



Wyle Document Transmittal No. 45827B-008

**DOCUMENT TRANSMITTAL**

Date: 10/9/01

TO:	Larry Dominguez
	Bureau of Elections
	State Capitol
	Room 420
	Sante Fe, NM 87503
P.O.	N/A

Dawn K. Bates	<i>Dawn K. Bates</i>
Wyle Laboratories, Inc.	
7800 U.S. Highway 20 W.	
Huntsville, AL 35806	
Phone: 256/837-4411, ext. 590	
Fax: 256/830-2109	

No. of Copies	Document(s) Type	Approval Required		Approved by (if required)
		No	Yes	
1 copy	Test Report 45827-01	X		

**NOTES:**

<p><b>IF APPROVAL IS REQUIRED</b>, please sign below and return this form, via Fax with your comments by the date shown above.</p>	<p>Please <b>ACKNOWLEDGE</b> by signing below and return by Fax to my attention, if <u>approval is not required</u>:</p>
<p>APPROVAL signature &amp; date (if required):</p>	<p>ACKNOWLEDGEMENT signature &amp; date:</p>

**Subject: Re: AVC Edge**

**Date:** Fri, 12 Oct 2001 16:23:48 -0500

**From:** "Doug Lewis" <electioncent@pdq.net>

**To:** "Denise Lamb" <denise.lamb@state.nm.us>

**CC:** "Tom Wilkey" <twilkey@elections.state.ny.us>

Denise:

They have shown it to Wyle but since there are no specific standards to govern this, there is no way to have a "sign-off" on its capabilities. It has been shown to work with their system and to record votes. Beyond that it will be up to the states to determine whether it is sufficient to solve problems for disabled voters.

Doug

----- Original Message -----

**From:** Denise Lamb

**To:** Doug Lewis

**Sent:** Friday, October 12, 2001 11:22 AM

**Subject:** re: AVC Edge

Doug, Has the audio assist for the disabled, that accompanies the AVC Edge, been certified? Thanks.

D.



Wyle Document Transmittal No. 44733B-013

### DOCUMENT TRANSMITTAL

TO:	Larry Dominguez
	Office of the New Mexico Secretary of State Capitol North Annex
	325 Don Gaspar
	Suite 300
	Santa Fe, NM 87503
P.O.	N/A

Date:	9/10/01
Dawn K. Bates	<i>Dawnk. Bates</i>
Wyle Laboratories, Inc.	
7800 U.S. Highway 20 W.	
Huntsville, AL 35806	
Phone:	256/837-4411, ext. 590
Fax:	256/830-2109

No. of Copies	Document(s) Type	Approval Required		Approved by (if required)
		No	Yes	
1 copy	Test Report 44733-01	X		
1 copy	Letter of ITA Qualification Testing of Source Revision Release 3.00F			

**NOTES:**

<p><b>IF APPROVAL IS REQUIRED</b>, please sign below and return this form, via Fax with your comments by the date shown above.</p>	<p>Please <b>ACKNOWLEDGE</b> by signing below and return by Fax to my attention, <u>if approval is not required</u>:</p>
<p>APPROVAL signature &amp; date (if required):</p>	<p>ACKNOWLEDGEMENT signature &amp; date:</p>



Wyle Letter No. 44733B-007

July 23, 2001

**Sequoia Pacific Voting Equipment**  
811 North Main Street  
Jamestown, NY 14702-1399

**Attention: Mr. Paul Terwilliger**

**Subject: ITA Qualification Testing of the AVC Edge DRE Voting Machine, Source Revision Release 3.00F**

**Reference: Sequoia Pacific Purchase Order No. 10001386  
Wyle J/N 44733**

Dear Mr. Terwilliger:

The AVC Edge DRE Precinct Voting Machine and associated machine resident firmware, Release 3.00F, was subjected to functional testing to verify continued compliance with the Federal Elections Commission Standards for Punchcard, Marksense, and Direct-Recording Electronic Voting Systems, January 1990. Specifically, a source review was performed on the revised release and regression testing was performed to verify continued operability of the voting machine hardware using release 3.00F.

It was demonstrated that the voting machine using the aforementioned machine resident firmware successfully met this criteria and thus has been qualified to the Federal Elections Commission Standard for Punchcard, Marksense, and Direct-Recording Electronic Voting Systems, January 1990.

Please note that the qualification testing referenced herein is limited to the operation of the AVC Edge DRE Voting Machine and its machine resident firmware at the precinct level and as such, does not encompass any ancillary voting system software which typically resides on a personal computer for ballot definition activities, report canvassing, absentee voting, etc.

If I may be of further assistance, please feel free to call me at (256) 837-4411, ext. 590, or fax (256) 830-2109.

Sincerely,

**Wyle Laboratories, Inc.**

Dawn Bates  
Contracts Manager

# APPENDIX A

## TECHNICAL DATA PACKAGE (TDP) REVIEW

### TDP REVIEW - APPROACH AND FINDINGS

The TDP review is an evaluation for compliance with FEC guidelines for TDP completeness and quality. The FEC standards state that vendor documentation relating to voting system hardware shall be submitted with the system as a precondition of qualification testing. These are the items necessary to define the product and its method of operation; to provide vendor technical and test data supporting the vendor's claims of the system's functional capabilities and performance levels; and to document instructions and procedures governing system operation and field maintenance.

In addition to the aforementioned items, documentation and records for configuration management and quality assurance are also required parts of the TDP. Both formal documentation and notes of Sequoia's software development process were reviewed.

The review of the TDP was completed by Computer Sciences Corporation prior to the transfer of the contract to Metamor. Sequoia Voting Systems, Inc. submitted the following documents to Metamor as the current versions prior to final system testing:

Current as of 7-17-2001

System Software Spec.doc  
Docs standards.doc  
SoftwarePackcages.htm  
System Components.htm  
System Management.htm  
SystemDescription.htm  
Tally.htm  
TestingMethodology.htm  
WinEDS Penetration Analysis.doc  
WinEDSSecurity.htm  
WinEDS Security Guidelines .doc  
CodingStandards.htm  
Database Model.htm  
CodingPractices.htm  
Powerbuilder Overview.htm  
Report Functions.doc  
PCMCIA Interface Card.doc  
WinEDS Database - Detail.rtf  
WinEDS Reference Guide .PDF  
Table of Contents.PDF  
Part 1 Introduction.PDF  
Part 2 Security.PDF  
Part 3 System Setup.PDF  
Part 4 Profile.PDF  
Part 5 Reports.PDF  
Part 6 Election.PDF  
Part 7 Election Setup.PDF  
Part 8 Election Day.PDF  
Part 9 Post Election.PDF  
Part 10 Tools.PDF  
Part 11 Error Messages.PDF  
Appendices.PDF  
Notes.PDF

QualityAssurance.zip

Design Documents

Automatic Layout Determinat.doc  
AVC Advantage Ballot Positi.doc  
AvxX Functionality.doc  
Ballot Editor.doc  
BART.obd  
Bart Preliminaries.doc  
BART Security.doc  
Bart Timeline.MPP  
Cartridge Reader SDK -- Obj.doc  
Cartridge Resource Kit.obd  
Cartridge Reader SDK -- Req.doc  
CDK.doc  
CDK - Specs.doc  
Components and help topics.xls  
Consistent Election Data.doc  
Consolidated Precincts.doc  
Consolidated Precincts\_Prof.doc  
Create Cartridge.doc  
Database List.doc  
Database requirements.doc  
Edge 2.doc  
EDS98a.ER1  
Election Generation.doc  
Election Archiving.doc  
Election Certification.doc  
Election Data Synchronizati.doc  
Election Day Reports.doc  
Enhancement List and Wish L.doc  
EV Processing.doc  
functemp.doc  
Hardware Recommendations.doc  
Impact analysis - ballot mo.doc  
Import and Export File Form.doc  
Machine Assignment.doc  
One Stop.doc  
Parameters.doc  
Preferential Voting.doc  
report.doc  
Requirements to Implementat.xls  
Sample Ballots.doc  
SDK Test Plan Script.doc  
Specs Diagram.doc  
Specs Diagram 19970923.doc  
Status Meeting.doc  
Tally.doc  
Tally and Tabulation.doc  
Tally Procedures.doc  
Testing and Documentation.doc  
Test Plan outline.doc  
Triggers for Ballot layout.doc  
Visio as Ballot Editor 2.doc  
WinEDS Installation Report.txt  
WinEDS Bug reporting.doc  
WinEDS Requirements.doc  
WinEDS Summary.doc  
Write-in Resolution.doc

The TDP for WinEDS version 2.6 build 200 was very complete and found to meet the requirements provided by the FEC. Some anomalies were detected during the review and all were corrected before testing was completed.

