

**COMMONWEALTH OF PENNSYLVANIA**

**DEPARTMENT OF STATE**

**REPORT CONCERNING THE REEXAMINATION RESULTS OF THE IVOTRONIC  
TOUCH SCREEN VOTING SYSTEM WITH UNITY SOFTWARE**



**Issued By:**

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**Carol Aichele**  
**Secretary of the Commonwealth**  
**September 11, 2012**

## I. INTRODUCTION

Article XI-A of the Pennsylvania Election Code, 25 P.S. § 3031.1 et seq., authorizes the use of electronic voting systems. Section 1105-A of the Election Code, 25 P.S. § 3031.5, requires that the Secretary of the Commonwealth examine all electronic voting systems used in any election in Pennsylvania and that the Secretary make and file a report stating whether, in her opinion, the electronic voting system can be safely used by voters and meets all of the applicable requirements of the Election Code.

In April 2006, Michael I. Shamos, Ph.D., J.D., a consultant retained by the Secretary<sup>1</sup> to conduct an examination of the iVotronic Voting System, version 9.1.4.1 and Unity software, version 3.0.1.0 (hereinafter referred to as the “iVotronic Voting System”), issued a report recommending that the Secretary certify the iVotronic Voting System under specific conditions. On April 7, 2006, the Secretary certified the iVotronic Voting System for use in elections in the Commonwealth and issued a report, in accordance with Section 1105-A(b) of the Election Code, 25 P.S. § 3031.5(b).

Section 1105-A(a) of the Election Code provides that, upon payment of a reexamination fee, “[a]ny ten or more persons, being qualified registered electors of this Commonwealth, may, at any time, request the Secretary of the Commonwealth to reexamine any electronic voting system theretofore examined and approved.” 25 P.S. § 3031.5(a). By letter dated January 20, 2006, a requisite number of electors formally requested that the Secretary conduct a reexamination of the iVotronic Voting System.<sup>2</sup> The Pennsylvania Department of State, acting through a Deputy Secretary of the Commonwealth, initially rejected the request on the basis that the reexamination was not necessary because (1) the iVotronic Voting System had only recently been examined and approved by the Secretary and, (2) there was no indication of irregularities or deficiencies that had arisen subsequent to the examination to warrant a reexamination.

Subsequent to, and partially as a result of, this decision by the Department of State, a group of Pennsylvania electors commenced suit (by means of a Petition for Review in the Commonwealth Court) claiming among other things, that the Secretary of the Commonwealth has a mandatory duty under Section 1105-A of the Election Code to conduct a reexamination when requested to do so in accordance with the statute. In overruling the Secretary’s preliminary

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<sup>1</sup> Section 1107-A of the Election Code provides that “[n]o electronic voting system shall, upon any examination or reexamination, be approved by the Secretary of the Commonwealth, or by any examiner appointed by [her], unless it shall be established that such system, at the time of such examination or reexamination” meet specified requirements. 25 P.S. § 3031.7 (emphasis added).

<sup>2</sup> The electors’ request concerned an earlier version of the iVotronic Voting System (version 9.1.3 and Unity software, version 3.0), which the Secretary had certified for use by report dated December 22, 2005.

objections to the Petition for Review, the Commonwealth Court unanimously agreed. See, e.g., Banfield v. Cortés, 922 A.2d 36, 48 (Pa. Commw. Ct. 2007) (concurring and dissenting op.) (“Upon receipt of a request for reexamination, the Secretary must examine the electronic voting system.... It is up to the Secretary how to examine the electronic voting system, but examine it [she] must under the most straightforward reading of Section 1105-A(a) of the Election Code.”).<sup>3</sup>

In July 2011, this Secretary, having only recently assumed the office, evaluated Section 1105-A of the Election Code and the duties of the Secretary of the Commonwealth to reexamine electronic voting systems when requested to do so pursuant to and consistent with the statute. Based on her evaluation of the law, including the interpretation reflected in the Commonwealth Court’s Banfield opinions, the Secretary determined that she had a duty to reexamine the iVotronic Voting System in response to the 2006 request.

