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Re: Election System & Software ("ES&S")-Unity Election System v 2.4.3 consisting of the following changes; the Ballot Definition and Layout-Hardware Programming Manager v5.0.3.0c; Election Day Software-Data Acquisition Manager (DAM) v5.03.1b and Election Reporting Manager v6.4.3.0a; Tabulators-iVotronic v8.0.1.02, PEB v1.07 and Model 150/550 Central Count v 2.1.1.0a; Data Acquisition Manager-Modem Manager v5.0.2.1a, DAM Client Reader v 5.03.0a and DAM Client Sender v5.02.1a (collectively the "Revised Voting Systems"); AutoMark Voter Assist Terminal v. 1.0.121 ("VAT"), AutoMARK Information Management System v. 1.0.2 ("AIMS") and MDB v. 1.0.40 (collectively "AutoMARK").

Dear Ms. McGeehan:

Pursuant to my appointment as an examiner under *Chapt. 122, Texas Election Code*, I examined the referenced software and hardware as presented by ES&S for examination. I examined the Revised Voting Systems with respect to Texas Election Law and procedure on May 26, 2004 and January 6, 2005. I made a brief examination of AutoMARK with respect to the function of the VAT on January 6, 2005.

***AutoMARK Discussion and Recommendation***

The AutoMARK system is primarily designed to be used by voters that need assistance due to a physical limitation. AIMS and the VAT function in a manner to permit the VAT to recognize a large number of different paper ballot styles providing different races and propositions for the same election. Upon the ballot being inserted in the VAT the voter can electronically select the candidate of choice or the measure and VAT will cause the proper mark to be made on the ballot for the selected candidate or measure. VAT functions equally with ballots providing for an oval shaped mark or an arrow.

AutoMARK is only a ballot marking aide, and the Secretary's staff examines and certifies voting systems and equipment for use by

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physically impaired voters. As a result, my review and examination of AutoMARK was limited to observing the operation and function of the VAT in a voting environment using AIMS, casting ballots, checking the accuracy of the electronic marking of selections, and tabulating such ballots on tabulation equipment provided by ES&S.

AutoMARK recognized the ballots presented for voting and marked the appropriate spaces provided on the paper ballot for the candidates selected by the voter. Those paper ballots were subsequently tabulated successfully on certified ES&S tabulation equipment. No detailed or indepth presentation was made and no review or examination of the software, etc. was made. Further, except for the touch screen, no review or testing of any part of the device or system designed to aide and assist a physically impaired voter was made. I did not observe any function or problem during my limited examination. Based on that limited examination, subject to the thorough examination and report by your staff, I recommend the Secretary consider the AutoMARK for certification for use by voters if and as recommended by the staff of the Elections Division.

*ES&S Revised Voting Systems.*

All the equipment and software collectively referenced above as the Revised Voting Systems, are increments of the Unity Election System v2.4.3. And, these may be separated into modifications made to the Ballot Definition and Layout function, the Election Day tabulation and reporting functions, the listed tabulation and ballot scanning devices, and the election day data acquisition and report function.

The Unity Election System v. 2.4.3 functions with all of the ES&S product line referenced above, and the other previously certified ES&S programs and equipment. In that respect, the testing of the Revised Voting Systems was divided roughly into two parts. One part, or grouping, consisted of the tabulation equipment, i.e. the iVotronic v8.0.1.0r, PEB v1.07 and the Model 150/550 Central Count v 2.1.1.0a. The functions of the Ballot Definition and Layout-Hardware Programming Manager v5.0.3.0c are also particularly important with respect to the function of the tabulation devices. The second grouping was election central and the central count and reporting of the election results from the tabulation devices. The Election Day Software-Data Acquisition Manager (DAM) v5.03.1b, the Election Reporting Manager v6.4.3.0a, the Data Acquisition Manager-Modem Manager v5.0.2.1a, the DAM Client Reader v 5.03.0a and the DAM Client Sender v5.02.1a are all essential parts of the counting and reporting of votes on election day. On January 6, 2005, although ballots were again cast, tabulated, and a mock election successfully completed, the examination focused on the issues of the real time audit log and automatic zero out of PEBs, iVotronics, etc. when the polls were opened.

