

ORIGINAL

THE STATE OF SOUTH CAROLINA
In The Supreme Court

APPEAL FROM
The South Carolina Election Commission

Appellate Case No. 2012-213679

RECEIVED

FEB 5 2013

S.C. Supreme Court

Michael Letts, ... Petitioner,

v.

Richland County and the Board of Elections and Voter Registration of
Richland County, ... Respondents.

In Re: Richland County Sales Tax Referendum Questions 1 and 2

PETITIONER'S APPENDIX

Petitioner, by his undersigned attorneys, submits this Appendix of his Exhibits to
his Petition for a Writ of Certiorari.

February 4, 2013

THE CARPENTER LAW FIRM, PC

James G. Carpenter, S.C. Bar No. 1136
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819 East North Street
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Attorneys for Petitioner

A

Lillian McBride
Director
Richland County Election Commission
2020 Hampton Street
Columbia, SC 29204-1002

Re: Richland County Sales Tax Increase Referendum Questions 1 and 2

Dear Ms. McBride

Please accept this letter as an Election Protest on behalf of myself and the Citizens Committee for New Elections in Richland County. We protest the November 6, 2012 Election for the Richland County Sales Tax Increase Referendum, Questions 1 and 2. We ask that the Commission order a new election on the following grounds:

- The County Election Commission made a decision regarding the number of voting machines to place in each precinct which was not in accordance with state law.
- Specifically, the County reduced the number of voting machines from the 2010 general election, which in many cases violated the law requiring one working machine per 250 registered voters at each precinct. For example, the Dutch Fork Middle School polling site, which had ten voting machines in the 2010 general election, had just four machines in November 6, 2012.
- This decision by the County Election Commission resulted in long lines and excessive wait times, and caused many people to be unable to participate in the process. This is due to the fact that many citizens have pressing obligations that don't permit them to stay at a polling location for hours at a time.
- The three above points are not reasonably in dispute, according to my own observations.
- Further, the fact that the Election Commission's decision regarding the number of voting machines at each precinct is unlawful, and therefore the election results are not valid.

The above reasons are the grounds for our protest. However, please consider these other, additional points:

- There is ample evidence to suggest that the lower turnout could have possibly impacted one or more election outcomes:
 1. Richland County's voter turnout percentage typically exceeds statewide turnout. However, on Election Day 2012, **Richland County had the second-lowest voter turnout in the entire state.** (Only Marlboro County had lower turnout.)
 2. While nearly 70 percent of all registered voters in South Carolina cast ballots, here in Richland County it was just 65 percent.
 3. Had Richland's turnout been equal to or greater than the statewide turnout percentage, that would have been AT LEAST an additional 8,652 voters - enough to have possibly made a difference in close elections such as the referendum on the one-cent sales tax increase.
- There were two different styles of paper ballots printed and distributed. It is unknown why or what effect this may have had.

- Many voters say they noticed that their votes were changed by the voting machines. This seems to be most notable among voters who tried to vote straight-party and then vote for a candidate of a different party. There have been numerous reports of voters noticing that their votes had their votes “corrected” back to straight-party.

Thank you,
Michael Letts
2 Stagbriar Ct., Columbia SC 29229
803-556-2528

B

The County of Richland



Office of the County Attorney

November 29, 2012

VIA US MAIL

Richland County Election Commission
Lillian McBride, Director
2020 Hampton Street
Columbia, South Carolina 29204

Re: Petition to Intervene
Protest of November 6, 2012 Penny Sales Tax Referendum

Dear Ms. McBride,

Please find enclosed Richland County and Central Midlands Regional Transit Authority's Petition to Intervene and Response to protest in the above action.

With kindest regards,

RICHLAND COUNTY ATTORNEY'S OFFICE

By: Elizabeth A. McLean
Elizabeth A. McLean
Assistant Richland County Attorney

Enclosure

Cc: Michael Letts

Lillian McBride, Director
Richland County Election Commission
2020 Hampton Street
Columbia, South Carolina 29201

AMENDED PETITION TO INTERVENE AND RESPONSE TO PROTEST

This petition is filed on behalf of Richland County, South Carolina and the Central Midlands Regional Transit Authority ("CMRTA").