Accordingly, the Secretary appointed Jack Cobb (“Examiner”), Laboratory Director of Pro V&V, Inc., as a professional consultant to conduct a reexamination of the iVotronic Voting System pursuant to Section 1105-A(a) of the Election Code, 25 P.S. § 3031.5(a). The Examiner performed the reexamination on February 29 and March 1, 2012, in Hearing Room 1 of the Commonwealth Keystone Building, 400 North Street, Harrisburg, Pennsylvania. Ian Harlow, Deputy Commissioner of the Department’s Bureau of Commissions, Elections and Legislation, and Kathleen Kotula, Assistant Counsel for the Department, represented the Secretary of the Commonwealth. Steve Pearson, Vice President, Certification; Benjamin Swartz, Pennsylvania State Certification Manager; and Mitch Keddrell, Customer Service Manager, represented Election Systems & Software (“ES&S”), the vendor of the iVotronic Voting System. The reexamination was open to the public and was video recorded by staff members from the Department’s Bureau of Commissions, Elections and Legislation. Seven members of the public attended the reexamination: Penny Brown and Adam Green of Cumberland County; Marybeth Kuznik of VotePA; Joshua Franklin of the U.S. Election Assistance Commission; Robert Fitzgerald of Buchanan, Ingersoll & Rooney PC; and Alisha Herb and Jeffrey Fetterman of Northumberland County.

## **II. THE IVOTRONIC VOTING SYSTEM**

The following firmware/software, hardware and peripheral components making up the iVotronic Voting System were presented for reexamination:

- Firmware/Software
  - iVotronic, version 9.1.4.1; and
  - Unity, version 3.0.1.0, with subcomponents.
- Hardware
  - Personalized Electronic Ballot (“PEB”);

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<sup>3</sup> The Banfield matter remains pending before the Commonwealth Court at No. 213 M.D. 2006.

- Initialization PEB;
  - Clear and Test PEB;
  - Communication Pack; and
  - iVotronic, Model HW 1.1.
- Peripherals
    - Compact Flash Memory Cards;
    - Voter Booths; and
    - Desktop Printer, Model Oki Data B431 dn.

The following paragraphs in this section briefly describe the iVotronic Voting System and are adopted in large part from Section 2.0 (“System Overview and Identification”) of the Test Report for Re-examination of the iVotronic Touch Screen Voting System Version 9.1.4.1 and Unity Software Version 3.0.1.0, a report issued by the Examiner on August 21, 2012.

The iVotronic Voting System is a Direct Recording Electronic (“DRE”) voting system that operates both at election headquarters for administrative purposes and at the polling location. The iVotronic Voting System consists of the following:

- Voter and supervisor terminals with touch screen interfaces;
- Supervisor and voter PEBs used to activate the iVotronic, open polls, load ballots onto the iVotronic and collect all votes from each terminal at the end of Election Day; and
- A communications pack used to transmit results and print polling place results reports.

There are two distinct iVotronic terminals and PEBs. Supervisor terminals and PEBs are red and voter terminals and PEBs are blue.

During an election, poll workers either activate ballots for voters using a PEB or provide a PEB to the voter to activate his or her own terminal. In the Poll Worker Activated System, poll workers use supervisor PEBs to load voter terminals with the appropriate voter ballot. The supervisor PEBs contain all of the ballots required by the polling location. When a voter is ready to begin voting, a poll worker inserts a supervisor PEB into the iVotronic to load a ballot for the voter. After the ballot loads, the official removes the supervisor PEB and steps aside so that the voter can make selections and cast the ballot privately. In the Voter Activated System, the poll worker uses a supervisor terminal to load a blue voter PEB with the appropriate ballot. The official gives the voter PEB to the voter, who inserts it into a voter terminal. The voter casts the ballot and returns the PEB to the poll worker. After a voter has used a PEB, the PEB will not activate any terminal until a poll worker reloads it with another ballot.

Additionally, the Compact Flash Multi-Card Reader/Writer can be used to copy election data to multiple compact flash cards for the iVotronic terminal and to read audit data files from multiple compact flash cards to a central directory.

### **III. REEXAMINATION PROCEDURES AND RESULTS**

#### **A. Reexamination Process and Procedures**

To ascertain whether the iVotronic Voting System can be safely used by the voters at elections in the Commonwealth and meets all the requirements of the Election Code, the Examiner developed test protocols for the reexamination.<sup>4</sup> The test protocols separated the requirements of Article XI-A of the Pennsylvania Election Code, sections 1101-A to 1122-A, 25 P.S. §§ 3031.1 – 3031.22, into four main areas of test execution: (1) Review; (2) Targeted Functionality; (3) System Integration; and (4) Penetration Analysis.

