



U.S. ELECTION ASSISTANCE COMMISSION

Voting System Testing and Certification Program

1201 New York Avenue, NW, Suite 300

Washington, DC. 20005

March 1, 2011

Steve Pearson
Vice President, Certification
Election Systems & Software
11208 John Galt Blvd.
Omaha, NE 68137

Sent via mail and e-mail

RE: Notice of Initiation of Formal Investigation

Pursuant to section 7.4 of the Election Assistance Commission's (EAC) Voting System Testing and Certification Program Manual the Decision Authority (Executive Director, Tom Wilkey) has authorized (attached) the EAC's Certification Program Director (Brian Hancock) to open a formal investigation of Election Systems and Software's (ES&S) Unity 3.2.0.0 voting system. This formal investigation arises as a result of an issue reported by ES&S to the EAC on June 6, 2010 and is based on an informal staff investigation of the issues following county notification and public notice of the issues.

Facts

EAC first became aware of a possible issue with the Unity 3.2.0.0 voting system used in Cuyahoga County, Ohio as a result of an article published in the *Cleveland Plain Dealer* on April 10, 2010. This issue was later confirmed by Cuyahoga County in conversations with the EAC. ES&S then reported the issue to EAC in June of 2010. As a result of ES&S's report on the freeze/shutdown issue, EAC began an informal inquiry into the nature and cause of the problem. ES&S has worked with EAC throughout the informal inquiry to provide all information necessary to fully understand the issue, including a detailed root cause analysis. ES&S's cooperation was vital to EAC understanding the cause of the freeze/shutdown and proposed solutions to the issue.

Since identifying the freeze/shutdown issue EAC identified two additional possible non-conformities. These non-conformities arose as result of information gathered during the informal inquiry and testing conducted on the DS200 to evaluate proposed solutions to the freeze/shutdown issue. ES&S is aware of these additional issues and worked with EAC to inform all DS200 users of the issues and workarounds for them. None of the issues identified are likely to have had an impact on the integrity or results of an election or to impact the integrity of future elections. They do, however, represent possible non-conformities to the Voluntary Voting System Guidelines (VVSG).

ES&S identified and submitted possible fixes for each of the issues identified in the summary below. These fixes are part of the Unity 3.2.1.0 certification effort currently under test at Wyle Laboratories. EAC will closely monitor the progress of this testing and understands that ES&S plans on upgrading all Unity 3.2.0.0 customers to Unity 3.2.1.0, should the system pass testing.

Scope of Investigation

The focus of the Investigation shall be the ES&S DS200 Precinct Count Optical Scanner (Firmware Version 1.3.10.0) contained in the ES&S Unity 3.2.0.0 EAC certified voting system. Specifically, the investigation will focus on the following possible non-conformities with the VVSG:

1. **Issue:** Freeze/shutdown. The DS200 initiates the shutdown process whereupon it will complete approximately 90% of the shutdown process and then freeze. The screen saver will initiate after the appropriate time has elapsed. The DS200 Unit will not accept ballots in the frozen state.

System Non-conformity:

2002 VSS Volume 1 Section 2.2.1 & 3.4.3

2.2.1.b – Provide system functions that are executable only in the intended manner and order, and only under the intended conditions

3.4.3 – Reliability: The reliability of voting system devices shall be measured as Mean Time Between Failure (MTBF) for the system submitted for testing. MTBF is defined as the value of the ratio of operating time to the number of failures which have occurred in the specified time interval. A typical system operations scenario consists of approx. 45 hours of equipment operation, consisting of 30 hours of equipment set-up and readiness testing and 15 hours of elections operations. For the purpose of demonstrating compliance with this requirement defined as any event which results in either the:

- *Loss of one or more functions*
- *Degradation of performance such that the device is unable to perform its intended function for longer than 10 seconds*

The MTBF demonstrated during certification testing shall be at least 163 hours.

2. **Issue:** Failure to log. Cuyahoga County election officials provided EAC the logs from their May 4 and August 8, 2010 elections. The May 4 election used over 1,000 DS200's; the August 8 election was smaller, providing logs from only 12 machines. Review of these records identified an additional issue. The freeze/shutdown issue does not result in any record of its occurrence in the system logs.

