NTS
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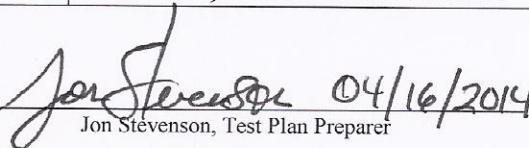
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Job No. T71615.01
Test Plan No. T71615.01 Rev A
April 16, 2014

CERTIFICATION TEST PLAN
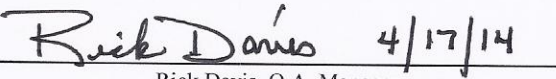
Prepared for:

Manufacturer Name	Dominion Voting Systems, Inc.
Manufacturer System	Democracy Suite Version 4.14-A.1
EAC Application No.	DVS1401
Manufacturer Address	1201 18th Street, Suite 210 Denver, Colorado 80202

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NVLAP
NVLAP LAB CODE 200771-0

U.S. Election Assistance Commission
VSTL
EAC Lab Code 0704

	NTS	**REPORT NO.**	Test Plan No. T71615.01 Rev A
	WE ENGINEER SUCCESS		
	HUNTSVILLE OPERATIONS	**DATE**	April 16, 2014
REV	**DATE**	**PAGE OR PARAGRAPH AFFECTED**	**DESCRIPTION OF CHANGES**
---	04-04-14	Entire Document	Original Release
A	04-16-14	1.2	Updated Scope
A	04-16-14	1.5	Added ending parenthesis
A	04-16-14	1.7.1	Changed the wording of System Overview section
A	04-16-14	1.7.1	Changed "D" to lowercase
A	04-16-14	3.0	Updated paragraph
A	04-16-14	3.1	Changed tense of word "update" to present tense
A	04-16-14	4.2	Removed ECO reference
A	04-16-14	4.2	Updated paragraph
A	04-16-14	4.2	Removed extra period
A	04-16-14	4.4	Updated Source Code Review section for further clarification
A	04-16-14	Appendix A	Clarified process of updating language files

TABLE OF CONTENTS

APPENDICES

1.0   INTRODUCTION

The purpose of this National Certification Test Plan (Test Plan) is to document the procedures that National Technical Systems (NTS) will follow to perform certification testing of the Dominion Voting Systems (DVS) Democracy Suite 4.14-A.1 voting system to the requirements set forth for voting systems in the U.S. Election Assistance Commission 2005 Voluntary Voting System Guidelines (EAC 2005 VVSG). Prior to submitting the system for certification testing, DVS submitted an application to the EAC for certification of the Democracy Suite 4.14-A.1 voting system modification to the previously certified Democracy Suite 4.14 (Certification number: DemSuite-4-14) and Democracy Suite 4.14-A (Certification number: DemSuite-4-14-A) voting systems. This test plan follows Notice of Clarification 09-005: Development and Submission of Test Plans for Modifications to EAC Certified Systems and Notice of Clarification 13-02: Detailed Description of Changes for Modifications.

At test conclusion, the results of all testing performed as part of this test campaign will be submitted to the EAC in the form of a final report.

1.1   Established Baseline System

The baseline system for this modification is the Democracy Suite 4.14-A voting system. Tables 1-1, 1-2, and 1-3 describe the certified equipment and firmware versions. For full details about the Democracy Suite 4.14-A system, refer to the Dominion Voting Systems Democracy Suite 4.14-A Modification's Final Test Report (Rev B) located on the EAC's website at http://www.eac.gov.

Table 1-1 Democracy Suite 4.14 Voting System Hardware Components

Component	Hardware Version	Software/Firmware Version
ICP – Precinct ballot scanner	320A and 320C	4.14.5
ICP – Ballot box	310A (metal), 330A (plastic), 340C (coroplast)and 341C (coroplast with latch)	N/A
ICE – Precinct ballot scanner	400A and 410A	4.14.10
ICE – Ballot box	400A (metal), 410A (plastic), 420A (coroplast)	N/A
ICC – Ballot scanner	Canon DR-X10C	N/A
ICC – PC workstation configured with ICC software	Dell OptiPlex 9010	4.14.4

Table 1-2 Democracy Suite 4.14 Voting System Software Components

Component	Version
Election Event Designer (EED)	4.14.23
Results Tally and Reporting (RTR)	4.14.23
File System Service (FSS)	4.14.23
Audio Studio (AS)	4.14.23
Data Center Manager	4.14.23
Application Server	4.14.23

Table 1-3 Democracy Suite 4.14 Voting System EMS Components

Equipment	Description	Serial Number
Server PC	Dell PowerEdge T620	J8H9H02
Client PC	Dell Precision T1500	61TPNM1

1.0   INTRODUCTION (Continued)

1.2   Scope of Modification

The scope of this modification includes four system changes to address the security and marketability of the Democracy Suite system. These changes include:

1. Introduction of source code obfuscation of the EMS software suite to conceal its purpose in order to prevent tampering and reverse engineering
2. Addition of a new tamper-proof bracket for the ICE service switch (ECO 100216) in order to prevent tampering
3. Additional language support for the ICE tabulator to improve product marketability
4. Introduction of a new hardware RAID controller for the EMS Standard Server computer to improve performance