## FEC REQUIREMENTS RELEVANT TO TDP REVIEW

The following sections list requirements as stated in the FEC Voting System Standards of 1990 that are applicable to the review of the software TDP.

The Sequoia Voting Systems, Inc. TDP was evaluated against each of the following requirements. Each requirement is listed along with a status of Pass, Fail, or Not applicable.

Description	Pass	Fail	NA	Comment
<b>TDP Requirements Extracted from 4.3 Software Standards, Configuration Management</b>				
The vendor shall maintain procedures required to identify and document the physical and functional characteristics of each software and firmware unit, manage changes to these characteristics, record and document the processing of changes, and identify the configuration and characteristics of all released versions.	√			
The vendor shall provide an audit trail of software acquisition.	√			
This shall include documentation of which software items were written in-house, which were procured and modified including descriptions of the modifications, and which were procured and not modified.	√			
The vendor shall also provide a certification that procured items were obtained directly from the manufacturer.	√			
The vendor shall also maintain documentation of the software development process, including all records of module and functional tests.	√			
All of this information shall become a part of the Technical Data Package described in Appendix B, to be submitted as a precondition for qualification.	√			
All software altered from the baseline configuration submitted for qualification shall be subject to retest at the discretion of the Independent Test Authority.	√			Changes made during the test process were retested.
No compiler(s) other than those specified as part of the technical data submitted for the Physical Configuration audit shall be used for testing or election -day processing.	√			
<b>TDP Requirements Extracted from 6.5 Quality Assurance, User Documentation</b>				
Complete product documentation shall be provided with voting systems or components.	√			
This documentation shall be sufficient to serve the needs of the voter, the operator, and the maintenance technician.	√			
(The product documentation) shall be prepared and published in accordance with standard industrial practice for electronic and mechanical equipment.	√			
(The product documentation) shall include, as a minimum, a Voter Manual, System Operations Manual, and System Maintenance Manual.	√			WinEDS Reference Guide contained all operations and maintenance procedures. No hardware maintenance or voter manual was provided for software testing.
The Voter Manual shall include a physical description of the equipment to be used by the voter, sufficient to identify and to illustrate all of its features.			√	Not Tested by software ITA.

Description	Pass	Fail	NA	Comment
(The Voter Manual) shall include instructions for proper operation, and warnings to preclude improper operation of the equipment.			√	Not Tested by software ITA.
<b>TDP Requirements Extracted from Appendix B Technical Data Package</b>				
Other items relevant to the system evaluation shall be submitted along with this documentation (e.g.; tapes, PMDs. source and object code, and sample output report formats).	√			Source code and sample reports submitted
Both formal documentation and notes of the vendors hardware and software development process shall be submitted for qualification tests, if available and if relevant to the design and conduct of the tests.	√			
If the vendor's developmental test data is incomplete or not available, the test agency shall design and conduct the necessary tests.	√			
At a minimum, the Technical Data Package shall contain a System Hardware Specification, a System Software Specification, a System Operations Manual and a System Maintenance Manual.	√			WinEDS Reference Guide contained all operations and maintenance procedures. No hardware maintenance or voter manual was provided for software testing.
The Technical Data Package shall include a detailed Table of Contents for the three primary documents, an abstract of each document and listing of each of the informational sections and appendices presented within each.	√			
A summary shall be provided indicating the portions of the documents that are responsive to documentation requirements for any item presented using the vendor's format.	√			
The vendor shall identify all documents, or portions of documents, containing proprietary information not approved for public release.	√			All documents are proprietary.
Any person or test agency receiving proprietary documents shall agree to use them solely for the purpose of analyzing and testing the system, and shall refrain from otherwise using the proprietary information or disclosing it without prior written consent.	√			
The vendor shall summarize the function or functions that the program performs in the System Software Specification.	√			
The vendor shall list all documents controlling the development of the software and its specifications.	√			
Documents shall be listed in order of precedence.	√			
The vendor shall provide the following information: design standards and conventions used in the development of the vendor's software; specifications for the environment and interfaces; functional specifications; program architecture specifications; and test and verification specifications.	√			Provided as a part of design documentation in TDP.
The vendor shall identify the system's hardware, and the environment in which the software will operate.	√			
Further, the vendor shall identify the general design, operational considerations, and constraints influencing the design of the software.	√			
The vendor shall also identify which software items were written in-house, which were procured and modified including descriptions of the modifications, and which were procured and not modified.	√			Covered in previous section (software Standards, Configuration Management).
The vendor shall include a certification that procured software items were obtained directly from the manufacturer.	√			Covered in previous section (software Standards, Configuration Management).
The vendor shall describe the software system concept, the specific software design objectives, the developmental methodology, and the logic structure and algorithms used to accomplish these objectives.	√			
The vendor shall provide information that can be used by a testing agency or state certification board as a partial basis for code analysis and test design.	√			Test Scripts provided
A description and discussion of the standards and conventions used in the preparation of the system software shall be included, as well as specification in the development of the software.	√			



Description	Pass	Fail	NA	Comment
The vendor shall identify all published and private standards and conventions used to document software development and testing.	√			
The vendor's internal procedures shall be provided as attachments to the software specification.	√			
The vendor shall describe, or provide reference to, all standards or other documents that influenced the implementation policy, the approach, and the coding of the software.	√			
If there are exceptions to the guidelines in Appendix D, the vendor shall identify these exceptions and cite the alternate methods.			√	
The vendor shall identify and standards or other documents that can assist in determining the program's correctness and ACCEPT/REJECT criteria.	√			
The vendor shall describe all standards or other documents that can be used to examine and test the software. These documents include standards for flowcharts, program documentation, test planning, and for test data acquisition and reporting.	√			
The vendor shall describe the system and subsystem interfaces at which inputs, outputs, and data transformations occur.	√			
This section shall describe or make reference to all operating environment factors that influence the software design.	√			
The vendor shall identify and describe the hardware characteristics that influence the design of the software, such as: the logic and arithmetic capability of the processor; memory read-write characteristics; external memory device characteristics; peripheral device interface hardware; data input/output device protocols; and operator controls, indicators, and displays.			√	Not tested by software ITA
The vendor shall identify the compiler or assembler used in the generation of executable code, and describe the operating system or system monitor.	√			
An overview of the compile-time interaction of the voting system software with library calls and linking shall be included.	√			
The vendor shall describe the interfaces between executable code, system input/output, and control hardware.	√			
For each software mode or modes of operation, the vendor shall provide a description of the overall functions that the software performs	√			
The vendor shall also describe the software's capabilities or methods for detecting or handling: exception conditions, system failure, data input/output errors, error logging, for audit record generation, production of statistical ballot data, data quality assessment, and security monitoring and control.	√			
The vendor shall describe the various software configurations and operating modes of the system, such as preparing for opening the polling place, recording votes and/or counting ballots, closing the polling place, and generating reports.	√			
For each software function or operating mode, a vendor shall provide: a definition of the inputs to the function or mode (with characteristics, tolerances, or acceptable ranges, as applicable), an explanation of how the inputs are processed, and a definition of the outputs produced (again, with characteristics, tolerances, or acceptable ranges as applicable).	√			
A definition of the information content and record formats shall be provided for any external files used for data input or output.	√			
The vendor shall also describe the procedures for file maintenance, management of access privileges, and security.	√			
Operating procedures for maintaining the security of the software shall be defined and identified for each system function and operating mode.	√			
This documentation shall be prepared such that these requirements can be integrated by the user into local administrative and operating procedures.	√			
The vendor shall provide in this section an overview of the software design, its structure, and implementation algorithms.	√			

