Voting System Qualification Test Report

Dominion Voting Systems, Inc.

Democracy Suite, Release 4.14.37, Version 3

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R. A. Gray Building, Room 316
500 S. Bronough Street
Tallahassee, FL 32399-0250

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Executive Summary

Dominion Voting Systems, Inc., (DVS) submitted an application requesting Florida voting system certification of *Democracy Suite Release 4.14.37, Version 3*. Previous releases of the Democracy Suite voting system have been certified in Florida, the latest being *Democracy Suite Release 4.14.37, Version 2* (certified January 17, 2020).

The Democracy Suite voting system is a paper-based voting system. The most recently certified voting system version consists of an election management system (EMS); two types of optical scan precinct count tabulators—the ImageCast Precinct (ICP) and the ImageCast Evolution (ICE), which is also certified as ADA accessible equipment; and two types of ImageCast Central (ICC) central count tabulators – the Canon brand and a digital DRS brand Photoscribe.

The currently certified Canon brand scanners run the ICC software on attached "all-in-one" series computers with a Windows 7 operating system, whereas the ICC software runs internally on the DRS PhotoScribes. This certification effort adds a Dell 5270 "all-in-one" series computer, with a Windows 10 operating system running in "Windows 7 compatibility" mode, to support the Canon G1130 model of ICC central count scanner.

The Bureau of Voting Systems Certification (BVSC) conducted the certification qualification testing in two phases. Phase I consisted of a physical audit to verify the setup configuration of the EMS (which has not been modified since Release 4.14.37, Version 2), the restoration of elections, and a mass ballot count test on the Canon brand of ICC central count tabulator. Phase II included a functional audit, including mock elections testing, as well as an examination of various election cycle events and a myriad of tests to verify continued conformity with the Florida Voting System Standards (FVSS)[1], and other applicable state and federal laws and rules.

The qualification test results affirm that *Democracy Suite Release 4.14.37, Version 3* met applicable requirements with the FVSS, applicable state and federal laws including the Help America Vote Act (HAVA) for usability and accessibility and other applicable rules. BVSC, therefore, recommends certification of the referenced voting system. Since the version submitted for certification was limited in scope, issues identified in the Continuous Improvements/Recommendations section of this report will still need to be addressed in any future release of this voting system involving a programmatic change to the system unless they are no longer an issue with the version submitted.

[1] DS-DE 101, Rule 1S-5.001, Florida Administrative Code

Introduction

Dominion Voting Systems, Inc. submitted an application requesting Florida voting system certification of *Democracy Suite Release 4.14.37, Version 3.* The new release for which DVS sought certification did not involve a programmatic change to the system and was limited in scope. The application sought to add the following update: a Dell 5270 "all-in-one" series computer, with a Windows 10 operating system running in "Windows 7 compatibility" mode, to support the Canon G1130 model of ImageCast Central (ICC) central count scanner.

The Democracy Suite voting system is a paper-based voting system that complies with HAVA provisions for accessibility voting. The voting system consists of an election management system (EMS); two types of optical scan precinct count tabulators—the ImageCast Precinct (ICP) and the ImageCast Evolution (ICE), which is also certified as ADA accessible equipment; and two types of ImageCast Central (ICC) central count tabulators – the Canon brand and a digital DRS brand Photoscribe.

The Bureau of Voting Systems Certification (BVSC) conducted the certification qualification testing in two phases from August 28 to September 11, 2020, at the Leon County Woodville Community Center.

Phase I consisted of a physical audit to verify the setup configuration of the EMS, verification of the previously tested presidential preference primary, general and primary elections with their required media, and a functional audit. Phase I also comprised the conduct of mock elections and election cycle events on the tabulator under test, including loading the tabulators with the requisite media, opening polls activities and reports, feeding ballots, closing polls activities and reports, and election night and post-election reporting. In addition, BVSC conducted various regression tests to confirm continued operability of the voting system.

In Phase II, BVSC conducted a publicly noticed mass ballot count, a required test for the upgrade of a Florida-certified voting system.

Background

The ICC scanner is certified as part of *Democracy Suite, Release 4.14.37, Version 1* (certified February 15, 2016) and *Version 2* (certified January 17, 2020). With this application, the vendor seeks to add the Dell 5270 Windows 10 "all-in-one" series computer, for use with the Canon brand G1130 ICC scanner, to the existing *Democracy Suite, Release 4.14.37, Version 2* voting system.