This report is concerned solely with the ability of the Revised Voting Systems, and each individual listed module thereof, to function individually and with other certified components of the Unity Election System in compliance with Texas Election Law. This report is based on the presentation by ES&S and the testing completed by the examiners on May 26, 2004 and on January 6, 2005. ES&S gave presentations on both such dates, and the casting, tabulation and reporting of votes, together with the remainder of the examinations, did not evidence any function that was not in compliance with *Chapt. 122, Texas Election Code*, for use in an election, other than the issues noted in the next paragraph.

*Issues.* The vendor presentation and discussion concentrated on two issues. (1) An automatic zero out of precinct voting systems, e.g. the PEBs and iVotronic, at the opening of the polls; and (2) the sufficiency of the real-time audit log at election central.

#### *Auto/Zero Discussion.*

It is clear from the presentations and discussions with the vendor that ES&S will not voluntarily provide for an automatic zero out of the precinct voting systems, e.g. iVotronic and the PEBs, prior to opening the polls for voting. Although generally accepted industry practice, ES&S is convinced the Revised Voting System is superior and that it will be less superior if a requirement for a zero total tape is made an automatic function. The value of an auto/zero feature is the subject of debate and apparently arguable. It is not a statutory requirement. *Sec. 122.032(b), Texas Election Code*, however, gives the Secretary authority to impose such requirements if needed. I recommend the Secretary consider if this should be a requirement, and, if so, added with the next version of Unity.

#### *Real-time audit log and DAM Discussion.*

The Election Reporting Manager ("ERM") was demonstrated to show that when the audit log printer is turned off or disconnected ERM is "locked" and cannot function until the real-time audit log is again fully functional. When ERM is exited that action is also now recorded immediately. ES&S also represented there is no way for any operator to circumvent the ERM lock when the printer is off.

The remaining point regards the fact that regional sites can continue to report and download results and tabulations to the Data Acquisition Manager ("DAM") when the audit log is not functioning. A sub-part of this point is that the real-time audit log printer does not log downloads to the DAM, it logs only transfers of data from DAM to the ERM. The vendor's position is that the DAM is not part of tabulation and therefore a real-time log is not required. However, DAM receives, via modem transfers, downloads of precinct

tabulations from regional centers and transfers these to ERM. As stated in my last report on the Revised Voting System:

"Based on prior decisions, the election system records and provides sufficient information to meet the Election Code requirements for auditing the election. However, the audit trail content for the Revised Voting System can be materially improved. My comments regarding the audit trail and recording of pertinent information are as follows: (1) no precinct machine number is recorded on the electronic or paper log when tabulated votes are forwarded to election central by modem; (2) although available, the PEB number is not required to be reported on the election central log; (3) when the election reporting manager ("ERM") or real-time audit log printer is turned off, precincts can continue to be reported via modem, although DAM prints such items from its internal log when ERM or the log printer is turned back on; and (4) if a regional site logs on to report via modem, a second (bogus) site can also log on and attempt to report at the same time, without material attention when either ERM or the log printer is turned off."

I have concerns remaining regarding DAM and the audit log. The log does not record downloads of data from a regional site to DAM, nor any attempts to download data from any site to DAM. Rather, the audit log only records transfers to ERM of data previously accepted by DAM. And, DAM will continue to receive tabulations from the regional sites, and the log will only print the basic information on each of such downloads when the audit log and ERM again become functional. As configured, it appears the real time audit log will never record any bogus attempts to download data to ERM via DAM, unless Dam accepts the download as valid. In that case, i.e. acceptance and transfer of bogus data either in the first instance or as a replacement/update of previously accepted data, and only then would the real-time audit log record the event. As presently configured, there will be no opportunity for readily observable red flags to appear and be observed as a result of the real-time audit log recording unsuccessful or foreign attempts to download data.