System Non-conformity:

2002 VSS Volume I 2.2.4.1 Integrity:

Integrity measures ensure the physical stability and function of the vote recording and counting processes.

To ensure system integrity, all systems shall:

- g. Record and report the date and time of normal and abnormal events.*
- i. Detect and record every event, including the occurrence of an error condition that the system cannot overcome, and time-dependent or programmed events that occur without the intervention of the voter or a polling place operator.*

3. **Issue:** Ballot Skew. When a 17" ballot is inserted incorrectly into the unit the lower left and right hand corners of the ballot are not accurately read.

System Non-conformity:

2002 VSS Volume I 2.2.2.1 Common Standards:

To ensure vote accuracy, all systems shall:

2.2.2.1.c – Record each vote precisely as indicated by the voter and be able to produce and accurate report of all votes cast.

4. **Issue:** Vote miscount. The DS200 accepts a voted ballot but does not record that ballot on its internal counter.

System Non-conformity:

2002 VSS Volume I 2.1.8 Ballot Counter:

For all voting systems, each piece of voting equipment that tabulates ballots shall provide a counter that:

- b. Records the number of ballots cast during a particular test cycle or election.*

Manufacturer Opportunity to Provide Information

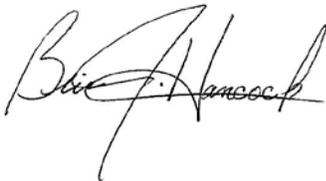
As stated in section 7.4.4.2 of the Certification Manual ES&S has the opportunity to provide any information it deems relevant to the scope of the investigation detailed above. ES&S is encouraged to provide any documents, testing data, or system specs it believes could help aid the EAC in making a determination. All information should be sent to the Program Director.

Estimated Timeline for Investigation

EAC estimates this investigation will take approximately 10 weeks to conduct. Several additional weeks may be necessary to compile the information and create the final report of investigation.

Conclusion

As you are aware, a formal investigation is concluded with the issuance of a formal report by the EAC. The purpose of the formal report is to document all relevant and reliable information gathered during the investigation and to document the conclusions reached by the Decision Authority. Per section 7.4.7 of the Certification Manual the Decision Authority can determine each allegation to be either substantiated or unsubstantiated. Please refer to section 7.0 of the Certification Manual for all of the details regarding the formal investigation, notices of non-compliance, and decertification. If you have any questions please do not hesitate to contact me.



Brian J. Hancock
Director
Testing & Certification Program
U.S. Election Assistance Commission



U. S. ELECTION ASSISTANCE COMMISSION
OFFICE OF THE EXECUTIVE DIRECTOR
1201 New York Avenue, NW, Suite 300
Washington, DC. 20005

To: Brian Hancock, *Director of Voting System Testing and Certification*

From: Thomas R. Wilkey, *Executive Director/Decision Authority* 

Date: February 25, 2011

Subject: **Authorization of Formal Investigation**

This memorandum constitutes the formal approval and authorization of formal investigation in response to your Recommendation to Refer for Formal Inquiry dated October 15, 2010 and your Addendum to the Recommendation to Refer for Formal Inquiry dated December 20, 2010 as required by §7.4.3 of the EAC's *Voting System Testing and Certification Program Manual, (Manual)*. The referral and addendum contain relevant information obtained during your Informal Investigation and show the progression of activities by the EAC, ES&S and the VSTLs since the initial discovery of the anomaly.

The focus of the Investigation shall be the ES&S DS200 Precinct Count Optical Scanner (Firmware Version 1.3.10.0) contained in the ES&S Unity 3.2.0.0 EAC certified voting system. The scope of the Investigation shall include a conclusive determination of the root cause of the freeze /shutdown anomaly first experienced in Cuyahoga County, Ohio during pre-election logic and accuracy testing in preparation for the May 4, 2010 Primary Election. As you note in your memorandum of October 15, 2010, in addition to the freeze/shutdown anomaly, your Informal Inquiry revealed additional anomalies with the DS200 including issues related to ballot skew, ballot insertion, unlogged errors, logged system halts and TDP Errors. Further, the potentially more serious issue noted in the December 20, 2010 addendum which outlined the problem encountered when the DS200 accepted a voted test ballot without recording that ballot on its internal counter during testing at iBeta Quality Assurance should also be investigated for potential non-compliance with the 2002 Voting Systems Standards.