The ICC central count software application runs on a variety of operating system platforms: Windows XP operating system (on the DRS PhotoScribe scanners) and Windows 7 operating system (on "all-in-one" computers supporting the Canon brand DRX-10C and G1130 scanners). This certification seeks to add the Dell 5270 "all-in-one" computer with a Windows 10 operating system to support the Canon G1130 scanner.

Due to a minor issue found during testing, the vendor has stipulated that the ICC software on the Dell 5270 computer must be run in "Windows 7 compatibility" mode. It is important to note that while the ICC software application is running in Windows 7 compatibility mode, the actual ICC computer (i.e., the Dell 5270) is functioning with the Windows 10 operating system. BVSC observed no issues with the ICC software running on the Windows 10 operating system in Windows 7 compatibility mode.

If certified, the voting system would become *Democracy Suite, Release 4.14.37, Version 3*.

System Overview

The DVS Democracy Suite voting system election management system consists of the following software applications:

- Application Server (APPS) – a server application for executing processes such as rendering ballots, generating audio files and election files, *etc*.
- Audio Studio (AS) – a client application used to record audio files
- Data Center Manager (DCM) – a server application used in the back-end data center configuration
- EMS Database Server – a server-side repository of the election project database, which includes pre-voting and post-voting data
- Election Data Translator (EDT) – an end-user application used to export election data from an election project and import election data into the election project
- Election Event Designer (EED) – a client application that integrates definition functionality together with ballot styling capabilities and represents a main pre-voting phase end-user application
- File System Service (FSS) – a Windows service application that helps read and write files on memory cards
- Results Tally and Reporting (RTR) – a client application used for integrating election results acquisition, validation, tabulation, and reporting

Democracy Suite includes the following scanning and tabulating devices and ADA voting device:

- ImageCast Precinct (ICP) tabulator is an optical scanner with ballot review. The ICP is attached on a ballot box (Figure 1, ICP only).

Figure 1. ImageCast Precinct tabulator (ICP)

- ImageCast Evolution (ICE) is a precinct-level optical scanner, with ballot marking capability, audio voting using the Audio Tactile Interface (ATI), and a tabulator connected to a ballot box.

  Audio accessible voting may be accomplished on the ICE via the main monitor, as shown in Figure 2, or through an external, or "dual," monitor attached to the main unit (Figure 3). The dual monitor setup (ICE-Dual) allows an accessible voting session to occur while the unit is in standard operating mode and scanning paper ballots.

Figure 2. ImageCast Evolution (ICE) with ballot box

Figure 3. ICE with external, "dual" monitor

- The central count scanners are the ImageCast Central (ICC) tabulators (Figures 4 and 5). These systems use commercial-off-the-shelf (COTS) hardware with Dominion software. The Canon brand scanners (Figure 4) were previously certified with *Democracy Suite Release 4.14.37, Versions 1* and *2*.

Figure 4. ImageCast Central tabulator (ICC model Canon G1130 shown)

Figure 5. ImageCast Central tabulator (ICC model DRS PhotoScribe shown).

The DRS PhotoScribe brand scanners were certified as ICC scanners with *Democracy Suite, Release 4.14.37, Version 2* (Figure 5 above).

Components Under Review

The test objective was to verify that the voting system meets the requirements of the applicable Florida statutes, standards, and federal laws.

Since this release is an upgraded version of a certified release of the Democracy Suite voting system, BVSC performed a limited FVSS qualification examination. In particular, BVSC conducted various regression tests and reviewed the Dell 5270 Windows 10 "all-in-one" series computer, for use with the Canon brand G1130 ICC scanner. DVS requires that the ICC software that controls the G1130 must be run in Windows 7 compatibility mode. Staff focused on this in the test campaign but included both options in testing.

Conduct of Tests / Findings

The FVSS qualification examination encompassed a physical and functional audit, as well as additional tests to verify continued compliance with standards for election cycle events with the introduction of a new tabulator. In addition, BVSC conducted a mass ballot count test on the ICC Canon brand central count tabulator.

Systems Setup & Configuration

BVSC set up the voting system and verified that the configurations of the system, as outlined in the submitted technical data package (TDP) documentation, corresponded with the actual system setup.

Findings:

After all materials were received, technical issues were resolved and the vendor clarified its documentation. BVSC found no discrepancies with the setup of the Democracy Suite voting system configurations.