1.3   Initial assessment

All versions of the precinct tabulators and central count components were submitted for testing in previous EAC campaigns. NTS personnel have analyzed the results of the Democracy Suite 4.14 and Democracy Suite 4.14-A testing to determine prior testing acceptance (Wyle Test Report T70251.01-01 and T71120.01-01). Based on this analysis, NTS is applying for reuse for all prior testing within the Democracy Suite 4.14 and Democracy Suite 4.14-A EAC test campaigns unless otherwise notated within this document. In addition, to verify that the modifications to the voting system do not introduce any nonconformities or instabilities, the Democracy Suite 4.14-A.1 voting system shall be subjected to a system integration test to ensure all components interact properly.

1.4   References

The documents listed below were used in the development of the Test Plan and are utilized to perform certification testing.

- Election Assistance Commission 2005 Voluntary Voting System Guidelines, Volume I, Version 1.0, "Voting System Performance Guidelines," and Volume II, Version 1.0, "National Certification Testing Guidelines," dated December 2005

- Election Assistance Commission Testing and Certification Program Manual, Version 1.0, effective date June 1, 2011

- Election Assistance Commission Voting System Test Laboratory Program Manual, Version 1.0, expires November 2014

- National Voluntary Laboratory Accreditation Program NIST Handbook 150, 2006 Edition, "NVLAP Procedures and General Requirements (NIST Handbook 150)," dated February 2006

- National Voluntary Laboratory Accreditation Program NIST Handbook 150-22, 2008 Edition, "Voting System Testing (NIST Handbook 150-22)," dated May 2008

- United States 107th Congress Help America Vote Act (HAVA) of 2002 (Public Law 107-252), dated October 2002

- Quality Assurance Program Manual, Revision 5

- ANSI/NCSL Z540-1, "Calibration Laboratories and Measuring and Test Equipment, General Requirements"

- ISO 10012-1, "Quality Assurance Requirements for Measuring Equipment"

1.0   INTRODUCTION (Continued)

1.4   References (Continued)

- EAC Requests for Interpretation (listed on http://www.eac.gov)

- EAC Notices of Clarification (listed on http://www.eac.gov)

- EAC Quality Monitoring Program residing at:
  http://www.eac.gov/testing_and_certification/quality_monitoring_program.aspx

- Dominion Voting Systems' Democracy Suite 4.14 Modification VSTL Certification Test Report Rev. C (listed on http://www.eac.gov)

- Dominion Voting Systems Democracy Suite 4.14 Technical Data Package

- Dominion Voting Systems' Democracy Suite 4.14-A Modification VSTL Certification Test Report Rev. B (listed on www.eac.gov)

- Dominion Voting Systems Democracy Suite 4.14-A Technical Data Package

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1.0 INTRODUCTION (Continued)

1.5 Terms and Abbreviations

Table 1-4 defines all terms and abbreviations applicable to the development of this Test Plan.

Table 1-4 Terms and Abbreviations

Term	Abbreviation	Definition
Americans with Disabilities Act of 1990 (Amended 2008)	ADA	ADA is a wide-ranging civil rights law that prohibits, under certain circumstances, discrimination based on disability.
Audio Studio	AS	EMS application used to record audio files.
Audio Tactile Interface	ATI	Electronic voter interface that does not require visual reading of a ballot. Audio is used to convey information to the voter and sensitive tactile controls allow the voter to convey information to the system.
Configuration Management	CM	---
Commercial Off the Shelf	COTS	Commercial, readily available hardware or software.
Direct Record Electronic	DRE	An electronic voting system that utilizes electronic components for the functions of ballot presentation, vote capture, vote recording, and tabulation which are logically and physically integrated into a single unit. A DRE produces a tabulation of the voting data stored in a removable memory component and in printed hardcopy.
United States Election Assistance Commission	EAC	Commission created per the Help America Vote Act of 2002, assigned the responsibility for setting voting system standards and providing for the voluntary testing and certification of voting systems.
EMS Election Event Designer	EED	EMS application used for election definition functionality.
Election Management System	EMS	An umbrella term for the software application used to define and report election projects
Equipment Under Test	EUT	---
Functional Configuration Audit	FCA	Exhaustive verification of every system function and combination of functions cited in the manufacturer's documentation.
Federal Communications Commission	FCC	---
Help America Vote Act	HAVA	Act created by United States Congress in 2002.
ImageCast Central	ICC	High-speed central ballot scan tabulator.
ImageCast Evolution	ICE	Precinct-level optical scanner, ballot marker, and tabulator with audio voting.
ImageCast Precinct	ICP	Precinct-level optical scanner and tabulator with audio voting capabilities.
National Institute of Standards and Technology	NIST	Government organization created to promote U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhances economic security and improves our quality of life.
National Technical Systems, Inc.	NTS	---
NTS Operating Procedure	OP	NTS Test Method or Test Procedure.
System Under Test	SUT	---
Test Case Procedure Specifications	TCPS	NTS-developed document that specifies test items, input specifications, output specifications, environmental needs, special procedural requirements, inter-case dependencies, and all validated test cases that will be executed during the area under test.
Technical Data Package	TDP	Manufacturer documentation related to the voting system required to be submitted as a precondition of certification testing.
Underwriters Laboratories Inc.	UL	---
Uninterruptible Power Supply	UPS	---
Voluntary Voting System Guidelines	EAC 2005 VVSG	Published by the EAC, the third iteration of national level voting system standards.

