FLORIDA DEPARTMENT of STATE

Division of Elections

Election Audit Report
for
Pinellas County, FL

March 7, 2006 Elections
Using
Sequoia Voting Systems, Inc.
ACV "Edge" Voting System, Release Level "4.2"

May 24, 2006

Prepared by:

Bureau of Voting Systems Certification

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Election Audit Report
for
March 7, 2006 Elections held in Pinellas County, FL
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Sequoia Voting Systems, Inc.
AVC "Edge" Voting System, Release Level "4.2"
Audit location: Largo, FL
Audit Dates: 04/11/06 to 04/12/06

EXECUTIVE SUMMARY:

The Florida Division of Elections conducted an audit of the March 7th, 2006 Pinellas County municipal elections at the request of the supervisor of elections. The audit focused on the election management system's ability to accumulate the vote totals and to accurately report the results. The audit team performed a 100% examination of the accumulation of the voting devices' results, an examination of the absentee and provisional vote accumulation, an examination of ballot images from randomly selected voting devices, and an examination of the installed software. The results of these examinations did not uncover any evidence that suggests the official results are in error. The audit team did note several areas that offered opportunities for improvement. Nevertheless, it is the audit team's opinion based on the available evidence that the results for the March 7, 2006 Pinellas County elections are accurate.

BACKGROUND:

The Division of Elections performed a limited-scope audit of the Pinellas County voting system in response to the March 15, 2006 request from the supervisor of elections, the Honorable Deborah Clark. Ms. Clark requested the Division to examine the county's ballot tabulation system in an effort to reassure the public that a database lockup that occurred during the March 7th election night reporting did not affect the reported results. The supervisor documented this issue within the conduct of elections report dated March 11, 2006 as required under section, 102.141(8), F.S. and provided an analysis of this event along with supporting documents as part of her March 15, 2006 audit request to the Division. The March 7, 2006 elections included the City of Largo, City of Pinellas Park, and the Palm Harbor Community Services District.

Specific concerns were noted by Ms. Gyan Hardman who served as the Democratic Party observer for the central vote tabulation. Ms. Hardman documented her observations in a report to the supervisor of elections. In that report, Ms. Hardman noted that there was a problem with the election management system (i.e., WinEDS) during the election night vote tabulation that prevented further accumulation after a number of results cartridges were uploaded into WinEDS. Ms. Hardman expressed a concern that there may have been a software update that led to this problem and also questioned the nature of what appeared to be vendor supplied code that the election office received that night from the voting system vendor, Sequoia Voting Systems, Inc. The supervisor of elections provided a response to Ms. Hardman on March 13, 2006.

The audit team was composed of two members from the Bureau of Voting Systems Certification and an independent member from the Okaloosa County, FL elections staff.

OBJECTIVE and SCOPE:

The objective of this audit is to examine the conduct of the Pinellas County municipal elections and make a determination as to whether Sequoia's election management system (WinEDS) tabulated the results from the March 7, 2006 municipal elections without error and the official certified results are accurate. The audit examined the events surrounding the database lockup and the activities that eventually resolved the issue. Thus, the audit's scope included the events surrounding election night reporting, the accumulation of these results into the WinEDS, and WinEDS's accuracy in reporting these results. Early voting, absentee voting, election day and provisional voting were examined as noted within this report.

VOTING SYSTEM:

The Pinellas County voting system is the Florida certified *"AVC EDGE Voting System, Release Level 4.2"*, certification # 0804SEQ-02, dated August 3, 2004. This voting system is an upgrade from the Florida certified *"AVC EDGE Voting System, Release Level 4"*, certification # 0204SEQ-01, dated February 13, 2004. The difference between these two systems is the revised firmware for the AVC EDGE DRE and the AVC EDGE Card Activator that permits the use of a larger capacity memory card (a.k.a. results cartridge.) It is also significant to note that this *"Release Level 4"* was itself an upgrade from the Florida certified *"AVC EDGE Voting System, Release Level 3.1"*, certification # 0210SEQ-03, dated October 31, 2002. The difference between these two systems includes two hardware improvements that were made to the Optech 400-C central count tabulator. Therefore, the election management system and the database setup in use during the March 7, 2006 election (WinEDS version 2.6.220 and Database Setup version 2.6.220a) have remained unchanged since October, 2002. Note that the "220" in the version is the software build number.