Physical Audit

BVSC conducted a physical audit to verify that the voting system matched the specifications described in the application and the TDP documentation.

Findings:

BVSC found no discrepancies between the voting system and the vendor's specifications in the certification application and TDP.

Functional System Audit

BVSC conducted a functional system audit on the unit under test, the Dell 5270 Windows 10[2] "all-in-one" series computer, for use with the Canon brand G1130 ICC scanner to verify that all components of the unit operated as described in the TDP.

Election Definitions

BVSC used existing election definitions for a general election, a presidential preference primary (PPP) election, and a primary election.

Election Management System – Administrative Reports

Because there were no changes to the *Democracy Suite 4.14.37, Version 3* election management system software, BVSC generated only the reports needed to verify test activities.

In previous test campaigns, *Democracy Suite 4.14.37, Versions 1* and *2,* BVSC staff reported an issue with the Statement of Votes Cast report (a report that shows precinct-level results for each candidate). Since the EMS was not upgraded in this test effort, the observed problem remains outstanding. Specific details are in the "Findings" below.

Findings:

The Statement of Votes Cast (SOVC) report contains extraneous data fields that could be confusing to individuals seeking to interpret report data. Below is an excerpt of a SOVC report (Figure 6). Election results are reported accurately for candidates and precincts, as expected. However, the "cumulative" data rows highlighted in blue are meaningless and unnecessary and the "County – Total" row is redundant, containing data that is already displayed in another report line. Please see an example of the previously reported issue:

[2] This was also tested in Windows 7 compatibility mode.

United States Senator (REPUBLICAN) (Vote for 1)

REP

Precinct	Times Cast	Precinct	LeRoy Collins Jr. (REP)	Katherine Harris (REP)	William "Will" McBride (REP)	Peter Monroe (REP)	John Smith (REP)
County		**County**					
Miami-Dade County		**Miami-Dade County**					
01	6,040	01	400	800	1,200	1,600	2,000
02	3,020	02	200	400	600	800	1,000
03	6,020	03	200	400	600	800	1,000
04	3,020	04	200	400	600	800	1,000
05	6,040	05	400	800	1,200	1,600	2,000
06	3,020	06	200	400	600	800	1,000
07	3,020	07	200	400	600	800	1,000
08	3,020	08	200	400	600	800	1,000
09	3,020	09	200	400	600	800	1,000
10	3,020	10	200	400	600	800	1,000
11	3,020	11	200	400	600	800	1,000
12	3,020	12	200	400	600	800	1,000
13	3,020	13	200	400	600	800	1,000
14	3,020	14	200	400	600	800	1,000
15	3,020	15	200	400	600	800	1,000
16	3,020	16	200	400	600	800	1,000
17	3,020	17	200	400	600	800	1,000
49	3,020	49	200	400	600	800	1,000
50	3,020	50	200	400	600	800	1,000
51	3,020	51	200	400	600	800	1,000
Miami-Dade County - Total	69,440	Miami-Dade County - Total	4,400	8,800	13,200	17,600	22,000
Cumulative		**Cumulative**					
Cumulative	0	Cumulative	0	0	0	0	0
Cumulative - Total	0	Cumulative - Total	0	0	0	0	0
County - Total	69,440	County - Total	4,400	8,800	13,200	17,600	22,000

Figure 6. Excerpt from the Statement of Votes Cast Report

Mock Elections Testing

BVSC conducted mock elections as regression testing on the voting system. The mock elections incorporated single- and multiple-card ballots of varying ballot lengths (11-inch, 14-inch, and 17-inch) for three election types: a primary, a PPP, and a general. The tests included both hand marked and machine marked ballots, pre-printed and on-demand ballots. BVSC simulated elections using several Canon brand G1130 ICC scanners, and combining this with previously tested results from the remaining types of equipment, from initial preparations (pre-election activities) through voting (election activities), election night and precinct level reporting (post-election and reporting activities). BVSC compared election results to pre-determined results.

Findings:

The system performed as indicated in the vendor's TDP and in accordance with the applicable Florida Statutes and FVSS. BVSC did not test the precinct tabulators as a part of this test campaign; however, DVS has not yet corrected a previously observed and reported anomaly from testing of *Democracy Suite 4.14.37, Versions 1* and *2* with contest titles on the precinct tabulator tapes for both the ICE and ICP. The special character "-" (hyphen) does not display correctly on the tapes (see Figure 7). This issue appears to be isolated only to the contest titles and only on the paper tapes (zero and results tapes). Furthermore, this issue does not affect the operation of the precinct tabulators or the scanning and tabulation of votes. BVSC determined that this issue is of low impact and severity; however, the vendor will be required to correct this issue before any future releases of this voting system will be considered for certification.