1.0   INTRODUCTION (Continued)

1.6   Testing Responsibilities

All core and non-core software and hardware certification testing will be conducted under the guidance of NTS by personnel verified by NTS to be qualified to perform the testing.

1.6.1   Test Case Development

NTS will utilize the "NTS Baseline Test Cases" for the Functional and System Integration Tests. These will be augmented with specially designed test cases tailored to the Dominion 4.14-A.1 system.

1.6.2   Test Procedure Development and Validation

NTS will utilize the NTS Operating Procedures (OPs) during the duration of this test program.

1.6.3   Third-Party Tests

NTS will not utilize any 3rd party testing during performance of the Democracy Suite 4.14-A.1 test campaign.

1.7   Target of Evaluation Description

The following sections address the design methodology and product description of the Democracy Suite 4.14-A.1 Voting System, as taken from the Dominion Voting Systems technical documentation.

1.7.1   System Overview

The Dominion Voting Systems Democracy Suite 4.14-A.1 System is a paper-based optical scan voting system, and a modification to the previously-certified Democracy Suite 4.14-A System.

The certified system consists of four major components: the Election Management System (EMS), ImageCast Evolution (ICE) precinct scanner and ballot marking device, ImageCast Precinct (ICP) precinct scanner with audio ballot, and ImageCast Central (ICC) central count scanner.

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1.0   INTRODUCTION (Continued)

1.7.1   System Overview (Continued)

Election Management System

The EMS consists of eight components running as either a front-end/client application or as a back-end/server application. Below is an overview and brief description of each. This listing is for informational and verification purposes only and not all areas will be included in testing based on the limited modifications included in this test campaign.

- Election Event Designer (EED) client application - integrates election definition functionality and represents a main pre-voting phase end-user application.

- Results Tally and Reporting client application - integrates election results acquisition, validation, tabulation, reporting and publishing capabilities and represents a main post-voting phase end-user application.

- Audio Studio client application - represents an end-user helper application used to record audio files for a given election project. As such, it is utilized during the pre-voting phase of the election cycle.

- Data Center Manager client application - represents a system level configuration application used in EMS back-end data center configuration.

- Application Server application - represents a server side application responsible for executing long running processes, such as rendering ballots, generating audio files and election files, etc.

- Network Attached Storage (NAS) Server application - represents a server side file repository for election project file based artifacts, such as ballots, audio files, reports, log files, election files, etc.

- Database Server application - represents a server side RDBMS repository of the election project database which holds all the election project data, including pre-voting and post-voting data.

- Election Data Translator (EDT) – exports and imports data in a format suitable for usage in the Election Event Designer (EED) application.

Precinct Ballot Tabulator: ImageCast Evolution (ICE)

The Dominion Democracy Suite ImageCast Evolution System employs a precinct-level optical scan ballot counter (tabulator) in conjunction with ImageCast compatible ballot storage boxes. This tabulator is designed to mark and/or scan paper ballots, interpret voting marks, communicate these interpretations back to the voter (either visually through the integrated LCD display or audibly via integrated headphones), and upon the voter's acceptance, deposit the ballots into the ballot box. The unit also features an Audio Tactile Interface (ATI) which permits voters who cannot negotiate a paper ballot to generate a synchronously human and machine-readable ballot from elector-input vote selections. In this sense, the ImageCast Evolution acts as a ballot marking device.

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1.0   INTRODUCTION (Continued)

1.7   Target of Evaluation Description (Continued)

1.7.1   System Overview (Continued)

<u>**Precinct Ballot Tabulator: ImageCast Evolution (ICE) (Continued)**</u>

Photograph 1: ImageCast Evolution (ICE) on Plastic Ballot Box

1.0   INTRODUCTION (Continued)

1.7   Target of Evaluation Description (Continued)

1.7.1   System Overview (Continued)

Precinct Ballot Tabulator: ImageCast Precinct (ICP)

The Dominion Democracy Suite ImageCast Precinct ballot counter is a precinct-based optical scan ballot tabulator that is used in conjunction with ImageCast compatible ballot storage boxes. The system is designed to scan marked paper ballots, interpret voter marks on the paper ballot and store and tabulate each vote from each paper ballot. The ICP contains a small touch-screen LCD to allow the poll worker to access diagnostic and configuration settings.