The interface between WinEDS and the precinct count tabulator (Edge I DRE) is a PC Card that has a modified external cartridge package. This PC Card, formally known as a PCMCIA card, is called the Results Cartridge and contains the election parameters and the tabulator's results. One can use additional cartridges to perform various tasks and these cards would then take the name of those specific tasks, such as accumulation, simulation, or audit. Once the polls are closed, the results cartridges are transported to the central tabulation site and are uploaded into WinEDS by use of multiple workstations, typically laptop computers. The interface between WinEDS and the central count tabulator (Optech 400-C) is a 3 ½" floppy disk. One uses this disk to load the election parameters into the tabulator and to accept the tabulation results for upload into WinEDS. The Pinellas County election staff used 3 ½" floppies for transferring the provisional ballot totals and the absentee totals into WinEDS and used the results cartridges to transfer the early vote and election day totals into WinEDS.

The "*Release Level 4.2"* voting system consists of:

Election Administration:

- WinEDS application, version 2.6.220
- WinEDS Database Setup, version 2.6.220a

- AVC EDGE OCX, version 1.1.8.1
- AVC EDGE Cartridge Reader / Programmer (Part No. 460-40070-00)
  - w/ COTS device driver as indicated on the product label or release note
- COTS software
  - Microsoft Visio 2000 with SR1 or later
  - Microsoft Office 2000 with SR1 or later
  - Microsoft SQL Server 6.5 with Service Pack 5a (version 6.50.416)

Precinct Count (one or more of the following):

- AVC EDGE I (15" DRE)
  - w/ firmware version 4.2
- *Auxiliary equipment for EDGE I:*
  - AVC EDGE Card Activator, version D
    - w/ firmware version 4.32
  - AVC EDGE Audio Component, version D

Central / Absentee Count (one or more of the following):

- Optech IV-C, Model 400-C, hardware version 2.03
  - w/ OCX Version 1.001
  - w/ firmware version 1.02B

ELECTION SETUP:

The March 7, 2006 elections utilized both paper ballots and direct recording electronic (DRE) ballots. Absentee and provisional voters used paper ballots while early voters and election day voters utilized the Edge I DREs. There were three ballot styles, one for each of the municipal elections (Pinellas Park, Largo, and Palm Harbor). There were 3 early voting sites and a total of 36 election day polling locations that accommodated 85 precincts: 25 precincts in Pinellas Park, 38 precincts in Largo, and 22 precincts in Palm Harbor. The total number of Edge I DREs for the March 7, 2006 election was 425: 125 DREs assigned to Pinellas Park; 121 DREs assigned to Largo; and 170 DREs assigned to Palm Harbor with 3 Edge I DREs at each of the three early voting sites. Each polling location included two AVC EDGE Card Activators with one of these at each site serving as a backup. The central tabulation site has two Optech 400-C central count tabulators for high speed scanning of absentee and provisional ballots. However, only one Optech 400-C, identified as "Scanner 2" was used for these elections. The central tabulation site includes a WinEDS server along with a mirrored backup server, Dell OptiPlex GX 400 tower units, and Dell Latitude laptop computers serving as the WinEDS workstations. Access to the administrative computers is restricted to users with administrative rights. Access to the laptop workstations is limited to user rights.

