminate exemptions for recounts, contests, referendums, special elections, and questions
- State reimbursement to municipalities to pay reasonable costs for audits.
- Begin research into best practice hand counting methods that are accurate, transparent, and efficient.

- Codify strict rules in the law with strong thresholds for expanding audits in the case of discrepancies – make reasonable allowances for questionable ballots, but eliminate the unlimited exemption of questionable ballots from recognition as audit discrepancies.
- Empower the Independent Audit Board to expand audits for any reason they deem appropriate
- Codify that all recounts must be manual hand counts.

#### 2009 Changes – To Protect Elections For 5-10 Years With The AccuVote-OS

- Expand the scope of the audit such that most, if not all, races and questions are audited after each election.
- Consider options for managing and conducting audits that relieve individual towns and registrars from the responsibility to randomly be burdened with the audit process
- Implement so called “Hot Audits” that provide for speedy audits starting quickly after an election – providing a stronger opportunity to change results if that is ever required – providing less time for after election skullduggery, to make audit results equal inaccurate initial reports.
- Use statistics based auditing to focus our audit expenditures to add hand counting where necessary and reduce hand counting where it is excessive. (reference <http://www.votetrustusa.org/pdfs/VerifiedVoting/SAFE-Auditing-July-26-Final.pdf> )
- Codify audit procedures where necessary to make them enforceable
- Codify chain-of-custody for ballots, memory cards, and optical scanners to at least the levels that state police must handle evidence. Require optical scanners, memory cards, and ballots used in elections be sealed and protected until all investigations are complete.
- Initiate in programming of memory cards in Connecticut by election officials or state employees, with independent testing of each memory card before shipment to registrars.

#### Prepare For The Long Term – AccuVote-OS Replacement In 5-10 Years

Expect a continuing stream of creative solutions in voting, voting equipment, and auditing methods over the next several years that can improve the integrity and lower the costs of voting.

- Research technology such as scanners that record images of all paper ballots, allowing auditing with more confidence with greatly reduced costs.
- Research disabled access technologies for better long term solutions
- Consider open source options.
- Consider investment in voting technology research in Connecticut both academic and commercial.

The Constitution State has the opportunity be a leader in conducting elections and supplying election technology to the United States and to the World.