In addition, enhanced accessibility voting may be accomplished via optional accessories connected to the ImageCast unit. The ICP utilizes an ATI device to allow voters with disabilities to navigate and submit a voted ballot. This is accomplished by presenting the ballot to the voter in an audio format. The ATI is connected to the tabulator, and allows the voter to listen to an audio voting session consisting of contest and candidate names. The ATI also allows a voter to adjust the volume and speed of audio playback. The cast vote record is recorded electronically when the ATI is used to cast a ballot. There is no contemporaneous paper ballot or paper record produced when the ATI is utilized for voting. A ballot representing the voter's choices may be printed from EMS at a later time.

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1.0   INTRODUCTION (Continued)

1.7   Target of Evaluation Description (Continued)

1.7.1   System Overview (Continued)

Photograph 2: ImageCast Precinct (ICP) on Metal Ballot Box

1.0   INTRODUCTION (Continued)

1.7   Target of Evaluation Description (Continued)

1.7.1   System Overview (Continued)

Central Tabulator: ImageCast Central Count (ICC)

The Dominion Democracy Suite ImageCast Central Count ballot counter system is a high-speed, central ballot scan tabulator based on COTS hardware, coupled with the custom-made ballot processing application software. It is used for high speed scanning and counting of paper ballots. Central Count scanning system hardware consists of a combination of two COTS devices used together to provide the required ballot scanning processing functionality:

- ImageCast Central Workstation: a COTS computer which hosts the ImageCast Central application used for ballot image processing, election rules processing, and results transfer to the EMS datacenter.

- Canon DR-X10C Scanner: a COTS scanner used to provide ballot scanning and image transfers to the local ImageCast Central Workstation.

Photograph 3: Canon DR-X10C Scanner and ImageCast Central Workstation

2.0 PRE-CERTIFICATION TESTING AND ISSUES

NTS has conducted a pre-certification review, and findings indicate that all system changes are consistent with the change items documented in the EAC Application DVS-1401.

2.1 Evaluation of Prior VSTL Testing

NTS will reutilize all testing from the previously-certified systems submitted by Dominion Voting Systems. The testing of these systems was conducted by Wyle Laboratories in accordance with the EAC 2005 VVSG, and the EAC Certification Numbers are DVS-40-G-10, DVS-DemSuite-4-14, and DVS-DemSuite-4-14-A.

2.2 Known Field Issues

This system is a modification to previously-certified systems. There were no systemic or significant issues traceable to any of the previously certified systems.

3.0 MATERIALS REQUIRED FOR TESTING

The materials required for certification testing of the Democracy Suite 4.14-A.1 Voting System include software, hardware, test materials, and deliverable materials. These items were shipped directly to NTS by Dominion Voting Systems to enable the test campaign to occur. The equipment used during this test is the same equipment used during the original certification campaign.

3.1 Software

The Democracy Suite Version 4.14-A software will be utilized during the Democracy Suite 4.14-A.1 modification, although a new software build will be performed to include obfuscation of the source code. The software for the ImageCast Precinct and ImageCast Central will be utilized with no modifications since the Democracy Suite 4.14-A test campaign. The software for ImageCast Evolution precinct ballot tabulators will be updated to include new languages and fonts. The update is handled within the build process as no source code has been changed within this campaign from the certified Democracy Suite 4.14-A system.

Table 3-1 Software Utilized for Testing

Software Required For Testing	Software Version
Democracy Suite EMS Application Suite	4.14.2301
ImageCast Precinct (ICP)	4.14.5
ImageCast Central (ICC)	4.14.4
ImageCast Evolution (ICE)	4.14.10A1

3.2 Equipment

This subsection categorizes the equipment the manufacturer submitted for testing listed in Table 3-2. Each test element is included in the list of equipment required for testing of that element, including system hardware, general purpose data processing and communications equipment, and any required test instrumentation.

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3.0 MATERIALS REQUIRED FOR TESTING (Continued)

3.2 Equipment (Continued)

Table 3-2 Test Equipment

Equipment	Description	Serial Number
ICP - Precinct Count Optical Scanner	Dominion Voting Systems	WLDAFBH0023
ICP - Precinct Count Optical Scanner	Dominion Voting Systems	WLDAFBH0018
ICP - Precinct Count Optical Scanner	Dominion Voting Systems	AANAGCP0265
ICE - Precinct Count Optical Scanner	Dominion Voting Systems	CAFEBDC0015
ICE - Precinct Count Optical Scanner	Dominion Voting Systems	AAFEBDW0117
ICE - Precinct Count Optical Scanner	Dominion Voting Systems	ICE2P200004
ICE - Precinct Count Optical Scanner	Dominion Voting Systems	ICE2P200002
ICE Plastic Ballot Box	Dominion Voting Systems	AAUCBDQ0074, T70251-BOX-01
ICE Metal Ballot Box	Dominion Voting Systems	BOX-57381-007, BOX-57381-15
ICP Metal Ballot Box	Dominion Voting Systems	BOX-57381-011, BOX-57381-016, BOX-57381-014
Dell PowerEdge 1620	EMS Server PC	J8H9H02
Dell Precision T1500	EMS Client PC	61TPNM1
Canon DR-X10C	Central Count Digital High Speed Scanner	ED300880
Dell Optiplex 9010	Central Count All-in-One PC	627BRW1
iButton (SHA-1) with USB Reader/Writer	Maxim	514DFD
RiData CFC-14A	Compact Flash cards	N/A
SanDisk CF Card Reader	Compact Flash Card Reader	0171630

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3.0   MATERIALS REQUIRED FOR TESTING (Continued)

3.3   Test Tools/Materials

This subsection enumerates any and all test materials needed to perform voter system testing in Table 3-3. The scope of testing determines the quantity of a specific material required.