Description	Pass	Fail	NA	Comment
This overview shall include such items as flowcharts, HIPOs, dataflow diagrams, and other graphical techniques which facilitate understanding of the software.	√			
This section shall be prepared to facilitate understanding of the internal functioning of the individual software modules.	√			
Implementation of the functions shall be described in terms of the software architecture, algorithms, and data structures; all procedures or procedure interfaces vulnerable to degradation in data quality or security penetration shall be identified.	√			
The vendor shall describe the procedures used during software development to verify logic correctness, data quality, and security.	√			
This description shall include existing standard test procedures, special purpose test procedures, test criteria, experimental design, and validation criteria.	√			
In the event that this test data is not available, the test agency shall design test cases and procedures equivalent to those ordinarily used during product verification.	√			
The vendor shall provide specifications for verification and validation of overall software performance.	√			
These specifications shall cover control and data input/output, acceptance criteria, processing accuracy, data quality assessment and maintenance, ballot interpretation logic, exception handling, security, and production of audit trails and statistical data.	√			
The specifications shall identify procedures for assessing and demonstrating the general suitability of the software for elections use.	√			
The vendor's specifications and procedures shall be used to establish the requirements of the tests described in Section 7 of the standards.	√			
The vendor shall provide specifications for validation of installation, acceptance, and readiness.	√			
These specifications shall define specific procedures for assessing and demonstrating the capability of the software to accommodate actual ballot formats and format logic, and for assessing and demonstrating the pre-election logic, accuracy, and security test requirements of using jurisdictions.	√			
The content and arrangement of appendices shall be at the discretion of the vendor.	√			
The System Operations Manual Shall provide all information necessary for system use by polling place for central counting place personnel, as applicable.	√			
The System Operations Manual shall contain all information that is required for the preparation of detailed operating procedures, and for operator training, including the sections listed below: (Introduction, Operational Environment, Operational Features, Operating Procedures, Operations Support, and Appendices).	√			
The vendor shall provide a summary of system operation functions and modes, in sufficient detail to permit understanding of the system's capabilities and constraints.	√			
The roles of operating personnel shall be identified and related to the operating modes of the system.	√			
Decision criteria and conditional operator functions (such as a error and failure recovery actions) shall be described.	√			
The vendor shall also list all reference and supporting documents pertaining to the use of the system during elections operations.	√			
The vendor shall describe the system environment, and the interface between the user or operator and the system.	√			
Emphasis shall be given to the flow of functions and to choices presented to the user or operator.	√			

Description	Pass	Fail	NA	Comment
The vendor shall provide a detailed description of all input, output, control, and display features accessible to the operator or voter.	√			
The description shall include examples of simulated interactions in order to facilitate understanding of the system and its capabilities.	√			
This description shall include sample data formats and output reports, and shall illustrate and describe all status indicators and information messages.	√			
The vendor shall identify and describe operating procedures required to initiate, control, and verify proper system operation.	√			
Emphasis shall be placed on operator assessment of the correct flow of system functions (as evidenced by system-generated status and information messages), and upon operator intervention required to recover from an abnormal system state.	√			
If operator intervention is required to load, initialize and start the system, appropriate procedures and operator responses to system prompts shall be defined and illustrated.	√			
The procedures required to enable and control the external interface to the system operating environment shall be defined and illustrated if supporting hardware and software are involved.	√			
Such information shall be provided for the interaction of the system with other data processing systems or data interchange protocols as well.	√			
Administrative procedures and off-line operator duties (if any) shall be included if they relate to the initiation or termination of system operations, to the assessment of system status, or to the development of an audit trail.	√			
The vendor shall define the procedures required to support system acquisition, installation, and readiness testing. These procedures may be provided by reference, if they are contained either in the System Hardware Specifications, or in other vendor documentation provided to the test agency and to system users.	√			
The vendor shall also describe procedures for providing technical support, system maintenance and correction of defects, and for incorporating hardware upgrades and new software releases.	√			
The content and arrangement of appendices shall be at the discretion of the vendor.	√			

# APPENDIX B

## SOURCE CODE REVIEW

### SOURCE CODE REVIEW APPROACH AND FINDINGS

The source code review is an evaluation for compliance with FEC guidelines and Sequoia Voting Systems, Inc. standards for software quality.

This report details the results of the Sequoia Voting Systems, Inc. system software evaluation. The evaluation is an assessment of the source code considering the following characteristics:

Simplicity:	Is the design straightforward. Does it avoid complex structures and obscure algorithms.
Understandability:	The ease with which the intent and function of the code can be ascertained and verified
Testability:	The construction of code so as to facilitate testing
Robustness:	How well does the code handle error conditions or unexpected inputs
Security:	How well does the code protect the integrity of voting data
Usability:	Does the code inform the user about progress and errors
Installability:	The ease with which a system can be made fully operational after delivery
Maintainability:	How easy would it be to identify and fix defects in the code in the future
Modifiability:	How easy would it be to incorporate new features into the code in the future

#### Approach.

This report discusses how well the software addresses each of the above source code characteristic. It concludes with an assigned a grade of A, B, C, D, or F. The grades are based on the typical 100-point scale. A = 90..100, B=80..89 etc.

#### Evaluation

WinEDS version 2.6 build 200 uses a combination of C++ and Powerbuilder code to construct a sophisticated windows application for election data processing. These languages facilitate and enforce the object oriented design and programming methodology, resulting in a more understandable and maintainable code set than is typically the case with procedural languages. The code was well commented and contained very little dead code. Some of the modules exceeded the size guidelines, but the module definitions and commenting made them clear and understandable. Naming conventions and coding standards were provided and consistently adhered to. In addition to password protection, the security design provides the capability to define user roles with specific privileges by function and to limit user access to specified workstations.

#### System Score

Simplicity:	B
Understandability:	B
Testability:	A
Robustness:	A
Security:	A
Usability:	A
Installability:	A
Maintainability:	A
Modifiability:	A

## FEC REQUIREMENTS RELEVANT TO SOFTWARE SOURCE CODE REVIEW

The table below lists requirements as stated in the FEC Voting System Standards of 1990 that are applicable to the voting system software source code review. The Sequoia Voting Systems, Inc. source code was evaluated against each of the following requirements.

Each requirement is listed along with a status of Pass, Fail, or Not applicable.