While these devices individually function so as to meet the requirements of the Election Code, the real-time audit log printer does not meet the requirements of *Chapt. 122, Texas Election Code*. The tabulation of votes begins at the precinct, continues at the regional sites, and then continues at election central when tabulated results are downloaded to the DAM for transfer to the ERM. Modification of the real-time audit log to report all transfers to and from DAM is preferred. However, since the transfer of data to the ERM is almost instantaneous when the audit

log printer is online, substantial gain could be achieved by the DAM automatically shutting down and remaining locked when the real-time audit log printer is turned off or is not functioning.

Contrary to the vendor's position, DAM appears to be an essential part of the tabulation process an election in a large geographic area. The tabulation begins at the precinct level, advances to a regional site, continues with the transfer of tabulations from the regional site to ERM via the DAM, and is completed by ERM. DAM accepts, temporarily stores and transfers tabulations from one electronic device to another, comparably an election judge only carries that electronic device or a stack of paper ballots to ERM.

### Recommendations

**AutoMARK.** AutoMARK, consisting of the AutoMark Voter Assist Terminal v. 1.0.121 ("VAT"), AutoMARK Information Management System v. 1.0.2 ("AIMS") and MDB v. 1.0.40, collectively provides a device to electronically mark ballots which is designed for use by voters requiring some accommodation by reason of a physical impairment. The basic/fundamental functions of AutoMARK appeared to conform with the requirements of the Texas Election Code. However, the function and utility of AutoMARK for its intended purposes, and its compliance with the Texas Election Code, should be determined based on the required reports made by competent laboratories and the full examinations made by your office and the Elections Division.

**Unity Election System v2.4.3.** It appears adequate procedures can be followed to assure the Unity Election System v 2.4.3 complies with the Election Code, and, except as noted below, I recommend the constituent parts of that system (collectively defined above as the "Revised Voting Systems") be certified by the Secretary as meeting the requirements of Chapt. 122, Subchapt. A, Texas Election Code.

**Automatic Zero on Opening Precinct for Election.** Unity v2.4.3 appears to provide user instructions to satisfy the literal requirements of the Election Code with respect to the process and procedures for opening the election. If all recommended procedures are followed, the iVotronics and PEBs are zeroed and a zero total tape is produced prior to the polls being opened. This should be made an automatic function for an electronic system, in order to prevent problems as occurred in a prior examination. ES&S believes this would be detrimental to the value and use of Unity v2.4.3.

I recommend the Secretary review and consider this as to the efficiency of operation and use of an electronic voting system, and as to safety from fraudulent or unauthorized manipulation. Under the authority of Sec. 122.001(c) and Sec. 122.032(b), should rules be adopted in furtherance of Sec. 122.001(a)(3), to require an

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automatic zero out of voting stations and devices for electronic voting systems when voting stations are opened for voting. I recommend the Secretary adopt such rules and requirements.

*Real-time audit log.* The DAM Modem Manager v5.0.2.1a, the DAM Client Reader v 5.03.0a and the DAM Client Sender v5.02.1a, jointly receive, store and send reported tabulations to ERM v6.4.3.0a. They are, effectively an electronic door to the ERM, and are a point of risk and exposure. The risk may not be high, and reasonable electronic safeguards may be in place. However the risks and opportunities for detection and correction would be greatly improved with modification of the real-time audit log. Accepting tabulation reports by modem is a point of exposure. The acceptance point is physically within election central, DAM is a necessary part of the tabulation process (if modems are used), and DAM receives, stores and transmits tabulated results to ERM.

I recommend the Data Acquisition Manager-Modem Manager v5.0.2.1a, DAM Client Reader v 5.03.0a and DAM Client Sender v5.02.1a not be certified until such time as they are modified to automatically shut down and remain locked at all times when the real-time audit log printer is not operating. I recommend that Unity Election System v 2.4.3 and the Election Reporting Manager v6.4.3.0a not be certified for use with the DAM Modem Manager v5.0.2.1a, DAM Client Reader v 5.03.0a or DAM Client Sender v5.02.1a, at this time.

Sincerely,



Barney L. Knight