1. On November 6, 2012 a referendum was conducted in Richland County, South Carolina relating to the Imposition of a One Percent (1%) Sales And Use Tax, Subject To a Referendum, Within Richland County Pursuant To Section 4-37-30 of The Code of Laws Of South Carolina 1976, As Amended;

2. Based upon official election results it appears that the results of the Referendum were as follows:

Voting in Favor: 80,412

Voting Against: 73,821

3. A protest regarding the referendum has been filed with the Richland County Election Commission protesting the results of the Referendum upon the grounds that one voting machine was not provided for each 250 registered voters in one or more precincts and, as such, the machines were not placed according to state law and the election is, therefore, invalid; and that the long lines and excessive wait times caused many people to be unable to participate in the process.

4. Richland County, as the taxing authority imposing the tax and entity that shall be collecting and using the proceeds from the tax provided for in the Referendum, has an interest in the outcome of the Referendum and the above-referenced protest.

5. The CMRTA, which has responsibility for providing mass transit services in Richland County, has an interest in the outcome of the Referendum and the above-referenced protest.

6. Richland County and the CMRTA respectfully request that they be allowed to intervene in the protest and to fully participate in any proceedings relating to the protest.

7. Richland County and the CMRTA respectfully request that the protest be denied upon the grounds that while technical irregularities may have occurred during the election, an election should not be set aside unless the protestor can prove that the matters complained of were sufficient to change the outcome of the election.

8. Richland County and the CMRTA reserve the right to supplement this response or raise any additional arguments at any appropriate time.

November 29, 2012

Respectfully submitted,

Central Midlands Regional Transit Authority and
Richland County, South Carolina

By: Elizabeth A. Miller, on behalf of Helen T. McFadden
Helen McFadden, Esq.
Law Office of Ronnie A. Sabb
215 W. Thomas St.
Lake City, SC 29560
843-374-1628
843-374-1707 (fax)
ATTORNEY FOR INTERVENORS,
RICHLAND COUNTY AND CMRTA

C

Mr. Billy Way, Jr.
Chairman
S.C. Election Commission
2221 Devine Street, Suite 105
Columbia, SC 29205

Re: Richland County Sales Tax Increase Referendum Questions 1 and 2

Dear Mr. Way,

Attached, please find the original and five (5) copies of an Appeal regarding the matter of the Richland County Sales Tax Increase (Questions 1 & 2) of which I am the protestor/appellant.

Also, please note that I request a de novo hearing by the State Board of Canvassers and the State Election Commission pursuant to Section 7-17-70 of the S. C. Code of Laws

Thank you,

Michael Letts
2 Stagbriar Ct.
Columbia, SC 29229
803-556-2528

cc: Elizabeth A. McLean, Assistant Richland County Attorney, via U.S. Mail

cc: Helen McFadden, Attorney for Intervenors Richland County and Central Midlands Regional Transit Authority, via U.S. Mail

APPEAL

FROM: RICHLAND COUNTY BOARD OF CANVASSERS AND RICHLAND COUNTY BOARD OF ELECTIONS

TO: STATE BOARD OF CANVASSERS AND STATE BOARD OF ELECTIONS

As protestor in the matter of the November 6th Richland County Sales Tax Referendum (Questions 1 and 2) I appeal the decision of the Richland County Board of Canvassers and the Richland County Board of Elections on December 3rd on the following grounds:

1. The members of the Richland County Board of Elections failed to recuse themselves on Monday, Dec. 3, as I had requested. I made this request because each member of the Board had a hand in the operation of the election agency, and by hearing the case themselves they essentially were asked to be the judges of their own failure to follow the law. Instead of recusing themselves, the Board members chose to conduct the hearing themselves, and it's reasonable to question whether they conducted the hearing impartially.
2. In opening remarks at the Dec. 3 hearing, the acting Board Chairman erred by improperly and unfairly indicating that the hearing would be limited to consideration of whether there were "irregularities." However, the basis for our protest was NOT that there were irregularities, but that violation of the state statute caused the election to be invalid because it inhibited citizens' ability to exercise a Constitutional right.
3. At the end of the Dec. 3 protest hearing, the acting chair of the Richland County Board of Elections referred to the improper and unfair guidelines he established in his opening remarks, and asserted that my failure to follow those improper and unfair guidelines were a criteria in denying my protest. As the guidelines set forth in his opening remarks are not in accordance with state law, a new hearing is in order.
4. The Board of Elections held our protest hearing on Monday, Dec. 3, with full knowledge that important facts we needed to make our case were not available to us. Those facts weren't made available until Thursday, Dec. 6, when an attorney hired by the Board of Elections released a report on his "fact-finding" investigation. For example, during the Dec. 3 hearing, the director of the elections agency declined to say how many voting machines were used on Election Day, citing the pending report. Holding the hearing before the report was released inhibited our ability to make our case; it inhibited our ability to compare the number of machines required by law and the number of machines actually used.
5. Further, the report issued by the Board's attorney refers to "the actual distribution of 577 voting machines." The report later states that, by the end of Election Day, between 627 and 629 machines had been used. The report further states that around 980 machines were required under the statute. Had only a few polling sites been short of the required number of machines, or had the difference between the required number and the number actually provided been much smaller,