Audit Plan:

The audit plan that the Bureau provided to the supervisor of elections included the following activities:

Tuesday, April 11, 2006

Opening meeting

Precinct Count Examination
- Obtain the following:
  - Precinct list
  - List of voting devices at each precinct
  - Zero and results tapes for all the voting devices
  - Number of spoiled ballots that occurred at each precinct, if any
  - Number of provisional ballots issued at each precinct, if any
- Examine precinct voter rolls
  - Manually count number of voters that voted
- Examine precinct zero tapes
  - Verify counters are zero
    - Note the time/date stamp & signatures
  - Randomly select two contests and one candidate from each contest
- Examine precinct results tapes
  - Verify the public count from the protective counts
    - Note the time/date stamp & Signatures
  - Randomly select at three DREs and obtain the ballot image reports
    - Manually count the number of votes for the randomly selected contest/candidates
    - Manually count the number of ballots cast
    - Compare these manual counts to the results tapes
  - Sum the total ballots cast from the results tapes for each precinct
- Sum the total number of ballots issues/cast for each precinct
- Compare the ballot totals with the totals from the precinct voter rolls
- Repeat the above for early voting, if applicable

Central Count Examination, by precinct if time permits
- Manually count the number of acceptable absentee ballot signatures
- Manually count the number of acceptable absentee ballots
- Compare the signature count to the absentee ballot count

WinEDS Examination (Part 1)
- Obtain a directory listing of the WinEDS server and at least one workstation
- Obtain a copy of the server and workstation registry
- Obtain a copy of any software/patches installed during election day or the day after, if any

Wednesday, April 12, 2006

WinEDS Results Examination
- Examine the precinct results reports
- Examine the manual count of the selected contest/candidates with the election night input
- Compare the precinct election day totals, provisional totals, and absentee totals

WinEDS Examination (Part 2)
- Perform a SHA-1 hash of the installed server and workstation software

WinEDS Examination (Part 3 - To be performed at DOE/Tallahassee)
- Compare the hash message with the hash message of the State certified software
- Examine the registries
- Verify the installed software with the certification

Security Procedures and Work Instructions
- Examine the security procedures
- Examine the work instructions

Examine the conduct of elections report
Compare the conduct of elections with the documented procedures/work instructions
Examine the activities surrounding the resizing of the WinEDS database

Closeout Meeting

Friday, May 12, 2006, or sooner:

PREPARATION – Pinellas County Supervisor of Elections:

Prior to the audit team's arrival, the elections staff for Pinellas County prepared a compilation of reference material to facilitate the audit. This compilation included the following items:

- Three spreadsheets that tabulated the three municipal elections vote totals as obtained from each voting device's results tape.
- Letters to the Division of Elections including correspondence with Ms. Gyan Hardman.
- Absentee ballot summary including the ballot reconciliations, canvassing board's review, and the final absentee ballot report to the canvassing board.
- Provisional ballot summary including the ballot reconciliations, canvassing board's review, and the final provisional ballot report to the canvassing board.
- Security procedures revisions dated January 20, 2006.
- Election night procedures describing activities for the Poll Worker Department, Absentee Ballot Department, Operation – Check-in Board, Tabulation Department, Provisional Ballot Board, Briefcase/Accordion File Check-in, and Ballot Duplication.
- Vote reconciliations including the three municipal Official Final Results published on March 11, 2006 and the March 7, 2006 election night unofficial results as released at 7:12 PM, 7:24 PM, 7:45 PM, 7:58 PM, 8:19 PM, 8:30 PM, and 10:36 PM. Also included in the vote reconciliation section is the "Statement of Vote" report broken down by precinct that provides the turnout, undervote and overvote numbers for election day and early voting along with cumulative turnout, undervote and overvote numbers for absentee and provisional voting.
- Turnout and Voter History including tabulation count, an automated scan count, and a manual count for precinct and early voting sites.
- Conduct of Elections Report, dated March 11, 2006.

Examination of voter history:

The elections staff prepared a tabulation of the signatures by precinct using two methods: 1) Rocket Scan and 2) manual count. The elections staff then compared these counts to the public counts for each polling location. In addition, the audit team obtained the precinct registers and manually counted each signature and verified that the election staff's manual count matched the audit team's manual count. However, there were a number of cases where the count could have differed by one or more voters. That uncertainty in the count usually resulted from the lack of a clear indication that the voter had signed the register. This typically occurred where the signature appeared more as a deletion (i.e., the appearance of a scribble intended to mean a deletion of a mark) or a short squiggle. In these cases, it was unclear whether to count the signature or to treat it as a scratch out or an