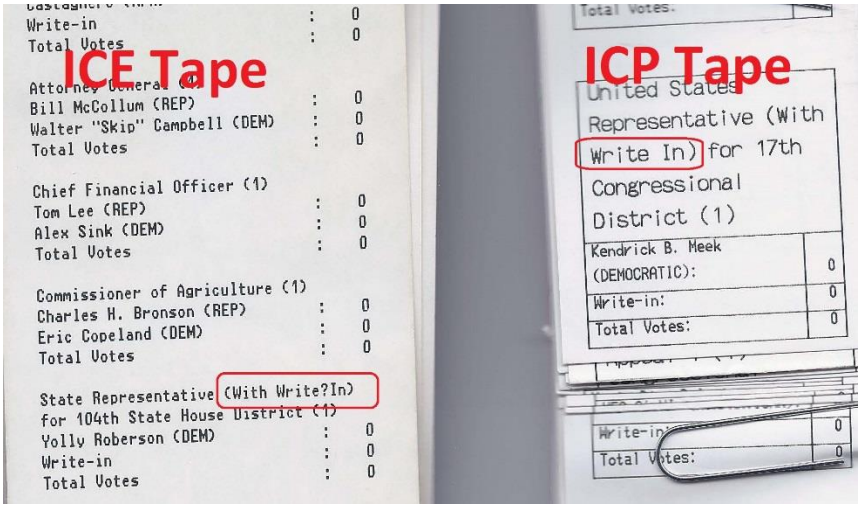

Figure 7. Special character display anomaly on precinct tapes

Pre-Election Activities

Pre-election activities included preparing the election media, preparing the ballot test decks (unless already prepared by the vendor), preparing and validating the expected results, and preparing the voting equipment. The primary election definition included a universal primary contest (UPC). Pertinent reports were reviewed as a part of this testing, such as the Ballot Overview and Ballot Distribution per Precincts reports.

Election Activities

Election activities included opening polls, casting ballots using prepared test decks, and closing polls.

Election Reporting

Testing included uploading and verifying election results in the EMS by election group (vote-by-mail, early voting, Election Day, and provisional voting). BVSC uploaded results directly for the primary election, the PPP and the general election. The Election Summary and Precinct-Level Results were created, printed, and compared against expected results.

Post-Election Activities

Post-election activities included generating reports, including the Cards Cast and Statement of Votes Cast reports.

Mass Ballot Count

Staff conducted a mass ballot count on the ICC central count tabulator to ensure that the introduction of the Dell 5270 Windows 10 “all-in-one” series computer, for use with the Canon brand G1130, did not negatively impact the previously approved machine’s ability to properly count ballots.

Central Count Scanner (ICC) – G1130

BVSC conducted a mass ballot count on the Canon brand G1130 ICC scanner. To reach the 192,000 minimum ballot requirement, BVSC used a test deck of pre-marked ballots supplied

by the vendor. The pre-audited ballots, in varying lengths, were printed on 80-lb. conventional stock. The test deck included easily verifiable vote patterns as well as overvoted and blank ballots. A set of predetermined results was also compared to the election results that were accumulated in the reporting application (RTR).

Specific details follow:

Table 1. Mass Ballot Count Details for the G1130 Canon Brand Central Count Scanners

Election definition used:	Miami-Dade County 2014 Primary Election
Ballot length:	Varies (17" and 18")
Number of scanner units used:	5
Number of test decks:	62
Number of runs per test deck:	10
Number of ballots per deck:	Varies
Number of cards per ballot:	Varies
Total number of ballots cast:	192,040
Total number of vote targets:	9,972,220

Findings:

The Canon brand G1130 ICC scanners, with a Dell 5270 "all-in-one" computer and the Windows 10 operating system, under test met the acceptance criteria for the central count scanner mass ballot count as shown below:

Table 2. Acceptance Criteria for the Mass Ballot Count

ICC Canon Brand G1130 Scanner Mass Ballot Count – Acceptance Criteria	Expected	Accepted
Did the memory registers overflow?	No	✓
Did the public counters increment appropriately?	Yes	✓
Did the tabulated results agree with predetermined vote totals?	Yes	✓
Number of errors (must not exceed 1 in 1,000,000 vote targets). An error is defined as a target scan that produces a result other than the expected result.	≤ 1/1M vote targets	✓
Number of multiple feeds (must not exceed 1 in 5,000 ballots). A multiple feed occurs when the machine pulls multiple ballots and does not "catch" the error.	≤ 1/5K ballots	✓
Number of incorrect rejections of ballots (must not exceed 3%)	≤ 3% total ballots	✓

There was one ballot position error on one contest on one ballot. Thus, the error rate was 1 (vote target error) in 9,972,220 (total vote targets), which is within acceptable criteria under the FVSS[3] and voluntary guidelines adopted by the federal U.S. Elections Assistance Commission.[4]

[3] "The error rate measured by this criterion shall not exceed one part in 1,000,000." DS DE-101, Rule 1S.5-001, Florida Administrative Code, page 27.

[4] "…benchmark was defined as a ballot position error rate of one in 500,000." VVSG, Version 1.1, Volume 1, page 80.

BVSC found that the ICC software application exhibited an anomaly during the scanning of ballots, in which the "Admin" icon and function buttons "blink" momentarily. The user was able to select the function buttons when the screen was in an operational state. The rate of alternating states (every few seconds) only nominally impacted the user's ability to select functions. When notified of the finding, DVS responded that this was caused by a feature in the Windows 10 operating system which places USB ports into a low power state when they are left idle, thus affecting the connection with the equipment's security sensor, i.e., the iButton. Windows 7 does not have this feature. Because of this, DVS is requiring that the ICC software application be run in Windows 7 compatibility mode to avoid this behavior. DVS provided updated documentation to address this issue, including instructions for changing the Windows compatibility mode for the ICC application file. It is important to note, however, that BVSC conducted several tests using the ICC software in both Window 10 and Windows 7 compatibility modes and, other than the relatively inconsequential behavior described above, found no difference between the two modes.

Additional Testing

In addition to mock elections and a mass ballot count, BVSC conducted tests to verify continued conformity with applicable Florida Statutes and standards, as well as to observe specific features and functions of the voting system.

Contest Recounts

BVSC conducted recount testing to verify compliance with sections 102.141(7) and 102.166(2), Florida Statutes, Rule 1S-2.031, Florida Administrative Code, and the FVSS. BVSC selected three countywide races and two district-wide races in the general election. Per instructions DVS provided in the required Florida Overview Manual, BVSC suppressed non-recount races in the EMS results software.

Findings:

BVSC found that the voting system complied with applicable statutes and standards. Democracy Suite allows the user to report results from only the affected races. Furthermore, the system permits a recount on more than one race at a time, as demonstrated by processing three statewide races and two local races in one recount. The system functioned as expected.

Folded Ballot

Although Florida law and FVSS do not require this test, BVSC conducted a folded-ballot test to simulate vote-by-mail ballot processing. The objective was to observe the behavior of the Canon brand G1130 ICC central count scanners when folded ballots are scanned.

BVSC used a test deck comprised of elections with a multitude of ballot lengths (11-inch, 14-inch, 17-inch, and 18-inch, 19-inch, and 22-inch ballots). Each test deck included several fold types: Z-fold, C-fold, a fold

through a vote target[5], and a fold through a write-in, up to the maximum number of folds allowed per ballot length[6]. BVSC cast ballots into the ICC scanner and compared the results to expected results.

Findings:
The scanner appropriately accepted all ballots presented and tabulated results matched expected results.

Simulated System Failure / Recovery

BVSC performed a catastrophic failure test on the G1130 Canon brand scanner to observe whether it correctly handles a "graceful"[7] shutdown due to a power loss. The expectation is that the scanner will retain counts and votes after a shutdown.

Findings:
BVSC found that the ICC scanner lost the public count but retained the protective count[8] on the device and in the audit log. All ballots cast, at the time of shutdown, tallied correctly.

Daylight Saving Time

BVSC examined the ICC scanner clock's ability to automatically advance or turn back one hour with the Daylight Saving Time change. Staff tested two ICC scanners, with one scanner using Windows 10 and one scanner using Windows 7 compatibility mode.

Findings:
BVSC found that the ICCs retained the updated time as expected.