Following is a list of known non-conformities that ultimately will serve as the basis of any EAC determination on the certification status of this system.

1. Issue: The DS200 initiates the shutdown process whereupon it will complete approximately 90% of the shutdown process and then freeze. The screen saver will initiate after the appropriate time has elapsed. The DS200 Unit will not accept ballots in the frozen state.

System Non-conformity:

2002 VSS Volume 1 Section 2.2.1 & 3.4.3

2.2.1.b – Provide system functions that are executable only in the intended manner and order, and only under the intended conditions

3.4.3 – Reliability: The reliability of voting system devices shall be measured as Mean Time Between Failure (MTBF) for the system submitted for testing. MBTF is defined as the value of the ratio of operating time to the number of failures which have occurred in

the specified time interval. A typical system operations scenario consists of approximately 45 hours of equipment operation, consisting of 30 hours of equipment set-up and readiness testing and 15 hours of elections operations. For the purpose of demonstrating compliance with this requirement, a failure is defined as any event which results in either the:

- Loss of one or more functions
- Degradation of performance such that the device is unable to perform its intended function for longer than 10 seconds

The MTBF demonstrated during certification testing shall be at least 163 hours.

2. Issue: Ballot Skew. When a 17" ballot is not inserted correctly into the unit the lower left and right hand corners of the ballot are not accurately read.

System Non-conformity:

2002 VSS Volume I 2.2.2.1 Common Standards:

To ensure vote accuracy, all systems shall:

2.2.2.1.c – Record each vote precisely as indicated by the voter and be able to produce and accurate report of all votes cast.

3. Issue: Failure to log. Cuyahoga County election officials also provided to the EAC the logs from their May 4 and August 8, 2010 elections. The May 4 election used over 1000 DS200's. The August 8 election was smaller, providing logs from only 12 machines. Review of these records identified additional issues:

- The freeze/shutdown issue does not result any record of its occurrence in the system logs.

System Non-conformity:

2002 VSS Volume I 2.2.4.1 Integrity:

Integrity measures ensure the physical stability and function of the vote recording and counting processes.

To ensure system integrity, all systems shall:

- g. Record and report the date and time of normal and abnormal events.
- i. Detect and record every event, including the occurrence of an error condition that the system cannot overcome, and time-dependent or programmed events that occur without the intervention of the voter or a polling place operator.

4. Issue: Vote miscount: DS200 accepting a voted ballot but not recording that ballot on its internal counter.

System Non-conformity:

2002 VSS Volume I 2.1.8 Ballot Counter:

For all voting systems, each piece of voting equipment that tabulates ballots shall provide a counter that:

- b. Records the number of ballots cast during a particular test cycle or election.

Attachments

October 15, 2010 Recommendation to Refer for Formal Inquiry

December 20, 2010 Addendum to Recommendation to Refer for Formal Inquiry



U. S. ELECTION ASSISTANCE COMMISSION
VOTING SYSTEM TESTING AND CERTIFICATION PROGRAM
1201 New York Avenue, NW, Suite 300
Washington, DC. 20005

To: Tom Wilkey, *Executive Director/Decision Authority*
From: Brian Hancock, *Director of Voting System Testing and Certification*
Cc: Matthew V. Masterson, *Deputy Director, Voting System Testing and Certification*
Date: October 15, 2010
Subject: **Recommendation to Refer for Formal Inquiry**

As required under §7.3.5 of the EAC's *Voting System Testing and Certification Program Manual*, (*Manual*) this memorandum constitutes a recommendation that you refer the ES&S DS200 Informal Inquiry for Formal Investigation under § 7.4 of the *Manual*.

The focus of the Investigation shall be the ES&S DS200 Precinct Count Optical Scanner (Firmware Version 1.3.10.0) contained in the ES&S Unity 3.2.0.0 EAC certified voting system. The scope of the Investigation shall include a conclusive determination of the root cause of the freeze /shutdown anomaly first experienced in Cuyahoga County, Ohio during pre-election logic and accuracy testing in preparation for the May 4, 2010 Primary Election.

