From: mmasterson@eac.gov
To: ellen@votersunite.org ; jgideon@votersunite.org
Cc: bhancock@eac.gov ; lotero@eac.gov ; rrodriguez@eac.gov
Sent: Thursday, August 14, 2008 7:03 AM
Subject: Fw: Questions from VotersUnite!

Ellen,

See below for a response from SysTest regarding your questions. Thank you for your patience in this matter.

Matthew V. Masterson, Esq.
Testing and Certification Program Analyst
U.S. Election Assistance Commission
1225 New York Ave. NW, Washington, D.C.
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----- Forwarded by Matthew Masterson/EAC/GOV on 08/14/2008 10:01 AM -----

Jim Nilius" <**JNilius@Systest.com**>
08/14/2008 08:44 AM

To bhancock@eac.gov
cc mmasterson@eac.gov, lotero@eac.gov
Subject RE: Questions from VotersUnite!

Brian,

In response to the questions from VoterUnite! Is below. If you need anything additional, please let me know.

The Data Accuracy Test entails passing over 1.5 million vote positions (voted and not voted) through the device and voting system. Accuracy Tests for all but two devices used an election definition with 30 races and 66 candidates for each race. Each ballot contained 1,980 vote positions, and 792 ballots were cast during each of these tests.

A different ballot design was used for the AccuVote-OS Central Count and the Optical Scan Accumulator Adapter (OSAA). These devices used ballots with 28 contests and 32 candidates each due to their design. The break down of these races and candidates for each device are included in Appendix A of the Premier Assure 1.2 Certification Test Report located on the EAC web site. Each of these ballots contained 896 vote positions, and 1,760 ballots were cast during each of these tests.

Most tests involved several units of a type of device, to process the large amounts of ballots needed to process over 1.5 million vote positions. Separate Accuracy Tests were run for each type of touch screen, optical scanner, and ballot marking device. For example, several AccuVote-TSX units were tested simultaneously to process enough ballots to reach the required quantity of ballots and vote positions. Similar examples include the AccuVote-TS R6 touch screen units which had their own test and the AccuVote-OS Precinct Count units which had their own tests. The AutoMark Voter Assist Terminal (VAT) ballot marking devices had a test for the Model A300, and a combined test for the Models A100 and A200, also being tested for certification with the Premier Assure 1.2 system.

The number of people manually executing voting testing on touch screen and ballot marking devices ranged from two to 6 per test. The time required to execute these tests ranged from 7 to 10 days.

Video recording was not done as votes were being manually entered on the touch screen and ballot marking devices. To make testing more manageable, ballots are processed in batches with close

observation of any variances introduced by the testers. All such variances were documented in the vote results.

Regards,

James M. Nilius
Senior Director, VSTL
SysTest Labs Incorporated

My Response

Dear Matt,

Thank you for passing on the explanation from SysTest, which shows, without question, that the testing DID NOT test the accuracy of the machines. I am shocked that a professional test lab would not know (or would fail to implement) a basic premise of accuracy testing that is both known and implemented by the Washington Secretary of State, who has no background in software testing.

In SysTest's plan, between 95% and 98% of the candidates — even in the same contest — received the same number of votes. It is therefore impossible to know if a machine assigned votes to the correct candidate or to a different candidate who had the same total. Thus, even if the machines yielded the expected results, this plan cannot assure that the system assigned votes correctly.

To explain, I will use the touch screen test details. In testing the touch screens, only 792 ballots are used. SysTest failed to say whether all the contests are "vote for one" races or "vote for more." To simplify the explanation, I will assume they are all "vote for one" (the defect in the plan is equally severe if some or all contests are multi-vote contests).

If all contests are "vote for one":

- Each ballot will have at most 30 votes since overvotes are not allowed; the other ballot positions will be blank.

- 66 ballots are required for each position to be tested once, with each position having one vote.