Infrared (IR) Security Sensor

The infrared (IR) paper sensor is a security feature which, when enabled for an election on the ICE or ICP, allows only ballots printed on special IR-reactive paper ballot stock to be cast. The IR paper sensor contained in the ICE and ICP scanners detects paper infused with IR-reactive elements; when paper without the IR-reactive elements is inserted (as in the case of a fraudulent ballot), the tabulator rejects it. Counties have the option to enable this feature and print their ballots on the IR-reactive paper (IR security ballot stock), or use conventional ballot stock with the feature disabled.

A test deck of IR-reactive paper ballots was scanned through a G1130 Canon brand scanner to ensure that, in the case of a recount, the scanners would accept ballots using this type of paper.

[5] Folds through a vote target do not conform to the ballot printing specification as outlined in the vendor's documentation. See Dominion Voting Systems ImageCast Printing Specification, 4.14.DS-FL::113 (December 5, 2019), p. 11.

[6] Dominion Voting Systems ImageCast Printing Specification, Version 4.14.DS-FL::113 (December 5, 2019), p. 11.

[7] A "graceful" shutdown is an industry term meaning the unit is turned off by software function and the operating system is allowed to perform its tasks of safely shutting down processes and closing connections.

[8] The 'public count' is a publicly displayed count of ballots cast in a given voting session. The protective count is a count that, although not publicly displayed, is maintained and recorded (in the audit log) over time so that the user can be assured that only ballots expected to be scanned have been scanned through the voting equipment.

Findings:
The Canon brand G1130 scanner appropriately accepted ballots printed on IR-reactive paper (IR security ballot stock).

Source Code Review

The source code did not change between *Democracy Suite 4.14.37, Version 1* testing and *Democracy Suite 4.14.37, Version 2* testing. Therefore, a source code review was not required.

Continuous Improvement / Recommendations

There were no programmatic changes from the previously certified version of *Democracy Suite 4.14.37, Versions 1 and 2*, which were certified in 2016 and 2019, respectively. BVSC did not, therefore, add to the list of continuous improvement recommendations reported during those test efforts. Since DVS has not yet addressed recommendations from *Democracy Suite 4.14.37, Version 1* or *Version 2* testing, they are again listed below in this *Democracy Suite 4.14.37, Version 3* test report.

1. The precinct tabulator tape anomaly observed during *Democracy Suite 4.14.37, Version 1* testing should be addressed in the next release of the voting system. This issue where the zero tapes and results tapes of the precinct scanners do not correctly display the special character "-" (hyphen) affects only the paper tapes and not the operability or tabulating ability of the scanners; therefore, the anomaly does not preclude this version of the Democracy Suite voting system from recommendation for certification. However, any future certification for the Democracy Suite voting system, if granted, will be conditioned upon the vendor correcting this display issue. See pages 9 – 10 of this report for details.

2. The vendor's remedy of the ICP's unexpected shutdown issue during *Democracy Suite 4.14.37, Version 1 testing* was to disable the audit mark feature on the ICP. The audit mark feature is not required by the Florida Statutes, FVSS or other rules. If any future release of the Democracy Suite voting system continues to incorporate the audit mark, DVS will be required to leave the audit mark disabled or, if enabled, the certification of such a system will be conditioned upon DVS correcting the shutdown issue. See Appendix B for details.

3. Statement of Votes Cast Report – This report contains extraneous data fields that could be confusing to individuals seeking to interpret report data. The Statement of Votes Cast Report should be revised to include only data that is needed to convey the votes cast in a given election. See page 8 for details.

Conclusion

Qualification test results affirm that *Democracy Suite Release 4.14.37, Version 3* met applicable requirements of the Florida Voting Systems Standards, the Florida Statutes and administrative code rules, and the Help America Vote Act (HAVA) for usability and accessibility. The Florida Division of Elections, Bureau of Voting Systems Certification, therefore, recommends certification of the referenced voting system.

This approval, however, is recommended because of the limited scope of testing (i.e., no programmatic changes to the system). The next application for certification of any future release for the Democracy Suite voting system must include corrections for all the issues in the Continuous Improvements/Recommendations section of this report, unless they are no longer relevant.