“Review” testing consisted of analyzing ITA<sup>5</sup> and other third-party reports for specific tests pertaining to the requirements of the Pennsylvania Election Code and verifying that the iVotronic Voting System meets those requirements. The Examiner conducted Review testing after the February 29 and March 1, 2012, reexamination to determine compliance with the following sections of the Election Code:

- 1105-A(a), 25 P.S. § 3031.5(a), requiring that an electronic voting system “ha[ve] been examined and approved by a federally recognized independent testing authority” and that it “meet any voting system performance and test standards established by the Federal Government;”
- 1107-A(11), 25 P.S. § 3031.7(11), requiring that an electronic voting system be “suitably designed for the purpose used, ... constructed in a neat and workmanlike manner of durable material of good quality, ... safely and efficiently useable in the conduct of elections and, with respect to the counting of ballots cast at each district, ... suitably designed and equipped to be capable of absolute accuracy, which accuracy shall be demonstrated to the Secretary of the Commonwealth;”
- 1107-A(13), 25 P.S. § 3031.7(13), requiring that an electronic voting system, “[w]hen properly operated, records correctly and computes and tabulates accurately every valid vote registered;”
- 1107-A(14), 25 P.S. § 3031.7(14), requiring that an electronic voting system be “safely transportable;” and

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<sup>4</sup> The test protocols, as well as the time and place of the reexamination, were published on the website of the Department of State prior to the start of the reexamination on February 29, 2012.

<sup>5</sup> Section 1105-A(a) of the Election Code requires that an electronic voting system be examined and approved “by a federally recognized independent testing authority,” or ITA. 25 P.S. § 3031.5(a).

- 1107-A(15), 25 P.S. § 3031.7(15), requiring that an electronic voting system be “so constructed that a voter may readily learn the method of operating it.”

“Targeted Functionality” testing consisted of single-thread test cases designed to ascertain whether the iVotronic Voting System complies with the requirements set forth in the following sections of the Election Code:

- 1107-A(1), 25 P.S. § 3031.7(1), requiring that an electronic voting system “[p]rovide[] for voting in absolute secrecy and prevents any person from seeing or knowing for whom any voter, except one who has received or is receiving assistance as prescribed by law, has voted or is voting;”
- 1107-A(2), 25 P.S. § 3031.7(2), requiring that an electronic voting system “[p]rovide[] facilities for voting for such candidates as may be nominated and upon such questions as may be submitted;”
- 1107-A(3), 25 P.S. § 3031.7(3), requiring that an electronic voting system “[p]ermit[] each voter, at other than primary elections, to vote a straight political party ticket by one mark or act and, by one mark or act, to vote for all the candidates of one political party for presidential electors and, by one mark or act, to vote for all the candidates of one political party for every office to be voted for, and every such mark or act shall be equivalent to and shall be counted as a vote for every candidate of the political party so marked including its candidates for presidential electors, except with respect to those offices as to which the voter has registered a vote for individual candidates of the same or another political party or political body, in which case the automatic tabulating equipment shall credit the vote for that office only for the candidate individually so selected, notwithstanding the fact that the voter may not have individually voted for the full number of candidates for that office for which he was entitled to vote;”
- 1107-A(4), 25 P.S. § 3031.7(4), requiring that an electronic voting system “[p]ermit[] each voter, at other than primary elections, to vote a ticket selected from the nominees of any and all political parties, from the nominees of any and all political bodies, and from any persons whose names are not in nomination and do not appear upon the official ballot;”
- 1107-A(5), 25 P.S. § 3031.7(5), requiring that an electronic voting system “[p]ermit[] each voter to vote for any person and any office for whom and for which he is lawfully entitled to vote, whether or not the name of such person appears upon the ballot as a candidate for nomination or election;”
- 1107-A(7), 25 P.S. § 3031.7(7), requiring that an electronic voting system, “[i]f it is of a type that registers the vote electronically, ... preclude each voter from voting for more persons for any office than he is entitled to vote for or upon any question more than once;”
- 1107-A(10), 25 P.S. § 3031.7(10), requiring, in pertinent part, that an electronic voting system, “[i]f it is of a type that registers the vote electronically, ... permit each voter to change his vote for any candidate or upon any question appearing on the

official ballot up to the time that he takes the final step to register his vote and to have his vote computed;”<sup>6</sup> and