Description	Pass	Fail	N/A	Comments
<b>Source Code Review Requirements Extracted from 7.4.2 Source Code Review</b>				
The test agency shall compare the source code to the vendor's software design documentation to ascertain how completely the ballot counting program conforms to the vendor's specifications. Source code inspection will include an assessment of its logical correctness, the adequacy of the code's modularity and construction, the implementation of algorithms in assembly language( if used ) , the absence of hidden code, and the extent to which the following " industry standard " characteristics are incorporated:	√			
1) Simplicity: the straightforwardness of the design, such as avoidance of complex structures and obscure algorithms.	√			Scored B
2) Understandability: the ease with which the intent and function of the code can be ascertained and verified.	√			Scored A
3) Testability: The construction of code so as to incorporate implicit or explicit points or features to test the flow of data and control within modules and at module interfaces.	√			Code was testable
4) Robustness: a property of software design that is enhanced by editing and range specification, by the incorporation of controls or traps for immediate detection of errors to prevent their propagation throughout the rest of the code and to provide a means of recovery without loss of control or data, and by data typing possible in programs using high-level language.	√			Scored A
5) Security: the inclusion of provisions to prevent unauthorized access, or to detect and control it should it be attempted.	√			Scored A
6) Usability: the ability of the system to be operated without recourse to excessive or obscure control procedures ( e.g.; text messages rather than numerical error codes which require the user to consult a table ).	√			Scored A
7) Installability: the ease with which a system can be made fully operational after delivery.	√			Application was easily installable.
8) Maintainability: the ease with which defects can be identified, corrected, and validated in the field.	√			Scored A
9) Modifiability: the ease with which new features can be incorporated into existing software.	√			
<b>Source Code Review Requirements Extracted from Appendix E Software Design Recommendations. Since these guidelines are advisory, non-adherence in the strictest sense will not be cause for failing qualification testing. Egregious instances of non-compliance ) shall be cause for failure.</b>	√			
It is preferable to use high level programming language for that segment of the ballot tabulation software associated with the logical and numerical of operations on vote data.	√			C++ and Powerbuilder were used.
The code for each module shall perform a single function and shall not be self-modifying; external modification of code during execution shall be prohibited.	√			
Each unit shall be uniquely named. It should follow a standard format consisting of prologue, declarative statements, and executable statements or comments, in that order.	√			
No more that 50% of all modules shall exceed 60 lines in length, no more than 5% of all modules should exceed 120 lines in length. The vendor should justify in comments in the code, each module larger than 120 lines. Any additional branching shall be explained by detailed comments in the code.	√			Scored C
Voting system software should utilize any or all of the following control constructs: Sequence; If-Then-Else; Do-while; Do-until; Case	√			
An alternative to the Do-While and Do-Until constructs, the Loop construct may be used.	√			

If the language does not contain these control constructs, the vendor should use suitable assembly language constructs, or these constructs should be simulated by code that follows their logic. If these constructs are simulated, the same form of simulation should be used throughout the code. No other constructs should be used to control the logic program execution.			√	
The redirection of control by means of operator intervention or data-driven logic should not be allowed during the execution of any program unit. The redirection of control resulting from the calling of subroutines, procedures and functions, or by the action of exception handlers and interrupt service routines, is allowed.	√			
Language keywords should not be used as names of objects, functions or procedures, or in any manner not consistent with the design of the language.	√			
Object, function, and procedure names should be chosen so as to enhance the readability of the program.	√			
Insofar as possible, identifiers should be selected so that their parts of speech represent their use, such as nouns to represent objects, verbs to represent functions, etc.	√			
Names used in code and in documentation should be consistent, and all names should be unique.	√			
In developing source code, coding conventions should be consistent among all units.	√			
Uniform calling sequences should be used, and all parameters should be validated for type and range on entry into each unit.	√			
All source code should be indented to clearly indicate logical levels.	√			
Each line of source code should contain no more than one executable statement.	√			
Mixed-mode operations should be avoided. If it is necessary to use them, then their use should be identified by comments.	√			
Separate and consistent formats should be used to distinguish between normal status messages and error or exception messages.	√			
Error messages should be self-explanatory, and they should not require the operator to perform and function or look-up to interpret them.	√			
Comments should be formatted in a uniform manner.	√			
Comments should be used to describe: the purpose of the unit and how it works; other units called and the calling sequence; inputs and outputs; file references by name and method of access (read, write, modify, append, etc.); the use of global and local variables; and date of creation and a revision record.	√			
Descriptive comments should be provided to identify objects and data types.	√			
In-line comments should be provided to facilitate interpretation of functional operations, tests and branching.	√			
It is recommended that source code modules be organized so that they be edited to comply with individual state laws, such that no extraneous code not required by a state is installed.	√			
Optional audit record and vote tally data entries represent additional software features that are not considered to be critical to acceptable system performance. These feature would, however, enhance the professionalism of elections operations, contribute to timeliness, and ultimately lead to increased levels of public confidence in the process.	√			

# APPENDIX C

## FUNCTIONAL TEST REVIEW

### FUNCTIONAL TEST APPROACH AND FINDINGS

This Appendix describes the functional testing of the WinEDS software application. The functional testing performed by Metamor included tests for:

#### Security

- Role Maintenance
- User Maintenance
- Workstation Maintenance

#### System Setup

- General Information Maintenance
- Tally Category Maintenance
- Tally Type Maintenance
- Ballot Header Maintenance
- Response Set Maintenance
- Terminology Maintenance
- Machine Type Maintenance
- Election Type Maintenance
- Operator Panel Maintenance
- Visio Element Maintenance
- Language Maintenance

#### Profile

- Political Subdivision Maintenance
- Voting Location Maintenance
- Precinct Maintenance
- Office Maintenance
- Party Maintenance
- Voting Machine Maintenance
- Voting Location Group Maintenance
- Validation
- Consolidated Precinct

#### Reports

##### Election

- New Election
- Election Properties
- Open Election
- Delete Election
- Close Election

##### Election Setup

- Candidate/Contest
- Candidate/Precinct Level Contest
- Proposal
- Recall
- Control Contests
- Validation
- Machine Assignment
- Ballot Management
- Create Cartridge

- External Codes
- Election Day
  - Tally Processing
  - Election Night Statistics
  - Cartridge Processing
  - Refresh Data Store
- Post Election
  - Resolve Write In
  - Declare Winners
  - Backup Election
  - Restore Election
  - Certify Election
  - Offline Election
  - Online Election
- Tools
  - Task List
  - Change Password
  - Cartridge Utilities
  - Import
  - Export
  - Data Wizard
  - Customizing Tool Bars
  - Reset Tool Bar

The WinEDS application performed the tested functions properly. The application went through several revisions prior to the final functional testing. These revisions were required due to anomalies that were detected and resolved during preliminary functional testing. Anomalies detected during the test process were satisfactorily resolved before the final functional test was conducted. WinEDS version 2.6 build 200 met the functional requirements provided by the FEC as well as the additional requirements stated or derived from the TDP.

## FEC REQUIREMENTS RELEVANT TO SOFTWARE FUNCTIONAL TESTING

The following sections list requirements as stated in the FEC Voting System Standards of 1990 that are applicable to the qualification testing of voting system software. The Sequoia Voting Systems, Inc. software was evaluated against each of the following requirements.

Each requirement is listed along with a status of Pass, Fail, or Not applicable.