Table 3-3 Test Tools/Material

Test Tool/Material	Quantity
100 lb. Stock Ballot Paper	as required
Sharpie Markers	as required
Printer Thermal Paper Rolls	as required
Ballot Box Security Seals/Hasp Locks	as required

3.4   Deliverable Materials

At test conclusion, NTS shall deliver a final report to Dominion Voting Systems and the EAC that includes the following:

- A description of the functional testing results
- ECO analysis results
- TDP documentation showing changes
- A list of any anomalies discovered during testing on NTS form WH1066, Notice of Anomaly

All supplied equipment and software furnished to NTS for this modification shall be returned to the customer at the conclusion of testing unless otherwise agreed in writing.

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4.0   TEST SPECIFICATIONS

Modification testing of the DVS 4.14-A.1 will be performed on the configuration submitted in the EAC application DVS1401. NTS' qualified personnel will ensure that all certification testing performed on the manufacturer's voting system follows NTS' procedures for testing, and the specific test cases developed for this campaign meet the requirements of the EAC 2005 VVSG and EAC Testing and Certification Program Manual.

All Requests for Interpretation (RFIs) and Notices of Clarification (NOCs) applicable as of the date of this document shall apply to this test campaign unless otherwise noted.

4.1   Requirements (Strategy of Evaluation)

NTS personnel shall maintain a test log of the procedure(s) employed. This log identifies the system and equipment by model and serial number. In the event that the project engineer deems it necessary to deviate from NTS Test Cases or NTS Operating Procedures (OP) pertaining to the test environment, the equipment arrangement and method of operation, the specified test procedure, or the provision of test instrumentation and facilities shall be recorded in the test log. A discussion of the reasons for the deviation and the effect of the deviation on the validity of the test procedure shall also be completed by the Project Engineer and Program Manager.

NTS personnel utilize an internal issue tracking system in order to capture and track all issues and discrepancies found during the testing campaign. This allows for all issues and discrepancies to be monitored for reoccurrence, tracks the root cause analysis, and provides a resolution status. NTS personnel shall verify all items logged into the bug tracking system are resolved prior to the completion of testing and before any recommendation may be made for certification.

The specific NTS OPs to be used during testing include the following:

OP 1 Operations Status Checks	OP 25 Physical Configuration Audit
OP 2 Receipt Inspection	OP 26 Functional Requirements
OP 3 Technical Data Package Review	OP 30 System Integration Test
OP 4 Test Plan Preparation *(This document)*	OP 34 Test Report
OP 7 Trusted Build	

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4.0   TEST SPECIFICATIONS (Continued)

4.2   Hardware Configuration and Design

The Dominion Voting Systems Democracy Suite is a paper-based optical scan voting system. The Democracy Suite system consists of four major components: the EMS, ICE precinct scanner and ballot marking device, ICP precinct scanner, and ICC central count scanner. The Democracy Suite is comprised of two proprietary pieces of hardware (ICE and ICP) and one piece of COTS hardware (ICC). All EMS functions are handled by proprietary software running on COTS PC/laptops/servers.

The hardware modifications submitted for this test campaign include the addition of a hardware RAID controller for the EMS computing environment, and the addition of a hardware bracket to the ICE service switch housing. NTS performed an engineering analysis of the Dominion documents, as well as a visual inspection of the changes, and determined the changes to be "Minor Modifications" with some testing required to confirm that these changes did not affect the system's functional operation. This will be accomplished by performing a System Integration test to confirm that the RAID controller does not negatively impact the functionality of the EMS.

4.3   Software System Functions

The modifications shall be tested using targeted functional tests designed to verify specific changes made to the voting system. Operational status checks will be performed before and after each test to confirm system readiness.

4.4   Source Code Review

The strategy for evaluating Dominion Democracy Suite 4.14-A.1 will be based on the previously identified modification to the system. There are no source code changes claimed from the Democracy Suite 4.14A to the Democracy Suite 4.14-A.1. A comparison will be completed by NTS qualified personnel to verify no changes to the source code and the only changes are within the build documentation. All prior source code reviews were reviewed to the EAC 2005 VVSG coding standards and the manufacturer supplied coding standards (Dominion Voting C C++ Coding Standard).

The next step in the source code review will be to create a "Trusted Build" from the approved source code.

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4.0 TEST SPECIFICATIONS (Continued)

4.4 Source Code Review (Continued)

Trusted Build Process

- Clean the build machine of existing software

- Retrieve the compliant source code

- Construct the build environment

- Create digital signatures of the build environment

- Load the compliant source code into the build environment

- Create a digital signature of the pre build environment

- Create a disk image of the pre-build environment

- Build executable code

- Create a digital signature of executable code

- Create a disk image of the post-build environment

- Build installation media

- Create a digital signature of the installation media

- Install executable code onto the system and validate the software/firmware

- Deliver source code with digital signature, disk image of pre-build environment with digital signatures, disk image of post-build environment with digital signatures, executable code with digital signatures, and installation media with signatures to the EAC Approved Repository.