The facts and findings from our Informal Investigation into this matter are contained in the attached Informal Inquiry Report. In summary, the report concludes that the claims made by Cuyahoga County are credible and may therefore serve as a basis for decertification of the Unity 3.2.0.0 voting system by the EAC. In addition to the freeze/shutdown anomaly, the Inquiry revealed additional anomalies with the DS200 and included the following:

- Ballot skew
- Ballot insertion problems
- Unlogged errors
- Logged system halts
- TDP Errors

Based upon the inconclusive information provided by the manufacturer regarding the freeze/shutdown anomaly, the EAC has concerns with the results of the root cause analysis that was performed by ES&S regarding the anomaly. At this time, the EAC does not have confidence that the actual root cause of the anomaly was discovered nor remedied.

Attachments

EAC Informal Inquiry Report
Cleveland Plain Dealer Article
ES&S Notification to the EAC
EAC/Cuyahoga County Teleconference Minutes
ES&S DS200 System Lockup Analysis
EAC DS200 Freeze/Shutdown and XWindows Correlation



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To: Tom Wilkey, *Executive Director/Decision Authority*
From: Brian Hancock, *Director of Voting System Testing and Certification*
Cc: Matthew V. Masterson, *Deputy Director, Voting System Testing and Certification*
Date: December 20, 2010
Subject: **Addendum to Recommendation to Refer for Formal Inquiry**

On October 15, 2010, I forwarded to your office a memorandum constituting a recommendation that you refer the ES&S DS200 Informal Inquiry for Formal Investigation under § 7.4 as required under §7.3.5 of the EAC's *Voting System Testing and Certification Program Manual (Manual)*.

The purpose of this addendum is to provide you with additional information regarding the ES&S DS200 Precinct Count Optical Scanner (Firmware Version 1.3.10.0) contained in the ES&S Unity 3.2.0.0 voting system. Since the October memorandum, the following additional information has come to light:

As a results of the analysis and changes submitted by ES&S (See section 2.1.5.2 DS200 Field Issue –Freeze and Shutdowns in Appendix H Amended Test Plan) reliability testing of the DS200 was required at iBeta Quality Assurance (iBeta).

The test at iBeta was schedule to run eight days (64 hours) on three units. Testing required that the DS200's operate for the full period of time without a loss of one or more functions or degradation of performance such that the device was unable to perform its intended function for longer than ten seconds. On the third day execution of the DS200 Reliability test was halted due to an issue encountered during test script iteration #67. The following observation report was provided to the EAC:

- 1) *"After the first ballot was cast a second ballot was inserted in the DS200.*
- 2) *The ballot was an open primary with a vote in two parties (Cross Vote). This ballot issue was identified to the tester with the option to "Accept" or "Reject" the ballot. The tester selected "Accept" and the tester heard the ballot drop. (At this point the system has performed as "intended".)*
- 3) *The tester then observed the screen flash two messages. The first contained the word "issue". The second contained the word "return". The motor did not engage or attempt to return the ballot.*
- 4) *The voting system continued operation by resetting to the "Welcome" page. It was in a state to accept a new ballot.*
- 5) *The tester observed that the ballot counter did not increment (1 vote was displayed).*

- 6) *The tester, recorder, ESS and EAC representatives observed there were two ballots (voter 1 & voter 2) in the ballot box and the counter indicated a single vote.*
- 7) *The polls were closed. The reports were printed.*
- 8) *It was confirmed on the reports that only a single ballot was recorded. The Cross Vote audit log entry was not recorded, but a returned ballot entry was recorded in the audit log.*
- 9) *The system was shut down via the touch screen selection.*
- 10) *The system was restarted, polls were re-opened, and additional ballots were scanned and reported, without error.*

Based upon the previous inconclusive information provided by the manufacturer regarding the freeze/shutdown anomaly, as well as the potentially more serious issue of the DS200 accepting a voted ballot but not recording that ballot on its internal counter, the EAC now has concerns not only with the results of the root cause analysis that was performed by ES&S regarding the Freeze/Shutdown anomaly, but has additional concerns regarding this latest anomaly which, as of the date of this memo, has not been addressed by ES&S. Because of the reasons stated above and in the previous memorandum, I reiterate my recommendation that you refer the ES&S DS200 Informal Inquiry for Formal Investigation under § 7.4 of the EAC's *Voting System Testing and Certification Program Manual (Manual)*.

Attachments

Appendix H of Amended Test Plan