perhaps it would constitute an “irregularity.” But the shortage of machines was pervasive, making the problem more than a mere “irregularity.”

6. The Board of Elections disregarded a statute (*South Carolina Code 7-13-1680. Number of voting machines; type and use; repair; custody*) which requires one voting machine per 250 registered voters to be placed at each voting precinct.
7. The Board’s disregard of the state statute resulted in long lines and excessive wait times, and caused many people to be unable to exercise their Constitutional right to vote. This is due to the fact that many citizens have pressing obligations that don’t permit them to stay at a polling location for hours at a time. This point is not reasonably in dispute.
8. This is not about mere “irregularities.” This protest is about the disregard of a state statute which caused people to be unable to exercise their Constitutional right to vote.
9. There is ample evidence to suggest that the lower turnout impacted one or more election outcomes:
 - a. In 2008 and 2010, Richland County's voter turnout exceeded the statewide average. However, on Election Day 2012, **Richland County had the second-lowest percentage of ballots cast in the entire state, according to the S.C. Election Commission.** (Only Marlboro County had lower turnout, according to S.C. Election Commission figures.)
 - b. While nearly 70 percent of all registered voters in South Carolina cast ballots, here in Richland County it was just 65 percent, according to S.C. Election Commission figures.
 - c. Had Richland's turnout been equal to or greater than the statewide turnout percentage, there would have been AT LEAST an additional 8,652 voters. This shows the number of people who did not vote because of the excessive wait times is far greater than the vote margin in the tax increase referendum.
10. There were two different styles of paper ballots printed and distributed. It is unknown why or what effect this may have had.
11. Many voters say they noticed that their votes were changed by the voting machines. For example, voters who tried to vote straight-party and then vote for a candidate of a different party report noticing that their votes had their votes “corrected” back to straight-party. There were also numerous reports of votes against the sales tax increase being changed by the machines to votes in favor of the sales tax increase.

Pursuant to Section 7-17-70 of the S. C. Code of Laws, I request that the State Board of Canvassers and the State Election Commission hold a hearing de novo due to the absence of a fair and impartial hearing on Dec. 3. To that end, I reserve the right to ask this body to issue such subpoenas for the appearance of persons, documents and other evidence necessary for a fair, complete hearing.

In closing, I realize there is no specific remedy in law for the Board’s violation of the law. However, I would submit that you must provide such a remedy in order for Richland and all other South Carolina counties to see that these kinds of violations of state law will not be tolerated. The only sensible remedy is to nullify the results of the election and invite the county to hold the referendums again, if they choose. A billion dollars is far too important to allow its removal from the economy of the community on the basis of an illegal election.

D

STATE OF SOUTH CAROLINA
BEFORE THE STATE BOARD OF CANVASSERS

STATE OF SOUTH CAROLINA)
)
COUNTY OF RICHLAND)

Michael Letts)
)
)
 Appellant,)
)
 -vs-)
)
Richland County and)
Richland County Board of)
Canvassers)
 Respondents,)
)
IN RE: Richland County Sales Tax)
 Increase Referendum Questions)
 1 and 2)
_____)

ORDER

This matter came before the State Election Commission in its capacity as the State Board of Canvassers ("the Board") on December 17, 2012.

Two members of the State Board did not call for an evidentiary hearing. Accordingly, the State Board heard the appeal in its appellate capacity.