Description	Pass	Fail	N/A	Comments
<b>Functional Requirements Extracted from 2 Functional Requirements</b>				
P&M systems shall allow for a database that performs automatic formatting of ballots in accordance with the requirements for offices, candidates, and measures qualified to be placed on the ballot.	√			
These (P&M) systems shall provide a ballot in the form of one or more cards or sheets containing printed information identifying the contests, candidates, and issues.	√			
P&M systems shall be capable of generating sufficient, distinct ballot formats to accommodate requirements for rotation of candidate positions within an office, and requirements for legislative or administrative jurisdictional subsets of a general format.	√			
Ballots generated by these systems shall contain identifying codes or marks uniquely associated with each format.	√			



Description	Pass	Fail	N/A	Comments
P&M systems shall provide a means of programming each piece of polling place or central count equipment in accordance with the ballot requirements of the election, and the jurisdiction in which the equipment will be used.	√			
Such (P&M) systems shall provide a means to ensure that software (whether nonresident or resident) has been properly selected and installed for the election, and that the software correctly matches the ballot formats that it is intended to process.	√			
P&M systems shall contain appropriate and necessary provisions for verifying the integration of all system equipment, obtaining status and data reports from each set of equipment, and generating consolidated data reports at the polling place and higher jurisdictional levels.	√			
All P&M systems shall provide for ballots on which are printed labels indicating the names of every candidate, and the titles of every measure on the ballot on which the voter is entitled to vote.	√			
Each label shall indicate the voting field on the ballot that is associated with it.	√			
Such systems shall provide a means by which the voter may directly punch or mark the ballot to register votes.	√			
The system shall enable the voter to vote for any and all candidates and measures appearing on the ballot, in any legal number and combination to which the voter is entitled.	√			
A P&M system to be used in any of the states allowing for contest write-in shall provide a means of recording the selection of candidates for any office whose names do not appear upon the ballot.	√			
This means shall consist of the capability for entry of as many names of candidates as the voter is entitled to select for each office.	√			
Ballot formats in P&M systems shall allow for the use of all special options, such as straight party voting, slate and similar methods of selecting more than one candidate by the casting of a single vote.	√			
The ballot formats shall permit cross-voting among parties in open, blanket and unitary primary elections, or any other non-standard pattern of voting authorized by the using jurisdictions.	√			
DRE systems shall allow for automatic formatting of ballots in accordance with the requirements for offices, candidates, and measures qualified to be placed on the ballot.	√			
Ballots shall comply with the requirements of the statutes and regulations of any jurisdiction in which they are used.			√	ITA not able to test for all jurisdictions.
The system shall be capable of generating sufficient, distinct ballot formats to accommodate requirements for rotation of candidate positions within an office, and requirements for legislative or administrative jurisdictional subsets of a general format.	√		√	
Ballots generated by DRE systems shall contain identifying codes or marks uniquely associated with each format.	√			
DRE systems shall be designed to ensure that the proper ballot is selected for each polling place, and that the format can be matched to the software or firmware required to interpret it correctly.	√			
In a primary election the voter shall be prevented from voting for a candidate of another party unless this act is allowed by the statutes and regulations of the jurisdiction using the system.	√			
In a general election, DRE systems shall provide the voter with means of selecting the appropriate number of candidates for any office and of voting on any measure on the ballot.	√			
If a voter is not entitled to vote for particular candidates or measures appearing on the ballot, the DRE system shall prevent the selections of the prohibited votes.	√			
DRE systems shall provide labels indicating the names of every candidate, and the titles of every measure on the voter's ballot.	√			
Each label shall indicate the voting field on the ballot that is associated with it.	√			
The system shall enable the voter to vote for any and all candidates and measures appearing on the ballot, in any legal number and combination.	√			
A DRE system shall provide a means of recording the selection of candidates for any office whose names do not appear upon the ballot.	√			

Description	Pass	Fail	N/A	Comments
For all types of voting systems, system functions shall be implemented such that unauthorized access to them is prevented and the execution of authorized functions in an improper sequence is precluded.	√			
System functions shall be executable only in the intended manner and order, and only under the intended conditions.	√			
If the preconditions to a system function have not been met, the function shall be precluded from executing by the system's control logic.	√			
Security provisions for system functions shall be compatible with the procedures and administrative tasks involved in equipment preparation and testing, and in operation by the public in a polling place.	√			
If access to a system function is to be restricted or controlled, then the system shall incorporate a means of implementing this requirement.	√			
The inclusion of control logic and data processing methods incorporating parity and check-sums (or equivalent error detection and correction methods) shall demonstrate that the system has been designed for accuracy.			√	Hardware function not part of this system.
Both P&M and DRE systems shall include built-in test, measurement and diagnostic software, and hardware for detecting and reporting the system's status and degree of operability.			√	Hardware function not part of this system.
All systems shall include capabilities for recording and reporting the date and time of normal and abnormal events, and of maintaining a permanent record of audit information that cannot be turned off.	√			
<b>Performance Characteristics Extracted from 3.2 Hardware, Performance Characteristics</b>				
The environment in which this database is operated shall include all necessary provisions for security and access control, and it shall ensure the security and access control of other databases in the subsystem.	√			
For each election, the subsystem shall generate and maintain a candidate and contest database, and provide for the generation of properly formatted ballots and software for each P&M and DRE voting device.	√			
This database shall interact with the administrative database, to ensure that ballots are properly formatted for each polling place within the jurisdiction.	√			
If the subsystem of P&M and DRE systems includes provisions for generating and maintaining a voter registration database, this database shall allow interaction with the administrative database to control, for example, the selection and distribution of correctly formatted sample ballots and absentee ballots.			√	
In P&M and DRE systems, the subsystem shall provide a software capability for the creation of newly defined elections, for the retention of previously defined formats in that election, and for the modification of a previously defined ballot format.	√			
Such systems shall be designed so as to facilitate the rapid and error-free definition of elections and their associated ballot layouts.	√			
The subsystem shall be capable of handling at least 500 potentially active voting positions, arranged so as to identify party affiliations in a primary election, offices and their associated labels and instructions, candidate names and their associated labels, and issues or measures and their associated text.	√			
The ballot generation capability shall incorporate provisions for rotation of candidate positions within an office, multiple endorsement of candidates by more than one party or body, straight party voting, slate or ticket voting, recall contests, and any other requirements common to the using jurisdiction.	√			
The subsystem in P&M and DRE systems shall provide a facility for the logical definition of the ballot, including the definition of the number of allowable choices for each office and contest, and for the selection of various voting options, in which a single selection causes a vote to be cast for more than one candidate or in more than one office.	√			

Description	Pass	Fail	N/A	Comments
The subsystem shall also provide for the logical definition of political and administrative subdivisions, where the list of candidates or contests may vary among polling places, and for the activation or exclusion of any portion of the ballot upon which the entitlement of a voter to vote may vary by reason of place of residence, or other such administrative or geographical criteria.	√			
The subsystem shall generate all required master and distributed copies of the voting program, in conformance with the definition of the ballot for each voting device and polling place.	√			
The subsystem shall provide a means of printing or otherwise generating a ballot display, which can be installed in P&M and DRE voting devices for which it is intended.	√			
Provisions shall be made to ensure that the allocation of space and the type fonts used for each office, candidate, and contest shall be uniform, and that no active voting position shall be perceived by the voter to be preferred to any other.	√			
<b>System Audit Requirements Extracted from 4.8 System Audit Requirements</b>				
All systems shall incorporate a real-time clock as part of system hardware.	√			
All audit record entries shall include the time-and-date stamp.	√			
The audit record shall be is used whenever the system is in an operating mode; this record shall be available at all times, though it need not be continually visible.	√			
The generation of entries shall not be terminated or interfered with by program control, or by the intervention of any person.	√			
The physical security and integrity of the record shall be maintained at all times.	√			
Once the system has been activated for ballot processing, the contents of the audit record shall be preserved during any interruption of power to the system until processing and data reporting have been completed.	√			
Error message entries shall be made and reported as they occur.	√			
Except for error messages which require resolution by a trained technician, all other error messages requiring intervention by an operator or precinct official shall be displayed or printed unambiguously in easily understood language text, or by means of other suitable visual indicators.	√			
When numerical codes are used for trained technician maintenance or repair, the text corresponding to the code shall be self-contained, or an instructional sheet shall be affixed inside the unit device.			√	Numerical codes not used with this software.
The message queue for all systems shall clearly state the action to be performed in the event that voter or operator response is required.	√			
System design shall ensure that erroneous responses will not lead to irrecoverable error.	√			
Nested error conditions shall be corrected in a controlled sequence such that system status shall be restored to that initial state existing before the first error occurred.	√			
Depending on the critical nature of the message, and the particular jurisdiction's needs, status messages shall preferably be displayed and reported by suitable, unambiguous indicators or English language text.	√			
Audit records shall be prepared for all phases of elections operations.	√			
During election definition and ballot preparation phases, an audit log shall be maintained of completion of the baseline ballot formats and modifications to them, a description of these modifications and corresponding dates.			√	Manual process not reviewed.
The pre-election audit log shall include manual data maintained by election personnel, samples of all final ballot formats, and the ballot preparation edit listings associated with them.			√	Manual process not reviewed.
<b>Security Requirements Extracted from 5 Security</b>				
The using jurisdiction shall be responsible for initiating a security program and policies covering: physical protection of facilities, data and communication access control, internal procedural security, contingency plans, and standards for programming, acceptance			√	