- If those 66 are arranged optimally, 726 ballots (792-66) remain to allow some positions to receive more than one vote.

- However, it would take an additional 2,145 ballots to ensure that each ballot position for a particular contest has a unique number of votes within that contest. 66 for one position, 65 for the next, 64 for the next, and so on. (67*66/2=2,211 and 2,211-66=2,145)

  A unique total for each ballot position is necessary for accuracy testing. For example, if two positions both receive 2 votes, it is impossible to know that the votes were not switched as they were being recorded.

- With SysTest's design, **a minimum of 26 ballot positions in each contest will have the same number of votes,** and there will be no way to determine if those positions received the votes intended for them or the votes intended for some other position. The vote-counting accuracy is NOT tested.

- But the design of SysTest's test deck is even worse than the above calculations indicate. Unfortunately, in real elections, we have seen votes from one **contest** given to another contest, and it is essential to ensure that does not happen. Even the 2,211 ballots required to ensure that each ballot position has a unique total **within a given contest** are not sufficient to ensure that votes for one contest are not being switched with votes for another contest.

  This fact was expressed in no uncertain terms in the pre-election testing guidelines developed by John Washburn, a certified software test engineer. He said, "In every complete test deck, each candidate and issue response must receive a unique number of votes to ensure that votes from one are not being switched to another." I encourage SysTest engineers to read Mr. Washburn's guidelines. (http://www.washburnresearch.org/archive/TestingGuidelines/GuidelinesForCreatingTestBallots.pdf)

- With 1,980 ballot positions on each ballot, a minimum of 1,961,190 ballots is required to ensure that each ballot position has a unique total on the ballot. First position has 1980 votes, second has 1979 votes, third has 1978 votes, and so on. [The calculation is 1981*1980/2]

- In SysTest's plan, with only 792 ballots, a maximum of 40 ballot positions can be unique numbers. (39*40/2=780 and 40*41/2=820) **That means, at least 98% (1940/1980) of the ballot positions will receive the exact same number of votes,** and there will be no way of knowing if they have received the votes intended for them or the votes intended for another ballot position.

- So, rather than testing 1,568,160 ballot positions, the most they could test is about 30,000. This small number does not satisfy the testing requirement for the federal voting system standards.

The fewer the ballot positions, the fewer the ballots required to ensure a unique total for each candidate. However, in what appears to be an effort to simply the testing process — rather than make it robust enough to safeguard our elections — SysTest designed a ballot that causes a true accuracy test to be more difficult than it need be.

At the same time, SysTest is using unrealistic ballots for testing the accuracy of the equipment. It is difficult to imagine a real election in which each of 30 contests would have 66 candidates, like the ballots for SysTest's touch screen testing.

The design of the test deck for optical scanners is equally unrealistic and equally flawed. It CANNOT assure that the scanners are accurately counting votes. With 896 ballot positions on the optical scan ballots, 401,856 ballots would have to be cast to obtain unique totals for each ballot position. However, SysTest is only using 1,760 ballots — wholly insufficient to test the accuracy of the optical scanners in counting votes.

1,760 ballots only allow for 58 positions to have unique totals. **So, at least 94% (838/896) of the ballot positions will receive the exact same number of votes.**

These simple calculations prove that SysTest's test decks CANNOT test the accuracy of the system. But in addition, because they have ignored this basic, simple, yet essential principle, it is quite likely that they have also ignored other essential principles of testing — as explained in John Washburn's guidelines.

For example, will they include ballots with every combination of two candidates in case the equipment cannot handle certain combinations? Will they test the straight-party feature that has caused so many problems in recent elections? Will the optical scanner ballots include overvotes? Will they include multi-vote contests (vote for more than one)? Did they fold the ballots that were scanned by a machine intended for mail-in ballots?

Surely, the EAC does not intend to approve the system that SysTest failed to test for accuracy.

Ellen Theisen
Co-Director and Managing Editor
www.VotersUnite.Org