inadvertent mark. Additionally, manual counting of signatures was prone to a miscount. There were a couple of occasions where the audit team had to recount the signatures to arrive at a repeatable number. It is quite obvious from this effort that the manual count of signatures is labor intensive and subject to uncertainty and error. The error can be reduced by repeated counting, but the uncertainty to count a signature or not is not so clear cut with the sign-in process currently in use in Pinellas County. Nevertheless, at 22 of the 36 election day polling locations the public count matched the number of voters that signed the poll books. Eight election day polling locations indicated that the public count was one less than the manual count of the signatures, 4 polling locations had 2 more signatures than the public count, and 2 polling locations had 2 less signatures than the public count. The public count at the early voting sites matched the early voting certificate signatures. The audit team also manually counted the signed absentee envelops and confirmed that this count matched the number of accepted absentee ballots.

The Pinellas County elections staff must develop a more robust and reliable method for capturing voter history at the polling locations. It is suggested that the elections staff consider enhancing poll worker training as to the importance for identifying signatures that are to be counted and to develop a methodology for identifying the marks that are to be counted as signatures. This training should emphasize to the poll worker the reason for capturing these signatures and the need to annotate in some manner those marks that are not to be counted as a voter's signature. The elections staff could consider a check that would occur periodically when the polls are open, and would entail a quick reconciliation of the signature count against the public count. The chief clerk could also perform some form of a quality control check by periodically examining the precinct register. The elections staff could also consider other methods such as signature authorization slips or a self-stick label to be placed next to each voter's signature by the poll worker, but these methods may not be suitable for use with the Sequoia voting system or during heavy voter turn-out. The improvements for capturing voter history is left to the elections department to evaluate the most appropriate and accurate methodology for their system.

Examination of precinct zero and results tapes:

The audit team obtained the zero and results tapes for each Edge I DRE used in the March 7, 2006 elections. As per common practice, the poll worker does not remove the zero tape from the Edge I DRE until after the results tape is printed, thus producing one continuous tape. The audit team examined each tape to verify that the zero tape indicated the counters were set to zero when the polls were opened. The audit team also examined the results tape's public count and protective count along with the time and date that the polls were closed. The difference between the results tape's protective count and the zero tape's protective count should equal the results tape's public count. The audit team verified that the public count matched the difference in the beginning and ending protective counts. However, one Edge I (Sn# 10573) did not have a zero tape and another Edge I (Sn# 12577) did not have a results tape due to paper jams. The audit team obtained the event log reports for these DREs and manually counted the number of votes cast and confirmed that the public count is accurate. Neither of these Edge I DREs were reported on the Call Log. The audit team also noted that Edge I Sn# 12382 had a damaged zero tape and Sn# 12398 had a partial results tape. The audit team considers this to be a significant weakness in the election staff's procedures and poll worker training. It is fundamentally important to ensure the integrity of an election by obtaining these printouts and ensuring that the required information is present, and readable with the correct time/date stamp. It is

strongly suggested that poll worker training include a "hands on" activity that examines a poll worker's response to simulated poor printing and a paper jam during both poll opening and closing.

Several Edge I DREs were noted to have a time/date set to +12 hrs. It is reasonable to assume that the individual setting the time did so in the 12 hr format without paying attention to AM / PM. In addition, the Call Log indicated that the same time/date problem existed for several of the card activators. This suggests that additional precautions need to be developed to ensure that the elections staff are setting the time and date in a consistent and accurate manner.

In any event, the audit team confirmed that the results obtained from the results tape matched the data that was uploaded into WinEDS via the results cartridge. The audit team did not find any evidence to suggest that the vote totals are in error.

Examination of central count system:

The audit team obtained directories from the following systems: 1) Dell PowerEdge 4400, property tag 98950, labeled Server 1; 2) Dell OptiPlex GX400, property tag 98956, labeled 153 98957; 3) Dell Latitude Laptop, property tag 9909, labeled 162 98980. Static election management system files from these computers were copied for comparison with the software held in escrow by the Division of Elections. That comparison using the SHA-1 hash confirmed that the files matched the files retained by the Division.