Description	Pass	Fail	N/A	Comments
contingency plans, and standards for programming, acceptance testing, audit trails, and documentation.				
The general features and capabilities of the access policy shall be specified by the vendor. Such generic capabilities might well include software access controls, hardware access controls, effective password management, the protection abilities of a particular operating system, and the general characteristics of supervisory access privileges.	√			
Access control measures shall be designed to permit access to system states in accordance with the access policy, and to prevent all other types of access. These measures may include: the use of data and user authorization, program unit ownership and other region boundaries, one- end or two-end port protection devices, security kernels, computer -generated password keys, special protocols, message encryption, and other controlled access security modems.	√			
Control methods shall be defined to preclude unauthorized access to the access control system itself.				
All software ( including firmware ) for all voting systems shall incorporate measures to prevent access by unauthorized persons, and to prevent unauthorized operations by any person. Unauthorized operations include, but are not limited to: modification of compiled or interpreted code, run-time alteration of flow control logic or of data, and abstraction of raw or processed voting data in any form other than a standard output report by an authorized operator.			√	Firmware not reviewed by software ITA.
The vendor shall provide a penetration analysis relevant to the operating status of the system, and its environment. This analysis shall cover the individual use of program units, the planned or inadvertent sharing of program units, and the resulting transitivity relationships. It shall identify all entry points and the methods of attack to which each is vulnerable. Such penetration analysis will be subject to strict confidentiality and non-disclosure by the test authority. For security reasons, the penetration analysis shall not be routinely distributed to the jurisdictions that program elections. The penetration analysis, however, will be part of the escrow deposit.			√	Penetration Analysis not reviewed by software ITA.
The integrity of the applications software and data must be preserved.	√			
Security procedures and logging records shall be used to control access to system functions.	√			

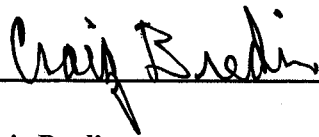
**Sequoia Voting Systems, Inc.  
Software Qualification Test Report  
WinEDS 2.6 Build 200**

**Prepared For:**

**The National Association of State Election Directors**

**Prepared By:**

**METAMOR**  
GOVERNMENT SOLUTIONS



---

**Craig Bredin**  
ITA  
Metamor Government Solutions, Inc.  
5030 Bradford Drive  
Building 2, Suite 115 Huntsville, AL 35805

---

# 1 INTRODUCTION

Metamor is pleased to submit this report summarizing the qualification testing of the Sequoia WinEDS Election Data System software Version 2.6 Build 200.

## 1.1 TEST AGENCY TEST AGENCY HISTORY AND CAPABILITY

Metamor has been providing IT consulting services for over 20 years. Although the name has changed due to an aggressive acquisition and merger market, the company has had the same executive leadership in place for 17 years. Metamor currently has 846 employees in 10 offices around the country. With annual revenues in excess of \$100M, Metamor provides a single source for IT solutions, including:

- Full-solution ASP services
- Applications maintenance and support
- Testing and IQA
- Web and database hosting
- Enterprise solutions, including SAP, Oracle, Great Plains, Baan and Peoplesoft
- Application outsourcing
- eBusiness, from architecture through execution
- Knowledge management and training
- CRM and SCM solutions

The company has been involved in numerous QA and IQA testing projects for commercial, state, and federal government customers. Metamor has an interim accreditation as an Independent Test Authority (ITA) through the National Association of State Election Directors (NASED).

## 1.2 DOCUMENT OVERVIEW

This document consists of five main sections: Introduction, Qualification Test Background, System Identification, System Overview, and Qualification Test Results. The Qualification Background gives general information about the qualification test process. The System Identification Section gives information about the Sequoia Voting Systems software and supporting hardware. The System Overview describes the software and the Qualification Test Results Section provides a summary of the results of the testing process.

Detailed information including the Technical Data Package (TDP) Review, Source Code Review, and Functional Test Review are included as appendices to this report. Tables illustrating the software's adherence to the FEC Software Qualification Requirements are included in each appendix.

## 2 QUALIFICATION TEST BACKGROUND

The primary purpose of Software Qualification Testing is to demonstrate compliance with levels of design, performance, and quality claimed for them by manufacturers. The tests are also intended to demonstrate that the system meets or exceeds the requirements of the Federal Election Commission (FEC) Voting System Standards.

The scope and detail of the requirements for qualification have been tailored to the design and complexity of the software submitted by Sequoia Voting Systems, Inc. for testing. The qualification test procedure is intended to discover defects in software design and system operation which, should they occur in actual election use, could result in failure to complete election operations in a satisfactory manner.

The tests have been designed to evaluate system compliance with the requirements of Sections 2 through 6 of the FEC Voting System Standards. The examination will include selective in-depth examination of software, the inspection and evaluation of system documentation and optional tests verifying system performance and function under normal and abnormal conditions.

## 3 SYSTEM IDENTIFICATION

The system submitted by Sequoia Voting Systems, Inc. for qualification testing consisted of the following software, hardware and documentation:

### Software

WinEDS Version 2.6 Build 200 election data system software consists of a workstation, or client application and a server application. The listing of files for the workstation application is presented in Exhibit 1 below. The server application is based upon the Microsoft SQL Server, which is a third party or COTS (Commercial-Off-The-Shelf) application. Exhibit 2 shows the WinEDS database components.

**Exhibit 1. Listing of Files for WinEDS Workstation Application.**

```
Volume in drive C is DRIVE C
Volume Serial Number is 07CF-061D

Directory of C:\Program Files\Sequoia

.                <DIR>          08-02-01  2:57p  .
..               <DIR>          08-02-01  2:57p  ..
WINEDS~1 6       <DIR>          08-02-01  2:57p  WinEDS 2.6
WINEDS~1      <DIR>          08-02-01  2:58p  WinEDS Agent
W_EDSW      TXT           0 08-20-01  9:17a  W_edsws.txt
WEDS_WS     TXT           0 08-20-01  9:17a  weds_ws.txt
           2 file(s)                0 bytes

Directory of C:\Program Files\Sequoia\WinEDS Agent

.                <DIR>          08-02-01  2:58p  .
..               <DIR>          08-02-01  2:58p  ..
UNINST  ISU           6,097 08-02-01  2:59p  Uninst.isu
HELP    <DIR>          08-02-01  2:58p  Help
PFCDW   PBD          886,784 07-17-01 10:50a  pfcdwrv.pbd
WINEDS~1 EXE        332,800 07-17-01 10:50a  wineds agent.exe
```

```

PFCMAIN PBD 1,001,984 07-17-01 10:50a pfcmain.pbd
PFCUTIL PBD 607,232 07-17-01 10:50a pfcutil.pbd
PFCWNSRV PBD 311,808 07-17-01 10:50a pfcwnsrv.pbd
PFEAPSRV PBD 189,952 07-17-01 10:50a pfeapsrv.pbd
PFEDWSRV PBD 107,008 07-17-01 10:50a pfedwsrv.pbd
PFEMAIN PBD 190,464 07-17-01 10:50a pfemain.pbd
PFEUTIL PBD 197,120 07-17-01 10:50a pfeutil.pbd
PFEWNSRV PBD 143,872 07-17-01 10:50a pfewnsrv.pbd
PFCAPSRV PBD 1,333,248 07-17-01 10:50a pfcapsrv.pbd
REPORT~1 PBD 190,464 07-17-01 10:50a reports_nested.pbd
PBVM60 DLL 3,408,384 06-24-98 2:09p pbvm60.dll
PBMSS60 DLL 169,984 06-10-98 10:09a pbmss60.dll
PBDWE60 DLL 1,608,704 07-01-98 4:21p pbdwe60.dll
CSCXFTP OCX 86,016 05-07-99 11:22a cscxftp.ocx
17 file(s) 10,771,921 bytes