- 1107-A(16), 25 P.S. § 3031.7(16), requiring that the “district component of the automatic tabulating equipment” of an electronic voting system that provides for the “computation and tabulation of votes at the district level” include (a) a “visible” public counter that “shall show during any period of operation the total number of ballots entered for computation and tabulation;” (b) lock(s) that “absolutely” prevent “all operation of the tabulation element of the automatic tabulating equipment ... after the polls are closed or where the tabulation of votes is completed;” (c) construction or control capabilities “that, during the progress of voting, ... preclude every person from seeing or knowing the number of votes theretofore registered for any candidate or question; and ... preclude every person from tampering with the tabulating element;” (d) a mechanism or capability that rejects overvotes but, “if used during the period of voting, it may also have the capacity to indicate to a voter that he has improperly voted for more candidates for any office than he is entitled to vote for, and in such case it shall have the capacity to permit the voter to mark a new ballot or to forego his opportunity to make such correction;” and (e) an “element which generates a printed record at the beginning of its operation which verifies that the tabulating elements for each candidate position and each question and the public counter are all set to zero and with an element which generates a printed record at the finish of its operation of the total number of voters whose ballots have been tabulated, the total number of votes cast for each candidate whose name appears on the ballot, and the total number of votes cast for, or against, any question appearing on the ballot.”

“System Integration” testing sought to ascertain whether the iVotronic Voting System meets all of the requirements of the Pennsylvania Election Code that can be met by the execution of an entire election. The Examiner created two election definitions, a general election and a closed primary election, to test and measure specific input devices, voting patterns, and results. Pre-voting reports were generated, consisting of a ballot proof report, precinct summary report, and election summary report. The polls were opened and precinct tabulator zero proof reports were generated. The Examiner, staff members from the Bureau of Commissions, Elections and Legislation, and employees from the Bureau of Management Information Systems and other bureaus within the Department of State, input a complex voting pattern consisting of distinct combinations of vote selection, as documented in the test protocols. The polls were closed and results reports were generated, including cast vote records and ballot images. The voted data was then transferred to the election management system (“EMS”), and election summary reports,

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<sup>6</sup> Section 1107-A(10) of the Election Code distinguishes between electronic voting systems that register votes electronically, like the iVotronic Voting System, and those that “use paper ballots or ballot cards to register votes.” 25 P.S. § 3031.7(10). For the latter, the Election Code requires that “the system shall provide that a voter who spoils his ballot may obtain another ballot; any ballot thus returned shall be immediately cancelled and at the close of the polls shall be enclosed in an envelope marked ‘Spoiled’ which shall be sealed and returned to the county board.” 25 P.S. § 3031.7(10).

precinct summary reports, and ballot images were printed. At the conclusion of the test, the Examiner conducted a statistical recount of at least 10% of the votes cast by comparing the documented voting pattern with the cast vote records and ballot images. The procedures identified each ballot by the distinct voting pattern that was input. The Examiner also generated a backup of the EMS database and retained a copy with the other test data.

System Integration testing tested proprietary hardware, firmware/software and peripherals, as well as commercial, off-the-shelf materials configured as a precinct- or district-count system. While System Integration testing addressed many of the requirements of the Election Code that were also the subject of Targeted Functionality testing, System Integration testing was designed to test compliance with the following additional sections:

- 1101-A, 25 P.S. § 3031.1, defining “electronic voting system” to mean “a system in which one or more voting devices are used to permit the registering or recording of votes and in which such votes are computed and tabulated by automatic tabulating equipment. The system shall provide for a permanent physical record of each vote cast;”
- 1107-A(4), 25 P.S. § 3031.7(4), requiring that an electronic voting system “[p]ermit[] each voter, at other than primary elections, to vote a ticket selected from the nominees of any and all political parties, from the nominees of any and all political bodies, and from any persons whose names are not in nomination and do not appear upon the official ballot;”
- 1107-A(6), 25 P.S. § 3031.7(6), requiring that an electronic voting system “[p]ermit[] each voter to vote for as many persons for any office as he is entitled to vote for and to vote for or against any question upon which he is entitled to vote and precludes each voter from voting or from having his vote tabulated for any candidate, or upon any question, for whom or upon which he is not entitled to vote;”
- 1107-A(8), 25 P.S. § 3031.7(8), requiring that an electronic voting system “[p]reclude[] each voter from voting or from having his vote tabulated more than once for any candidate for the same office or upon any question, except in districts and for offices where cumulative voting is authorized by law;”
- 1107-A(9), 25 P.S. § 3031.7(9), requiring that an electronic voting system “[p]ermit[] each voter at a primary election to vote only for the candidates seeking nomination by a political party in which such voter is registered and enrolled, and for any candidate for nonpartisan nomination, and for any question upon which he is entitled to vote;” and
- 1117-A, 25 P.S. § 3031.17, requiring that a “county board of elections, as part of the computation and canvass of returns, shall conduct a statistical recount of a random sample of ballots after each election using manual, mechanical or electronic devices of a type different than those used for the specific election. The sample shall include at least two (2) per centum of the votes cast or two thousand (2,000) votes whichever is the lesser.”

“Penetration Analysis” testing sought to ascertain whether the iVotronic Voting System meets the requirement of Section 1107-A(12) of the Election Code, which requires that an electronic voting system “provides acceptable ballot security procedures and impoundment of ballots to prevent tampering with or substitution of any ballots or ballot cards.” 25 P.S. § 3031.7(12).

Precinct tabulation devices were configured as if for delivery to a polling place from a warehouse; this included all suggested seals and locks. The Examiner inspected the device for the ability to tamper with the transportation case and the device inside the case. The inspection examined the ports, the outer case, and memory devices from the aspect of the device as delivered to the polling place and configured for voting. The Examiner also examined both the precinct device and the EMS for password management of administrative functions and ensured the system counter cannot be reset by unauthorized persons. The Examiner photographed the configuration and analyzed the configuration for possible vulnerabilities.

#### **B. Reexamination Specifications**

In accordance with the test protocols, the reexamination of the iVotronic Voting System occurred in an environmentally controlled room, which was selected primarily because it was large enough to hold the voting system, the participants, and the public. The room was configured such that the Examiner, the representatives of the Secretary of the Commonwealth, and ES&S each had their own independent work areas. Members of the public were allowed to observe the reexamination.<sup>7</sup>

SLI Global Solutions, a trusted source, provided the Department’s Bureau of Commissions, Elections and Legislation with a trusted build of the iVotronic Voting System prior to the date of the reexamination. On the day of the reexamination, ES&S provided three iVotronic precinct tabulation devices, the EMS with the test election definitions, and the components necessary to load the trusted build onto the precinct tabulation devices. The Examiner provided ES&S with the firmware/software that had been provided by the trusted source. ES&S then loaded the firmware/software onto the required media and installed the firmware/software on each of the precinct tabulation devices. Once the firmware/software was loaded onto the precinct tabulation devices, ES&S was not allowed access to the internal components of the devices without consent of the Examiner or a representative of the Secretary of the Commonwealth.

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<sup>7</sup> The Secretary published the time and place of the reexamination on the Department of State website prior to the date of the reexamination. Additionally, the Department sent a letter to the primary contact for the group of electors who requested the reexamination notifying them of the time and place of the reexamination.

## C. Reexamination Results

On August 21, 2012, the Examiner issued the test report for the iVotronic Voting System.

### 1. Review Testing Results

The Review testing performed by the Examiner demonstrates that the iVotronic Voting System meets the relevant requirements of the Pennsylvania Election Code.

Specifically, the ITA reports and certifications submitted by ES&S satisfy the requirements of Section 1105-A(a) of the Election Code, 25 P.S. § 3031.5(a); the iVotronic Voting System has been examined and approved by an ITA as meeting the applicable performance and test standards established by the federal government.

The design requirements of Section 1107-A(11) of the Election Code, 25 P.S. § 3031.7(11), are met by the documented Product Safety Test in the submitted ITA reports, which the Examiner deemed acceptable.