The "Trusted Build" for the Dominion Democracy Suite 4.14-A.1 includes source code, data, and script files, in clear text form. The build also includes COTS software on commercially available media, COTS software downloaded by the VSTL, COTS software verified by SHA1 from the software supplier, and picture and sound files in binary format provided by Dominion Voting Systems. The first step of the process is to clean the hard drives by writing data to every spot on the hard drive, so the drive is cleared of existing data. The appropriate operating system will then be loaded and the applications from the VSTL reviewed source along with the VSTL verified COTS software will be built. The final step is installing the applications on the hardware.

5.0 TEST DATA

5.1 Test Data Recording

All equipment utilized for test data recording shall be identified in the test data package. For hardware environmental and operational testing, the equipment shall be listed on the Instrumentation Equipment Sheet for each test. The output test data shall be recorded in an appropriate manner as to allow for data analysis. For source code and TDP reviews, results shall be compiled in output reports and submitted to Dominion Voting Systems for resolution.

Additionally, all test results, including functional test data, will be recorded on the relevant NTS Operating Procedure and Test Cases. Results will also be recorded real-time in engineering log books. Incremental reports will be submitted to Dominion Voting Systems and the EAC at the completion of major test areas to communicate progress and results as deemed necessary by the stakeholders.

5.0   TEST DATA (Continued)

5.2   Test Data Reduction

Test data shall be processed and recorded in the relevant NTS Operating Procedures and Test Cases. Results will also be recorded real-time in engineering log books.

6.0   TEST PROCEDURE AND CONDITIONS

The following subsections describe test procedures and a statement of the criteria by which readiness and successful completion shall be indicated and measured.

6.1   Facility Requirements

All testing will be conducted at NTS Huntsville, AL facility unless otherwise annotated.

Unless otherwise specified herein, all remaining tests, including system level functional testing, shall be performed at standard ambient conditions:

- Temperature: 68 to 75 degrees Fahrenheit ($\pm$ 4°F)
- Relative Humidity: 20 to 90%
- Atmospheric Pressure: Local Site Pressure

Unless otherwise specified herein, the following tolerances shall be used:

- Time $\pm$ 5%
- Temperature $\pm$ 3.6°F (2°C)

Deviations to the above tolerances may be submitted by the responsible test laboratory with sufficient engineering information to substantiate the deviation request, but only when best effort technique and system limitations indicate the need for a deviation.

6.2   Test Set-Up

All voting machine equipment (hardware and software), shall be received and documented utilizing NTS' Receiving Ticket (WL-218, Nov. '85) and proper QA procedures. When voting system hardware is received, NTS personnel will notify NTS QA personnel. With NTS QA personnel present, each test article will be unpacked and inspected for obvious signs of degradation and/or damage that may have occurred during transit. Noticeable degradation and/or damage, if present, shall be recorded, photographed, and the Dominion Voting Systems' Representative shall be notified. NTS QA personnel shall record the serial numbers and part numbers. Comparison shall be made between those numbers recorded and those listed on the shipper's manifest. Any discrepancies noted shall be brought to the attention of the Dominion Voting Systems' representative for resolution. All TDP and source code modules received will be inventoried and maintained by the NTS Project Engineer assigned to testing.

For test setup, the system will be configured as it would for normal field use. This includes connecting all supporting equipment and peripherals. NTS personnel will properly configure and initialize the system, and verify that it is ready to be tested by following the procedures detailed in the Democracy Suite 4.14-A.1 voting system technical documentation. NTS personnel will develop an Operational Status Check to be performed prior to and immediately following each hardware test. NTS personnel will develop the system performance levels to be measured during operational tests.

NTS personnel have developed six election definitions that shall be used during this test campaign:

6.0 TEST PROCEDURE AND CONDITIONS (CONTINUED)

6.2 Test Set-Up (Continued)

Operational Status Check

This election definition will be used to verify that the equipment operates properly prior to and immediately following the execution of all tests.

General Election: GEN-01

The Gen-01 is a basic election held in four precincts, one of which is a split precinct, containing nineteen contests compiled into four ballot styles. Five of the contests are in all four ballot styles. The other fourteen contests are split between at least two of the precincts with a maximum of four different contests spread across the four precincts. This election was designed to functionally test the handling of multiple ballot styles, support for at least two languages, support for common voting variations, and audio support for at least two languages.