The audit team also examined the card activators from three voting locations: 1) Early voting card activator Sn# 5231, 2) Precinct 291 card activator Sn# 4247, and 3) Precinct 617 card activator Sn# 4277. Examination of these card activators revealed that they had the correct 4.32 firmware version.

Examination of WinEDS results:

The audit team used the election staff's spreadsheet to verify the vote count for each contest/candidate and referendum. The audit team compared 100% of the vote totals from the results tape to the vote totals contained in the WinEDS produced reports. The audit team confirmed the supervisor of elections reprocessed results and the official election results. The audit team did not uncover any evidence to suggest that these tabulations are in error.

Examination of WinEDS:

As noted earlier, the WinEDS election management software has remained unchanged since late 2002. The Bureau confirmed that the WinEDS software matches the software being held in escrow based on the SHA-1 hash of these items. The escrowed software is the witnessed compiled executables that were provided to the Division of Elections directly from the Independent Test Labs (ITA). Therefore, there is no evidence to support the claims that this voting system software was altered or updated. The anomaly that occurred during election night reporting was the result of the election database not being set large enough to accommodate the data obtained from the three elections. It appears that

the guidelines provided by the vendor in the "Advanced WinEDS Training Manual" for setting the available database size is not acceptable. The pre-tabulation database size was 530 MB and the original available database size was set at 430 MB, but the actual available size required should have been closer to 588 MB. There apparently are no procedures in place for setting a realistic available database size. One method is to set the available database size to be around double the pre-tabulation size. In any event, it should be noted that the recently certified version of WinEDS (release 4.3.320) eliminates the need to set this available database size. Thus, the root cause of this election night anomaly will be eliminated when Pinellas County updates their voting system to *"The AVC 'Edge' Voting System, Release Level 4.3.320*", certified January 31, 2006, certification # 0601SEQ-01.

The key issue described in the Gyan Hardman's report concerned the vendor's and the elections staff's inability to recognize a database size issue in a timely fashion. Item 1 in Gyan Hardman's letter makes reference to a backup plan. This suggestion does have some merit, but in this case switching to the mirrored backup system as suggested by Ms. Hardman would have produced the same result, since the available database size would have been set to the same value. The audit team does agree that the elections department should develop a generic recovery plan to address an orderly process for resolving unforeseen anomalies. Item 3 in Gyan Hardman's letter expressed information that was not correct. As stated in this report, the WinEDS election management system has not changed since it was first certified in 2002. There have been certified changes to this voting system, but the WinEDS element has remained the same. The audit team is unsure of the source for Gyan Hardman's confusion. Jim Armstrong, the elections staff's IT manager indicated that he had used the "update" term to refer to the database being updated with results from the processing of the Edge I cartridges. The update could also refer to the certified changes to the voting system that did not involve the WinEDS element. Item 4 in Gyan Hardman's letter made reference to code provided by Sequoia. The audit team examined the explanation provided by the supervisor of elections and concur that her statements answer the questions posed by Gyan Hardman. One final point regarding the Gyan Hardman report: There are several references to MySQL. The Sequoia voting system does not use MySQL for the database engine. This version of the Sequoia voting system is based on MicroSoft's SQL Server 6.5 with service pack 5a. The installed version is 6.50.416.

Examination of Edge I:

The audit team examined the "call sheets" for the three elections to ascertain the type of problems that were being encountered during the March 7, 2006 elections. The primary items of interest are the time and date being set 12 hours ahead of the actual time, indications of dirty voter cards, and printer jams. None of these items contributed to any anomaly that adversely affected the election results. However, the printer jams and the lack of poll worker training to ensure that zero and results tapes are available and useable is of concern.

The audit team randomly selected three Edge I DREs for further examination. The ballot images were obtained for Sn # 12452 that was stationed at Bible Baptist Church in Palm Harbor; Sn# 12410 that was located at the Largo Community Center; and Sn# 12636 that was used at the Mainlands in Pinellas Park. The ballot images are contained in the "Official Full Audit Trail Report" obtainable for each Edge I. In addition to these reports,

the audit team also examined the "Official Blank/Under Votes Report" for these DREs. Sixty-one votes were cast on Sn# 12410, 65 ballots on Sn# 12452, and 136 ballots on Sn# 12636. The team verified the vote totals contained on the results tapes matched a manual count of the ballot images and reconciled with the blank/undervote reports.