Section 1107-A(14) of the Election Code, 25 P.S. § 3031.7(14), is met by the combination of Hardware Non-Operating Environmental Tests performed by the ITA, which included: bench handling, vibration, low temperature, high temperature, and humidity. These components tests were designed to test the storage of precinct tabulation devices between elections, as well as transportation between the storage facility and the polling place.<sup>8</sup>

### 2. Targeted Functionality Testing Results

The protocols relating to Targeted Functionality testing developed and published prior to the reexamination consisted of nine (9) separate tests. The Examiner conducted each of these tests during the reexamination with necessary modifications, as indicated below (see Part III.D). No issues or material anomalies were experienced during these tests, and the objective criteria established in the test protocols were met.

Specifically, the reexamination of the iVotronic Voting System demonstrates that, if set up pursuant to item four (4) of the Directive Concerning the Use, Implementation and Operation of Electronic Voting Systems by the County Boards of Elections issued by the Secretary of the Commonwealth on April 28, 2009, the iVotronic Voting System provides the requisite voter secrecy in compliance with Section 1107-A(1) of the Election Code, 25 P.S. § 3031.7(1). Additionally, the iVotronic Voting System successfully records and reports:

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<sup>8</sup> The ITA report submitted for Review testing did not include data relating to the Hardware Non-Operating Environmental Test results. The report, however, referenced two hardware reports as the basis for acceptance in the federal test campaign.

- votes for “1 of 1,” “N of M,” and “Question” contests for both a standard voting session and an ADA voting session in compliance with Section 1107-A(2), 25 P.S. § 3031.7(2);
- straight party votes and demonstrated the “Pennsylvania Method” of straight party voting for both a standard voting session and an ADA voting session, meeting the requirements of Section 1107-A(3), 25 P.S. § 3031.7(3); and
- straight party and write-in votes for both a standard voting session and an ADA voting session, meeting the requirements of Sections 1107-A(4) & (5), 25 P.S. §§ 3031.7(4) & (5).

The iVotronic Voting System also successfully prohibits a voter from selecting more than the number of allowable selections, including write-in votes, for both a standard voting session and an ADA voting session, in compliance with Section 1107-A(7), 25 P.S. § 3031.7(7). The iVotronic Voting System provides a voter with a review screen and allows a voter to return to either the beginning of the ballot or an individual contest to make changes to his or her selection(s) before casting the ballot for both a standard voting session and an ADA voting session, meeting the requirements of Section 1107-A(10), 25 P.S. § 3031.7(10). Lastly, the iVotronic Voting System provides a public counter that increments with each cast vote; provides the ability to be locked after the polls are closed; precludes the re-opening of the polls after they are closed; possesses design features that allow tamper evident locks and seals to be placed on the voting devices; and provides a zero proof and results report, as required under Section 1107-A(16), 25 P.S. § 3031.7(16).

### 3. System Integration Testing Results

The iVotronic Voting System successfully completed both the general and closed primary elections. The Examiner experienced no issues or material anomalies during these tests, and the iVotronic Voting System met the objective criteria set forth in the test protocols. Accordingly, the iVotronic Voting System meets the requirements of Sections 1101-A and 1117-A of the Pennsylvania Election Code, 25 P.S. §§ 3031.1 & 3031.17, in that the system is able to provide for a permanent physical record in the format of the cast vote record and ballot images that can be used to conduct a statistical recount. The System Integration testing further confirmed that the iVotronic Voting System complies with Section 1107-A(4), 25 P.S. § 3031.7(4), in that the system successfully allowed voters in a general election to vote for candidates from all parties and political bodies, including write-in candidates. The iVotronic Voting System complies with Section 1107-A(9), 25 P.S. § 3031.7(9), in that test voters in the primary election were only able to vote for candidates seeking nomination from their party and the system rejected attempts to vote for candidates seeking nomination from the other party. The iVotronic Voting System meets the requirements for Sections 1107-A(6) and (8), 25 P.S. §§ 3031.7(6) & (8), in that the test voters cast votes on different ballot styles for candidates and questions and the iVotronic Voting System precluded test voters from over voting.

#### 4. Penetration Analysis Results

During the performance of this analysis, the iVotronic Voting System provided acceptable ballot security procedures and impoundment of ballots to prevent tampering with or substitution of any ballots or ballot cards. It also provided acceptable password management and restriction of access to administrative functions. Therefore, the iVotronic Voting System meets the requirements of Section 1107-A(12) of the Election Code, 25 P.S. § 3031.7(12).