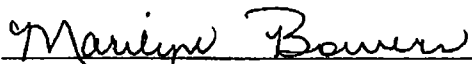
The State Board considered the transcript of the hearing below and arguments of counsel representing all parties. After entering into an executive session to receive legal counsel, the State Board returned to open session.

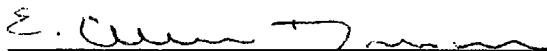
One member of the State Board moved to uphold the decision of the Richland County Board of Canvassers. This motion was properly seconded. The Chair called for

a vote on the motion. The vote was three in favor of denying the appeal and one against. The decision of Richland County Board of Canvassers is upheld. Accordingly, this appeal is hereby DENIED.

AND IT IS SO ORDERED.



Commissioner Billy Way, Chairman

Commissioner Marilyn Bowers

Commissioner E. Allen Dawson

Commissioner Nicole Spain White

December 17, 2012

E

**Initial and Limited Report on the Richland County
November 6, 2012 General Election**

December 6, 2012

Overview

I serve as outside legal counsel to the Board of Elections and Voter Registration of Richland County ("Board"). I was retained on the morning of Monday, November 12, 2012, by Richland County to represent the Board in pending legal matters. I was asked to immediately respond to an Order issued by the South Carolina Supreme Court on November 9, 2012. This Order stayed the lower court order and stopped the counting process that was underway at the South Carolina Election Commission of the votes cast in Richland County. Approximately twenty-four hours following engagement, with the active help of my law partner, Jo Anne Wessinger Hill, I submitted two filings on behalf of the Board with the South Carolina Supreme Court. Those filings requested that the Court issue an Order directing that all Richland County materials and voting data seized by SLED pursuant to an Order issued by Judge Manning on November 8, 2012, be returned to the Board and Election staff so that the required canvass of the vote in Richland County could be completed as required by state law. The second filing was a Motion to Dismiss the proceeding before the South Carolina Supreme Court due to the Stipulation of Dismissal by the South Carolina Democratic Party of the underlying circuit court action.

On the afternoon of Tuesday, November 13, the South Carolina Supreme Court issued an Order directing SLED to immediately return all seized Richland County voting materials to the Board and Election staff. In the following days, I assisted the Board in completing the preliminary canvass of the vote and assisted the Board in addressing issues of misaligned ballots

and counting newly discovered ballots. The certified election results for Richland County were submitted to the State Election Commission late on the afternoon of Friday, November 16, following the statutorily required hearing by the Board resolving (and counting) a few hundred challenged, fail safe and provisional ballots. During the very early days of my working with the Board, I was asked to begin examining election data and meeting with staff in order to prepare a comprehensive report to the Board addressing the problems related to the General Election.

On Thursday, November 29, 2012, the Board, at a specially-called meeting to address an Opinion issued by the Office of the Attorney General, requested that I prepare an initial and early written update on the status of my on-going interviews and data examination leading up to the November 6th General Election in Richland County. I was asked to provide the Board with my initial update no later than the afternoon of December 6th. This initial update is respectfully submitted in response to the Board's November 29th request. I continue to work on my comprehensive report which will address additional voting matters and provide suggestions for the Board to consider for upcoming elections.

Interviews of Director, Election Staff and Others

As a preliminary matter, I met and interviewed Lillian McBride on numerous occasions, as well as the Elections System Coordinator and all other election staff members involved in preparing for the November 6, 2012 General Election. Lillian McBride and her staff have fully cooperated with me and provided me with all materials and data I requested. In addition, I have also had both telephone and other discussions and a meeting with the former Election Director to discuss and explore election preparation procedures employed in previous elections. I wanted to independently determine if written procedures and checklists were created and utilized by the election staff in the preparation and conduct of prior elections. Those conversations confirm

that a specific election procedure guidelines addressing all steps necessary to prepare for an election does not exist as a single, discreet document.

The Director and Election System Coordinator met in June, 2012, to discuss the specific issue of the number of voting machines needed for the November General Election. The Election System Coordinator assigned the initial task of calculating the proper number of voting machines to a Voter Representative on June 21, 2012. That same day, the Precinct Coordinator, at the request of the Voter Representative, generated an election spreadsheet that included all precincts, current voter registration totals for each precinct and applied the correct statutory standard of one voting machine per 250 registered voters. That Precinct Coordinator spreadsheet calculated that a total of 864 voting machines would be needed for the General Election based on their current voter registration data. For reasons, I have still not been able to establish, the Voter Representative did not provide that voting machine spreadsheet with the calculated 864 voting machines to the Director or to the Election System Coordinator. Notably, in an email to the Election System Coordinator dated July 3, 2012, and not cc'd to the Director, the Voter Representative stated that the Director

“... gave me a revised list of the machines needed for the November 6 election. She got the number down to 605 machines....”