The audit team also examined several static files contained on the compact flash memory card located in each of these Edge I DREs. A SHA-1 hash of these files matched the hash fingerprint of the files retained by the Division of Elections. Therefore, it is the audit team's opinion based on this small random sample that there is no evidence to suggest that the Edge I DREs produced erroneous results. The scope of this audit focused on the observed anomaly that occurred with the election night results tabulation within the WinEDS election management system. From that perspective, the audit team has not uncovered any evidence that this tabulation, once the database was resized, was in error.

Examination of Security Procedures and Work Instructions:

As noted above, Gyan Hardman's suggestion that there should be a recovery plan has merit and should be given consideration by the elections staff. Likewise, the audit team believes that certain task specific work instructions are needed to ensure that the time/date are consistent and accurate, and the printers are properly setup/maintained to minimize the occurrence of paper jams. Along this line, the poll workers should undergo enhanced training to ensure that they know how to handle a paper jam and what should be done if a paper jam prevents the creation of a zero and/or results tape.

Conclusion:

The audit team has concluded that the March 7, 2006 Pinellas County municipal elections were conducted in a fair and accurate manner. The database size anomaly that occurred during election night reporting did not bias the reported results. Furthermore, the supervisor of elections and her staff conducted appropriate follow-up actions to ensure that these elections were reported correctly. It is the audit team's opinion that there is substantial evidence to support the certified results and no evidence to support any claim that the elections' results are suspect.

However, the audit team acknowledges that there are several areas that offer opportunities for improvement. These include developing procedures or work instructions to address processing errors, to ensure that the tabulation equipment are set with the correct time/date, and to provide a recovery method should a printer jam prevent a zero or results tape from being printed. In addition, the elections staff should consider developing a more robust and reliable method for capturing voter history.

Exhibit Log (Items available upon public record request (PRR) except where noted):

1. Event Log Report Sn# 12410
2. Event Log Report Sn# 12452
3. Event Log Report Sn# 12636
4. Official Full Audit Trail Report Sn# 12452
5. Official Full Audit Trail Report Sn# 12636

6. Official Blank/Under Votes Sn # 12636
7. Ballot Definition Report Sn# 12636
8. Official Blank/Under Votes Sn # 12452
9. Ballot Definition Report Sn# 12452
10. Official Blank/Under Votes Sn # 12410
11. Ballot Definition Report Sn# 12410
12. Official Full Audit Trail Report Sn# 12410
13. Event Log Report Sn# 12603
14. Event Log Report Sn# 12577
15. Event Log Report Sn# 12356
16. Official Election Results Report Sn# 12356
17. Event Log Report Sn# 12360
18. 3 ½" Floppy Disk for 400C Software *(This item is not available via PRR)*
19. Copy of Sequoia Software on CD *(This item is not available via PRR)*
20. Machine level files CD *(This item is not available via PRR)*
21. Event Log Report Sn# 12577, duplicate printout for exhibit 14
22. Event Log Report Sn# 12574
23. Event Log Report Sn# 12573
24. Official Election Results Report Sn# 12382, dated 3/9/06
25. Official Election Results Report Sn# 12382, dated 4/11/06
26. Event Log Report Sn# 12382
27. Event Log Report Sn# 12394
28. Event Log Report Sn# 12393
29. Event Log Report Sn# 12392
30. Event Log Report Sn# 12385
31. Memorandum from Jim Armstrong
32. Advance Training WinEDS CD *(This item is not available via PRR)*
33. Letter from Leonard Schmiege
34. Public Records Request from Leonard Schmiege (sent to Ms. Maria Matthews)
35. Pre-Tabulation database CD *(This item is not available via PRR)*
36. Call Log for touchscreens
37. Paul Lux's notes
38. Attendance sheet – April 11, 2006
39. Attendance sheet – April 12, 2006