The parameters of this election are listed below:

- Closed Primary: No
- Open Primary: No
- Partisan offices: Yes
- Non-Partisan offices: Yes
- Write-in voting: Yes
- Primary presidential delegation nominations: No
- Ballot Rotation: Yes
- Straight Party voting: Yes
- Cross-party endorsement: No
- Split Precincts: Yes
- Vote for N of M: Yes
- Recall issues, with options: No
- Cumulative voting: No
- Ranked order voting: No
- Provisional or challenged ballots: Yes
- Early Voting: No

In addition to the parameters listed above, the following will also be tested:

- Audio input in an alternative language for basic voting pattern using an ADA device
- Audio input for write-in voting using an ADA device
- Spanish language input for a basic voting pattern
- Input for write-in voting using Spanish language

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6.0   TEST PROCEDURES AND CONDITIONS (Continued)

6.2   Test Set-Up (Continued)

General Election: GEN-02

The Gen-02 is a basic election held in three precincts. This election contains fifteen contests compiled into three ballot styles. Ten of the contests are in all three ballot styles with the other five split across the three precincts. This election was designed to functionally test the handling of multiple ballot styles, support for ballot rotation, support for two languages, support for complex voting variations, and audio support for multiple languages.

The parameters of this election are listed below:

- Closed Primary: No
- Open Primary: No
- Partisan offices: Yes
- Non-Partisan offices: Yes
- Write-in voting: Yes
- Primary presidential delegation nominations: No
- Ballot Rotation: Yes
- Straight Party voting: No
- Cross-party endorsement: No
- Split Precincts: No
- Vote for N of M: Yes
- Recall issues, with options: Yes
- Cumulative voting: No
- Ranked order voting: Yes
- Provisional or challenged ballots: No
- Early Voting: Yes

In addition to the parameters listed above, the following will also be tested:

- Early voting election with at least one unit in all precincts
- Voting options for over-voting
- Voting options for under-voting
- Spanish language ballots
- Audio ballots utilizing ADA capabilities

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6.0   TEST PROCEDURES AND CONDITIONS (Continued)

6.2   Test Set-Up (Continued)

General Election: GEN-03

The Gen-03 is a basic election held in two precincts. This election contains eight contests compiled into two ballot styles. Four of the contests are in both ballot styles. The other four contests are split between the two precincts. This election was designed to functionally test the handling of multiple ballot styles, support for at least three languages including a character-based language, support for common voting variations, and audio support for at least three languages and an ADA binary input device.

The parameters of this election are listed below:

- Closed Primary: No
- Open Primary: No
- Partisan offices: Yes
- Non-Partisan offices: Yes
- Write-in voting: Yes
- Primary presidential delegation nominations: No
- Ballot Rotation: No
- Straight Party voting: No
- Cross-party endorsement: No
- Split Precincts: No
- Vote for N of M: Yes
- Recall issues, with options: No
- Cumulative voting: No
- Ranked order voting: No
- Provisional or challenged ballots: Yes
- Early Voting: No

In addition to the parameters listed above, the following will also be tested:

- Spanish language ballot with a basic voting pattern and write-in candidates
- Spanish audio input to simulate ADA device with write-in option
- Character based language with basic voting pattern
- Character based language utilizing an ADA option
- Binary input to support ADA option
- Binary input to support ADA audio device

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6.0   TEST PROCEDURES AND CONDITIONS (Continued)

6.2   Test Set-Up (Continued)

Primary Election: PRIM-01

The Prim-01 is a closed primary election in two precincts (one precinct is a split), containing thirty contests compiled into five ballot styles. Each ballot style contains six contests. This election was designed to functionally test an open primary with multiple ballot styles, support for two languages, and support for common voting variations.

The parameters of this election are listed below:

- Closed Primary: Yes
- Open Primary: No
- Partisan offices: Yes
- Non-Partisan offices: Yes
- Write-in voting: Yes
- Primary presidential delegation nominations: No
- Ballot Rotation: No
- Straight Party voting: No
- Cross-party endorsement: No
- Split Precincts: Yes
- Vote for N of M: Yes
- Recall issues, with options: No
- Cumulative voting: No
- Ranked order voting: No
- Provisional or challenged ballots: Yes
- Early Voting: No

In addition to the parameters listed above, the following will also be tested:

- Alternative language utilized with a write-in option
- ADA audio device utilized with a write-in option

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6.0 TEST PROCEDURES AND CONDITIONS (Continued)

6.2 Test Set-Up (Continued)

Primary Election: PRIM-03

The Prim-03 is a basic election held in two precincts. This election contains ten contests and is compiled into two ballot styles. Two of the contests are in both ballot styles. The other eight contests are split between the two party ballots. This election was designed to functionally test the handling of multiple ballot styles, support for at least three languages including an Ideographic based language, support for common voting variations, and audio support for at least three languages and an ADA binary input device.