```

Directory of C:\Program Files\Sequoia\WinEDS Agent\Help

```

. <DIR> 08-02-01 2:58p .
.. <DIR> 08-02-01 2:58p ..
0 file(s) 0 bytes

```

Directory of C:\Program Files\Sequoia\WinEDS 2.6

```

. <DIR> 08-02-01 2:57p .
.. <DIR> 08-02-01 2:57p ..
UNINST ISU 20,728 08-02-01 2:59p Uninst.isu
BIN <DIR> 08-02-01 2:57p Bin
HELP <DIR> 08-02-01 2:57p Help
POWERS~1 <DIR> 08-02-01 2:57p Powersoft DDK6
AVCSDK~1 <DIR> 08-02-01 2:57p Avc Sdk
1 file(s) 20,728 bytes

```

Directory of C:\Program Files\Sequoia\WinEDS 2.6\Avc Sdk

```

. <DIR> 08-02-01 2:57p .
.. <DIR> 08-02-01 2:57p ..
ADVANT~1 <DIR> 08-02-01 2:57p Advantage
EDGE <DIR> 08-02-01 2:57p Edge
ACR <DIR> 08-02-01 2:57p Acr
SEQ400C <DIR> 08-02-01 2:57p Seq400C
AVCUTILS OCX 36,864 07-17-01 10:34a AvcUtils.ocx
1 file(s) 36,864 bytes

```

Directory of C:\Program Files\Sequoia\WinEDS 2.6\Avc Sdk\Acr

```

. <DIR> 08-02-01 2:57p .
.. <DIR> 08-02-01 2:57p ..
AVCACR OCX 49,152 07-17-01 10:32a AvcAcr.ocx
1 file(s) 49,152 bytes

```

Directory of C:\Program Files\Sequoia\WinEDS 2.6\Avc Sdk\Advantage

```

. <DIR> 08-02-01 2:57p .
.. <DIR> 08-02-01 2:57p ..
AVCSDK HLP 35,720 09-11-98 12:44a AVCSDK.HLP
AVCSDK CNT 504 09-10-98 6:19p AvcSdk.cnt
AVCCORE OCX 700,416 07-17-01 10:04a AvcCore.ocx
3 file(s) 736,640 bytes

```

Directory of C:\Program Files\Sequoia\WinEDS 2.6\Avc Sdk\Edge



```

. <DIR> 08-02-01 2:57p .
.. <DIR> 08-02-01 2:57p ..
AVCEEDGE OCX 569,344 07-17-01 10:15a AvcEdge.ocx
1 file(s) 569,344 bytes

```

Directory of C:\Program Files\Sequoia\WinEDS 2.6\Avc Sdk\Seq400C

```

. <DIR> 08-02-01 2:57p .
.. <DIR> 08-02-01 2:57p ..
SPVUTIL DLL 28,672 07-17-01 10:29a spvutil.dll
SPV400C DLL 143,360 07-17-01 10:27a spv400c.dll
SEQ400C OCX 36,864 07-17-01 10:30a seq400c.ocx
3 file(s) 208,896 bytes

```

Directory of C:\Program Files\Sequoia\WinEDS 2.6\Bin

```

. <DIR> 08-02-01 2:57p .
.. <DIR> 08-02-01 2:57p ..
BALLOTS PBD 987,648 08-02-01 3:31p ballots.pbd
WINEDS EXE 1,720,832 07-17-01 9:48a wineds.exe
BALLOT~1 PBD 560,128 07-17-01 9:48a ballots_dw.pbd
BRASS74 WAV 50,330 03-31-97 1:04p BRASS74.WAV
CARDRE~1 AVI 62,464 02-04-00 5:53p CardRemove.avi
CARTRI~1 PBD 388,096 07-17-01 9:48a cartridge.pbd
CONFIG~1 PBD 783,360 07-17-01 9:48a configuration.pbd
EDGE PBD 581,632 07-17-01 9:48a edge.pbd
ELECTI~1 PBD 1,281,536 07-17-01 9:48a election_setup.pbd
FINALE WAV 47,482 03-31-97 1:49p FINALE.WAV
FINDFILE AVI 49,884 01-18-00 6:49p FINDFILE.AVI
GENERA~1 PBD 706,560 07-17-01 9:48a generation.pbd
MAIN PBD 958,464 07-17-01 9:48a main.pbd
PFCAPSRV PBD 1,334,272 07-17-01 9:48a pfcapsrv.pbd
PFCDWSRV PBD 886,784 07-17-01 9:48a pfcdwsrv.pbd
PFCMAIN PBD 1,001,984 07-17-01 9:48a pfcmain.pbd
PFCUTIL PBD 607,232 07-17-01 9:48a pfcutil.pbd
PFCWNSRV PBD 311,808 07-17-01 9:48a pfcwnsrv.pbd
PFEAPSRV PBD 190,464 07-17-01 9:48a pfeapsrv.pbd
PFEDWSRV PBD 107,520 07-17-01 9:48a pfedwsrv.pbd
PFEMAIN PBD 190,464 07-17-01 9:48a pfemain.pbd
PFEUTIL PBD 197,120 07-17-01 9:48a pfeutil.pbd
PFEWNSRV PBD 143,872 07-17-01 9:48a pfewnsrv.pbd
PROFILE PBD 720,896 07-17-01 9:48a profile.pbd
PROFIL~1 PBD 722,432 07-17-01 9:48a profile_dw.pbd
REMOVE AVI 62,464 02-02-00 2:56p Remove.avi
REPORT~1 PBD 112,640 07-31-01 2:25p report_argument.pbd
REPORTS PBD 696,320 07-17-01 9:48a reports.pbd
REPORT~2 PBD 450,560 07-17-01 9:48a reports_election.pbd
REPORT~3 PBD 487,424 07-17-01 9:48a reports_post.pbd
REPORT~4 PBD 560,640 07-17-01 9:48a reports_results.pbd
SCANAVI AVI 58,368 01-18-00 6:49p ScanAvi.avi
SECURITY PBD 298,496 07-31-01 2:28p security.pbd
STATIS~1 PBD 410,112 07-17-01 9:48a statistics.pbd
TALLY PBD 949,760 07-17-01 9:48a tally.pbd
TOOLSM~1 PBD 314,368 07-17-01 9:48a toolsmith.pbd
UTILIT~1 PBD 1,197,056 07-17-01 9:48a utilities.pbd
ARCHIVE PBD 293,888 07-17-01 9:48a archive.pbd
SCHEDU~1 PBD 156,160 07-17-01 9:48a scheduler.pbd
REPORT~5 PBD 190,464 07-17-01 9:48a reports_nested.pbd
SEQUIO~1 PBD 314,368 07-17-01 9:48a sequoia400.pbd
CSCXFTP OCX 86,016 05-07-99 11:22a cscxftp.ocx

```

```

FILESE~1 DLL          45,056 07-17-01 10:35a FileSelect.dll
DELETE~1 LOG           0 08-02-01 4:00p delete_item.log
      44 file(s)      21,277,424 bytes