#### **D. Observations**

##### 1. Review Testing Observations

As a result of the Review testing, the Examiner concluded that the iVotronic Voting System complies with the requirements of the relevant sections of the Pennsylvania Election Code.

The Examiner noted that although the submitted reports did not contain specific data for an Accuracy Test, see Sections 1107-A(11) and (13) of the Election Code, 25 P.S. §§ 3031.7(11) & (13), a test to meet the accuracy requirements of the Federal Election Commission 2002 Voting System Standards must be performed to receive an NASED Certification. Given that the iVotronic Voting System received such federal certification, it can be determined that the iVotronic Voting System met the requirement of this Accuracy Test during the federal testing campaign.

The Examiner also noted that ES&S did not provide a Summative Usability Report, related to the requirements set forth in Section 1107-A(15) of the Election Code, 25 P.S. § 3031.7(15). The Examiner nevertheless concluded that the iVotronic Voting System complies with this requirement. The Examiner did not encounter any issues performing the method of operation for standard voting sessions or ADA voting sessions during execution of the reexamination. Additionally, Department of State staff members were used to input voting data for the System Integration testing, and no operational issues were reported. The Secretary accepts this conclusion.

##### 2. Targeted Functionality Testing Observations

As a result of the Targeted Functionality testing, the Examiner concluded that the iVotronic Voting System complies with the requirements of the relevant sections of the Pennsylvania Election Code.

The Examiner noted that the observer reported being able to see parts of the ballot and voter inputs while executing both the standard voting and ADA test cases for Section 1107-A(1) of the Election Code, 25 P.S. § 3031.7(1), which requires an electronic voting system to provide for voting in secrecy. For the ADA test case, the Examiner noted that he tested the iVotronic Voting System while activated for a standard voting session and that the LCD display is not

active in an actual ADA voting session. The Examiner concluded that the iVotronic Voting System, if set up pursuant to item four (4) of the Directive Concerning the Use, Implementation and Operation of Electronic Voting Systems by the County Boards of Elections issued by the Secretary of the Commonwealth on April 28, 2009, provides the requisite voter secrecy so that an observer is unable to see whom a voter voted for, in compliance with the Pennsylvania Election Code.

The Examiner noted an anomaly that occurred while executing the ADA portion of the test case for Section 1107-A(7) of the Election Code, 25 P.S. § 3031.7(7), which requires an electronic voting system to prevent a voter from over voting. A loud static sound was emitted from the headphones after a long pause by the Examiner. This caused the Examiner to remove the headphones. When the Examiner resumed activity, the audio prompts continued without any issue. ES&S researched the occurrence and found that the audio file prompted by inactivity was in the wrong format. As a result, when the system attempted to play the file, the audio could not be read and static was produced. The Examiner noted that the unreadable audio file did not affect the voting system's ability to record a voter's selection and ultimately concluded that the iVotronic Voting System meets the requirements of Section 1107-A(7), 25 P.S. § 3031.7(7).

The Examiner also noted that while executing the test case for the requirements of Section 1107-A(16) of the Election Code, 25 P.S. § 3031.7(16), ES&S demonstrated a software feature that locked the device so no further voting could take place after the polls were closed. This software feature was in addition to the other features of the iVotronic Voting System that the Examiner concluded meet the requirements of Section 1107-A(16), 25 P.S. § 3031.7(16). According to the Examiner, the software feature is logged in the audit logs for both the locking and unlocking of the device, but this feature does not provide an obvious visual indication, like a tamper evident lock does, that indicates the device remains sealed and votes could not be input after the polls are closed. The audit logs would have to be reviewed in order to determine if additional votes were input after the polls were closed. As a result, the Examiner recommends that this feature not be used in place of the tamper evident locks to secure the device after the polls are closed.

### 3. System Integration Testing Observations

The Examiner did not observe any issues or anomalies during the execution of the System Integration testing. As noted above, as a result of this testing, the Examiner concluded that the iVotronic Voting System complies with the requirements of the relevant sections of the Pennsylvania Election Code.

#### 4. Penetration Analysis Observations

As a result of the Penetration Analysis testing, the Examiner concluded that the iVotronic Voting System complies with the requirements of the relevant sections of the Pennsylvania Election Code.