Exhibit A, email of Voter Representative.

The above email reflects the beginning step leading to a shortage of voting machines on November 6, 2012. Despite my best efforts, I have not located or confirmed the existence of any written directive issued by the Director or the Election System Coordinator establishing that 605 machines would be used on Election Day or how those 605 would be allocated to the 124 Richland County precincts. During my many meetings with the Director, I was repeatedly told

that she did not establish or approve orally or in writing regarding the use of 605 machines for the election as referenced in the July 3, 2012 email, instead of the 864 machines calculated last summer by the Precinct Coordinator. During several meetings and interviews with the Voter Representative, I asked for the "revised list of machines" he referenced in his July 3, 2012 email. An examination of office files did not yield a copy of the "revised list" of machines. The Director stated to me that she did not create a "revised list" of voting machines referenced in the Voter Representative email.

Please recall that during the Richland County Legislative Delegation meeting on November 26, 2012, Board Chairman Crum produced "Exhibit B" that included a hand-written list of red numbers on the right side of the printout. The total of the listed red numbers is 576. That number total of 576 closely matches the number of voting machines actually distributed to precincts prior to Election Day.

Exhibit B reflects a total internal office communication disconnect between the properly calculated voting machine requirements established in June and the actual distribution of 577 voting machines prior to the general election. So what happened? I now draw on my 35 years as an attorney, my many years of involvement in election disputes and challenges and on my personal staff interviews and examination of November election documents. The printed columns and numbers of registered voters in each precinct at that time -- with a printed column reflecting the proper application of the 1 to 250 ratio established by the General Assembly -- are the exact numbers of calculated voting machines produced by the Precinct Coordinator on June 21, 2012. The two hand-written columns guide me to the following conclusions: (1) The Voter Representative, who issued the July 3, 2012 email referencing 605 machines was also the individual staffer assigned the responsibility to arrange for a systematic delivery of voting

machines to precincts prior to the General Election. The Voter Representative assigned the zone numbers as a method of grouping voting machines for delivery to precincts located in the same general areas of Richland County. (2) I have concluded that the red numbers listed under the hand-written column entitled “# Machines” were numbers written by the Voter Representative and used for delivering voting machines to precincts. Ultimately, the issue of delivering the correct number of voting machines to each precinct was the responsibility of the Director and not a part-time employee.

The list of red numbers, which totals 576 and bears an almost direct relationship to voting machines actually delivered to voting precincts reflects the absence of a coordinated election preparation and procedure plan. This is no record of on-going and regular Director and staff reviews of voting machines allocations in the months and weeks leading up to the General Election despite the fact that the voter registrations for Richland County were continuing to increase right up to the day of the Election. It is hard to reach any other conclusion or judgment other than the fact that a part-time election staff worker was allowed to proceed and to establish the distribution of the number of voting machines without any system of checks and balances as part of the election preparation process. This situation reflects an unfortunate application of the concept of an assumption “someone else” had specifically approved a voting machine usage number well below the 864 machines total initially identified in June.

My interviews with the Director and other members of staff reflect an ongoing confusion as to which document identifying precincts, number of voting machines, and number of PEBs represented the controlling election planning document for purpose of making sure that the appropriate number of machines were prepared and ready for delivery to the precincts prior to the November 6, 2012 Election. While the Director and staff thought they were making

decisions in good faith, this confusion continued up to the November 6, 2012. The application of almost any procedure designed to review and follow up on on-going election preparations would have very likely identified this significant problem months before the election.

Outside Technical Assistance

As part of my assignment, I sought technical assistance from USC Professor Duncan Buell on election calculation procedures. He has established a strong reputation for employing computer programs designed to evaluate election data. He conducted several election data runs at my specific request. Professor Buell's help and willingness to engage in lengthy discussions and meetings with me to review and explore various aspects of election data provided me with an important outside perspective on the need to be cautious in drawing early and final conclusions about the specific election data we jointly examined. While I believe Professor Buell and I are in accord with our views and the weight we might attach to various election data that may be referenced in this Report, I am solely responsible for any misstatements or errors contained in this initial Report that may emerge in the coming days and weeks. I welcome any reviews, comments and specific criticism that my report might produce.