Appendices

Appendix A: Acronyms

ADA	Americans with Disabilities
AS	Audio Studio
ATI	Audio Tactile Interface
BVSC	Bureau of Voting Systems Certification
COTS	Commercial, off-the-shelf
DVS	Dominion Voting Systems, Inc.
EAC	U.S. Elections Assistance Commission
EED	Election Event Designer
EMS	Election Management System
FVSS	Florida Voting Systems Standards
HAVA	Help America Vote Act
ICC	ImageCast Central Count Tabulator
ICE	ImageCast Evolution Precinct Count / ADA Tabulator
ICP	ImageCast Precinct Count Tabulator
LAN	Local Area Network
PPP	Presidential Preference Primary
RTR	Results Tally and Reporting
TDP	Technical Data Package
UPC	Universal Primary Contest
UUT	Unit Under Test
VVSG	Voluntary Voting System Guidelines

Appendix B: ICP Shutdown Issue

Please see the following excerpt from the DVS Democracy Suite 4.14.37, Version 1 test report (Pages 10 – 11) regarding the ICP shutdown issue discussed in the Continuous Improvement / Recommendations section.

Precinct Scanner (ICP)

BVSC conducted a mass ballot count on one ICP precinct scanner. To reach the 9,900 minimum ballot requirement, BVSC used a test deck of pre-marked ballots supplied by the vendor. The pre-audited ballots, in varying lengths, were printed on 100-lb. conventional stock. The test decks included easily verifiable vote patterns as well as overvotes and blank ballots. A set of predetermined results was also supplied and compared to the election results that were accumulated in the reporting application (RTR).

Specific details follow:

Table 3. Mass Ballot Count Details for ICP Precinct Scanner

Election definition used:	*Miami-Dade County 2014 General Election*
Ballot length:	*Varies*
Number of scanner units used:	*1*
Number of test decks:	*14*
Number of runs per test deck:	*10*
Number of ballots per deck:	*Varies*
Number of cards per ballot:	*Varies*
Total number of ballots cast:	*10,120*
Total number of vote targets:	*465,440*

Findings:

BVSC re-started the ICP Mass Ballot Count when the ICP experienced unexpected shutdowns which the vendor attributed to a faulty ballot box lid power supply. Using a different ICP unit which bypassed the ballot box lid power supply, the second Mass Ballot Count also experienced an unexpected shutdown. BVSC asked DVS to investigate the cause.

The vendor asserted that the ICP is designed to perform a graceful shutdown under certain circumstances. DVS iterated that when the ICP fails to find sufficient contiguous space in the ICP random access memory (RAM) to allocate for the creation of an audit mark (before appending it to the ballot image), it performs a graceful shutdown operation. Audit marks require large chunks of RAM, which is affected by conditions such as ballot lengths of 19 inches or greater, vote targets exceeding 50, and the number of ballots scanned exceeding 1,200 (since the last shutdown). Powering down the ICP, whether initiated by a human or otherwise, allows it to consolidate the available memory space. When the ICP is re-booted, the audit marks of subsequent scanned ballots can then be created and saved. BVSC determined that the shutdown operation was unacceptable for Florida elections.

DVS asked to remedy the issue with an updated device configuration file (DCF) for the ICP, which disabled the audit mark functionality. At the vendor's request, BVSC conducted a new ICP mass ballot count using

the same ICP unit with the new DCF file, which allowed the ICP to save the ballot images without audit marks. With the new DCF file and the audit mark disabled, the ICP unit completed the Mass Ballot Count without incident, and all election results matched expected results.

The ICP precinct scanner met the acceptance criteria for the precinct scanner mass ballot count as shown below:

Table 4. Acceptance Criteria for ICP Precinct Scanner

ICP Precinct Scanner Mass Ballot Count – Acceptance Criteria	Expected	Accepted
Did the memory registers overflow?	*No*	✓
Did the public counters increment appropriately?	*Yes*	✓
Did the tabulated results agree with predetermined vote totals?	*Yes*	✓
Number of errors (must not exceed 1 in 1,000,000 vote targets). An error is defined as a target scan that produces a result other than the expected result.	*≤ 1/1M vote targets*	✓
Number of multiple feeds (must not exceed 1 in 5,000 ballots). A multiple feed occurs when the machine pulls multiple ballots and does not "catch" the error.	*≤ 1/5K ballots*	✓
Number of incorrect rejections of ballots (must not exceed 3%)	*≤ 3% total ballots*	✓

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Component Version List

The component version list describes in detail the components of the voting system.

[Redacted pursuant to section 282.318, Florida Statutes, and to the U.S. Department of Homeland Security's designation of elections as a critical infrastructure.]

Florida Department of State
Laurel M. Lee
Secretary of State