The Examiner noted that the lock placed over the serial port and compact flash memory did not prevent the possibility of access to the compact flash. During the penetration analysis, the Examiner was able to expose the edge of the compact flash memory card. The Examiner did not access the compact flash card, but deemed this a possible vulnerability since the compact flash card could possibly be removed and replaced without the lock being removed. The Examiner nevertheless concluded that the iVotronic Voting System meets the requirements set forth in Section 1107-A(12) of the Election Code, 25 P.S. § 3031.7(12), but had several recommendations to ensure that tampering with the compact flash card would not go without notice, including a more rigid lock, better installation of the lock used during the reexamination, or a tamper resistant seal over the compact flash card itself.

#### IV. CONDITIONS FOR CERTIFICATION

Given the results of the February 29 and March 1, 2012, reexamination and the findings of the Examiner as set forth in his August 21, 2012, report, the Secretary of the Commonwealth certifies the iVotronic Voting System in accordance with the conditions detailed in the reports dated December 22, 2005, and April 7, 2006, and the following additional conditions:

- Pennsylvania counties using the iVotronic Voting System must comply with the Directive Concerning the Use, Implementation and Operation of Electronic Voting Systems by the County Boards of Elections issued by the Secretary of the Commonwealth on April 28, 2009, and in particular adhere to item four (4) of the directive when setting up and positioning the precinct tabulation devices in the polling place to assure compliance with the constitutional and statutory requirements that secrecy in voting be preserved (see Pa. Const. Art. VII. § 4; and Section 1107-A(1) of the Election Code, 25 P.S. § 3031.7(1)).
- Pennsylvania counties using the iVotronic Voting System cannot use the software feature that locks the precinct tabulation device from further voting *in place of* the tamper evident locks to secure the device after the polls are closed.
- Pennsylvania counties using the iVotronic Voting System must install the locking mechanism over the serial port and compact flash memory in a manner to prevent access to the compact flash card.

## V. RECOMMENDATIONS

The Secretary of the Commonwealth reaffirms the recommendations in the Secretary's certification reports dated December 22, 2005, and April 7, 2006, and suggests the following additional recommendations for the iVotronic Voting System:

- The Secretary of the Commonwealth recommends the use of a rigid lock over the serial port and compact flash memory or a tamper resistant seal over the compact flash card itself, to ensure against tampering with the compact flash card without notice.
- The Secretary of the Commonwealth recommends the use of the software feature that locks the precinct tabulation device from further voting *in conjunction with* the tamper evident locks to secure the device after the polls are closed.

## VI. CONCLUSION

As a result of the reexamination conducted on February 29 and March 1, 2012, and after consultation with the Department's staff and the Examiner, the Secretary of the Commonwealth concludes that the iVotronic Voting System can be safely used by voters at elections as provided in the Pennsylvania Election Code and meets all of the requirements set forth in the Code, **provided it is implemented with the conditions listed in Section IV of this report, as well as all conditions listed in the December 22, 2005, and April 7, 2006, reports.** Accordingly, the Secretary reaffirms certification of the iVotronic Voting System and continues to approve the iVotronic Voting System for use in this Commonwealth.

In addition, pursuant to the Directive on Electronic Voting Systems issued by the Secretary of the Commonwealth on August 8, 2006, the Directive Concerning the Use, Implementation and Operation of Electronic Voting Systems by the County Boards of Elections issued on April 28, 2009, and Section 1105-A(d) of the Pennsylvania Election Code, 25 P.S. § 3031.5(d), this certification and approval is valid only for the voting system discussed in this Report. If the vendor or a County Board of Elections makes **any** changes to the iVotronic Voting System subsequent to the date of its reexamination, it must **immediately** notify the Pennsylvania Department of State and the relevant federal testing authority or laboratory. Failure to do so may result in the decertification of the iVotronic Voting System in the Commonwealth of Pennsylvania.

All jurisdictions that have implemented the iVotronic Voting System pursuant to the certifications of December 22, 2005, and April 7, 2006, must implement the iVotronic Voting System under this certification and must comply with the directives found in this Report, previous reports for the iVotronic Voting System, and any directives issued by the Secretary of the Commonwealth regarding the use of this System, in accordance with Section 1105-A(a)-(b) of the Election Code, 25 P.S. § 3031.5(a)-(b).

The iVotronic Voting System will accommodate no more than 300 voters per unit.