The parameters of this election are listed below:

- Closed Primary: Yes
- Open Primary: No
- Partisan offices: Yes
- Non-Partisan offices: Yes
- Write-in voting: Yes
- Primary presidential delegation nominations: No
- Ballot Rotation: No
- Straight Party voting: No
- Cross-party endorsement: No
- Split Precincts: No
- Vote for N of M: Yes
- Recall issues, with options: No
- Cumulative voting: No
- Ranked order voting: No
- Provisional or challenged ballots: Yes
- Early Voting: No

In addition to the parameters listed above, the following will also be tested:

- Spanish ballot with basic voting pattern and write-in option
- Spanish language ballot using ADA audio device with write-n option
- Character based language ballot with basic voting pattern
- Character based language utilizing ADA device
- Binary input to support ADA option
- Binary input to support ADA audio device

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6.0   TEST PROCEDURES AND CONDITIONS (Continued)

6.3   Test Sequence

The components of the Democracy Suite 4.14-A.1 voting system will undergo testing to verify that the modification performs as described by Dominion Voting Systems and meets the requirements of the 2005 VVSG. The following sections provide a list of each test and a brief description of each test. NTS personnel will utilize a combination of functional testing and TDP reviews to evaluate the system performance. (The tests are not in a specific sequence.)

6.3.1   Hardware Test Descriptions

All of the hardware tests have been previously performed during prior VSTL test campaigns.

6.3.2   Software Test Descriptions

The software tests include the following:

COTS Source Code Review – Unmodified, general purpose COTS non-voting software (e.g., operating systems, programming language compilers, database management systems, and web browsers) is not subject to the detailed examinations specified in this section; however, NTS personnel will examine such software to ensure that the specific version of software being used is identical to the design specification in order to confirm that the software has not been modified. NTS will verify by downloading the software directly from the manufacturer site, verifying against NRSL, or by being provided original OEM discs.

If there is COTS generated software source code, NTS qualified personnel will inspect the COTS generated software source code in preparation of test plans and to provide some minimal scanning or sampling to check for embedded code or unauthorized changes. For purposes of code analysis, the COTS units shall be treated as unexpanded macros. These will be identified in the Test Report.

The portions of COTS software that have been modified by the manufacturer in any manner are subject to review. Source code generated by a COTS package and embedded in software modules for compilation or interpretation will be provided in human readable form to NTS personnel to enable review.

Trusted Build – The trusted build is a process of converting the reviewed source code into machine-readable binary instructions for a computer. This test will follow Section 5.6 of the EAC Testing and Certification Program manual.

6.3.3   System Testing

TDP Review – The technical data package must be submitted as a precondition of national certification testing. These items are necessary to define the product and its method of operation; to provide technical and test data supporting the manufacturer's claims of the system's functional capabilities and performance levels; and to document instructions and procedures governing system operation and field maintenance. Any information relevant to the system evaluation shall be submitted to include source code, object code, and sample output report formats.

6.0   TEST PROCEDURES AND CONDITIONS (Continued)

6.3.3   System Testing (Continued)

<u>Physical Configuration Audit</u> – The Physical Configuration Audit compares the voting system components submitted for qualification to the manufacturer's technical documentation, and shall include the following activities:
- Establish a configuration baseline of software and hardware to be tested; confirm whether manufacturer's documentation is sufficient for the user to install, validate, operate, and maintain the voting system
- Verify software conforms to the manufacturer's specifications; inspect all records of manufacturer's release control system; if changes have been made to the baseline version, verify manufacturer's engineering and test data are for the software version submitted for certification
- If the hardware is non-COTS, NTS will review drawings, specifications, technical data, and test data associated with system hardware to establish system hardware baseline associated with software baseline
- Review manufacturer's documents of user acceptance test procedures and data against system's functional specifications; resolve any discrepancy or inadequacy in manufacturer's plan or data prior to beginning system integration functional and performance tests
- Subsequent changes to baseline software configuration made during testing, as well as system hardware changes that may produce a change in software operation are subject to re-examination

The components of the Dominion Voting Systems' Version 4.14-A.1 shall only undergo the tests described in Table 6-1.

Table 6-1 Dominion Voting Systems version 4.14-A.1 Test Sequence

Test	Procedure/Description	Specimen
Technical Data Package (TDP) Review	Documentation review for compliance, correctness, and completeness	TDP package submitted for Democracy Suite 4.14-A.1
Physical Configuration Audit	Audit hardware and software models and versions	System hardware and test artifacts submitted for Democracy Suite 4.14-A.1
Functional Tests	Functional testing to the system documentation and EAC 2005 VVSG requirements	System hardware and test artifacts submitted for Democracy Suite 4.14-A.1
System Integration	System testing to test the integrated operation of both hardware and software.	System hardware and test artifacts submitted for Democracy Suite 4.14-A.1

7.0   TEST OPERATIONS PROCEDURES

7.1   Proprietary Data

All proprietary data that is marked will be distributed only to those persons that the manufacturer or EAC identifies as needing the information to conduct qualification testing. The manufacturer is required to mark all proprietary documents as such. All organizations and individuals receiving proprietary documents will ensure those documents are not available to non-authorized persons.

APPENDIX A

CHANGE NOTES

Item Number	Module Affected	Version Number	Modification
1	EMS	4.14.2301	Added new level of code security by implementing code obfuscation during the build process.
2	ICE	410A	ECO 100216 - Introduced optional switch shield to protect the unit's on/off switch from tampering.
3	ICE	4.14.10A1	Added translation files to support ten languages by removing static file references in SVG files and updating software package to include language resources, as well as updating the application and root file system versions.
4	EMS	4.14.2301	Specified use of a hardware RAID controller.