```

Directory of C:\Program Files\Sequoia\WinEDS 2.6\Help

```

.          <DIR>          08-02-01 2:57p .
..         <DIR>          08-02-01 2:57p ..
PFCDLG   HLP           17,590 11-04-97 12:33p pfcdlg.hlp
WINEDS   CHM          730,672 05-24-01 12:47p WINEDS.chm
      2 file(s)          748,262 bytes

```

Directory of C:\Program Files\Sequoia\WinEDS 2.6\Powersoft DDK6

```

.          <DIR>          08-02-01 2:57p .
..         <DIR>          08-02-01 2:57p ..
PBODB60  DLL           288,768 06-10-98 11:09a pbodb60.dll
PBFNT60  INI            179 08-20-97 3:49p pbfnt60.ini
PBLAB60  INI           26,668 06-10-98 12:07a pblab60.ini
PBMSS60  DLL           169,984 06-10-98 10:09a pbmss60.dll
PBDWE60  DLL          1,608,704 07-01-98 4:21p pbdwe60.dll
PFCCOM32 DLL           32,256 06-15-98 3:33p pfccom32.dll
PBRTC60  DLL           816,640 06-10-98 10:09a pbrtc60.dll
PBTRA60  DLL           38,912 06-10-98 10:09a pbtra60.dll
PBVM60   DLL          3,408,384 06-24-98 2:09p pbvm60.dll
PBODB60  INI           62,529 06-10-98 12:08a pbodb60.ini
      10 file(s)        6,453,024 bytes

```

```

Total files listed:
      85 file(s)      40,872,255 bytes
      35 dir(s)       8,420.94 MB free

```

### Exhibit 2. WinEDS Server Files.

Directory of D:\MSSQL\DATA

```

07/31/01 03:52p          <DIR>          .
07/31/01 03:52p          <DIR>          ..
08/03/01 10:59a          52,428,800 MASTER.DAT
08/03/01 10:59a          6,291,456 MSDB.DAT
08/03/01 10:59a          2,097,152 MSDBLOG.DAT
04/03/96 08:00a          4,194,304 MSDTC.LOG
      6 File(s)          65,011,712 bytes

```

Directory of D:\WinEDS\_Databases

```

08/02/01 05:01p          <DIR>          .
08/02/01 05:01p          <DIR>          ..
07/31/01 01:23p          1,048,576,000 GENERAL_ELECTION_2000.dat
07/31/01 03:40p          31,457,280 GENERAL_ELECTION_2000sys.dat
07/11/01 08:57a          5,242,880 model.dat
07/31/01 03:40p          220,200,960 PROFILE.dat

```

[WinEDS database files are shown here for illustration. They are dependent upon customer and election specifics. Nonessential files have been omitted for brevity and clarity.]

## **Test Support Hardware**

Edge voting machine, firmware version 3.0.F  
Edge PC card reader  
Advantage voting machine, firmware version 8.00B  
Advantage cartridge reader  
Sequoia 400-C ballot counter system, firmware version 1.02b

## **Documentation**

Reference Guide dated 4 June 2001  
System Software Specification Release 2.6  
Additional documentation as listed in Appendix A

# **4 SYSTEM OVERVIEW**

Sequoia Voting Systems, Inc. is a full solution provider servicing the elections market and creating technological solutions for absentee and election day processing. WinEDS is designed to provide an election administrator with all the tools required to prepare, count, and report an election in accordance with their local laws. Each election in the WinEDS environment is kept in its own database. WinEDS provides the tools to manage and administrate these databases.

The basic functionality of WinEDS is grouped as follows:

- Security
- System Setup
- Profile
- Reports
- Election
- Election Setup
- Election Day
- Post Election
- Tools

The WinEDS software works with other products from Sequoia Voting Systems, Inc. These were included in the documentation and used in the testing process but were not considered part of this software qualification. They include the Edge voting machine, Advantage voting machine, and the Sequoia 400-C ballot counter system.

## **5 QUALIFICATION TEST RESULTS**

### **5.1 TECHNICAL DATA PACKAGE (TDP) REVIEW SUMMARY**

The TDP contains requirements, design, configuration management, quality assurance, and system operations information. The FEC requirements state that at a minimum, the TDP shall contain a System Hardware Specification, a System Software Specification, a System Operations Manual and a System Maintenance Manual.

A very complete software TDP was submitted. This included a software specification, configuration management documentation, test documentation, a database design specification, design and maintenance documentation, coding standards, and interface specifications. The Systems Operations and System Maintenance procedures were submitted as a part of the WinEDS Reference Guide. Sequoia Voting Systems, Inc. did not submit a hardware maintenance manual as there was no hardware component of WinEDS to be qualified.

The documents were reviewed for accuracy and completeness as a part of the TDP testing process. The documents from the TDP also served as the basis for developing the Software Test Plan that was used for functional testing.

Upon final review of the aforementioned documents, Metamor concludes that the TDP submitted by Sequoia Voting Systems, Inc. meets the requirements under the FEC standards of 1990. Appendix A TDP Review provides more detailed information about the reviewed documents.

### **5.2 SOURCE CODE REVIEW SUMMARY**

The code was reviewed in order to evaluate its compliance with the FEC standards for source code. These standards are intended to ensure that the overall objectives of the logical correctness, system integrity, reliability, and accuracy are being met. It was also reviewed for its adherence to any Sequoia Voting Systems, Inc. coding standards.

The WinEDS application source consists of the following components:

- Profile and election databases hosted on a Microsoft SQL server.
- Windows-based client election data system hosted on a PC workstation.

It was determined that WinEDS is well written and meets the standards required by the FEC. Appendix B Source Code Review details specific instances where the source excelled, met, or fell short in any of the areas under review.

### **5.3 FUNCTIONAL TEST SUMMARY**

The main goal of functional testing was to verify that the WinEDS 2.6 application met the FEC standards. The functional testing performed by Metamor included defining, creating ballots for voting, tallying, and reporting results for primary and general elections.

The functional testing included testing against the functional, overall system performance, software, security, communication and data transmission, and audit requirements as specified in the FEC Voting System Standards.

Functional testing was conducted in multiple passes. The first pass was a comprehensive test focusing upon the exercise of all functions and options in any given area. A list of anomalies was generated that was

resolved by coordination between Sequoia and Metamor. In some cases the observed behavior was the expected behavior and upon further explanation determined to be compliant with the standard and the software specification. Documentation was changed to clarify functions and operations. Other anomalies were resolved via software changes and these were then verified by Metamor. When the anomalies were all resolved, a system level functional test was conducted that exercised both primary and general elections and included contests, candidates and proposals. Votes were generated using both the voting machines and the paper ballot counting system. After successful completion of the system functional test, an on-site inspection, review, and witness of the software compile, build, and creation of the installation package was conducted at the software vendor facility. This installation package was then installed at the Metamor facility and all anomalies retested. Three minor problems were encountered that were fixed, resulting in a partial recompile and build at Metamor. Following this, final system testing was conducted successfully.

After completion of final functional testing, Metamor concludes that WinEDS version 2.6 build 200 meets the functional requirements provided by the FEC as well as the additional requirements stated or derived from the TDP. Appendix C Functional Test Review provides more information on the functional test process and the test results.

#### **5.4 RECOMMENDATION FOR QUALIFICATION**

It has been demonstrated through the TDP review, source code review, and functional testing that the WinEDS election data system software version 2.6 build 200 successfully meets the required acceptance criteria of the FEC Standards for Punchcard, Marksense, and Direct-Recording Electronic Voting Systems, January 1990.

It is upon completion of this testing that Metamor recommends to the NASED committee that WinEDS election data system software version 2.6 build 200 be certified and assigned NASED certification number N03070026200.