Voting Machine Shortages and Failures

As is well known, the General Election conducted in Richland County generated a great deal of public attention and on-going dismay as a result of the long waiting times reported by citizens seeking to vote on November 6, 2012. During the past weeks, I have spoken with many individual voters and with some poll workers. I have also examined emails and other materials sent to me from various sources. While many issues merit review and attention, I first address the various election staff decisions that led to a shortage of voting machines in various precincts and contributed to the long voting lines observed across Richland County.

First, let me state and confirm what the Board and our fellow citizens already know – Richland County did not deliver enough voting machines to the 124 voting precincts and that citizens are upset and suspicious of the voting results. If there were additional voting machines placed at each precinct as the voting began at 7 a.m., it would have helped to reduce the extended waiting times required to vote that more than a majority of the precincts experienced on Election Day. I also want to make clear that my on-going review of the General Election, with all the problems, continues to lead me to conclude that the results of the November 6th elections reflect the will of voters and that a new election, as some believe appropriate, is not required based on my application of state law and Supreme Court decisions. This initial conclusion is also supported by the election data when you compare the actual number of votes cast against the number of signatures by voters appearing at each polling location to cast their ballot. See Exhibit C.

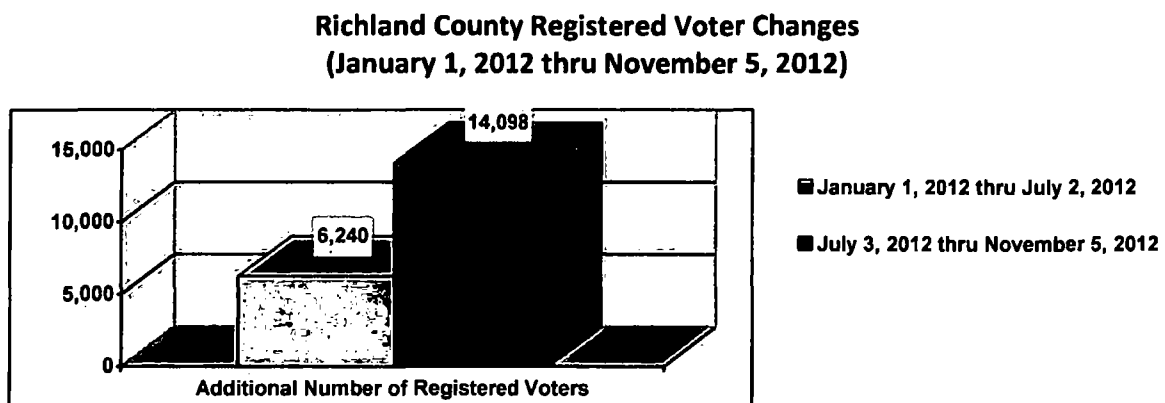
The General Assembly adopted a statutory standard regarding the use of election voting machines by county election officials. S.C. Code of Law Section 7-13-1680 established that at least one voting machine should be placed in service and capable of receiving votes on Election Day for every 250 registered voters in a voting precinct. Section 7-13-1680 states:

The governing body of any county or municipality providing voting machines at polling places for use at elections shall provide for each polling place at least one voting machine for each two hundred fifty registered voters or portion thereof or as near thereto as may be practicable. The machines shall be of the type approved as provided for in this title and shall be kept in complete and accurate working order and in proper repair. The machines may be used in such election districts or precincts in the county or municipality as the officials holding the election or conducting the primary may determine. The governing body of the county or municipality owning the machines shall have custody of such machines and other furniture or equipment of the polling places when not in use at an election.

S.C. Code Ann. §7-13-1680.

The South Carolina Attorney General has addressed on more than on occasion an Opinion examining the meaning and effect of Code Section 7-13-1680, as well as the implications when the suggested “number of machines” is not provided or available. The Attorney General has stated that the number of voting machines at a polling place as provided by §7-13-1605 is discretionary and that any purported failure to strictly follow the assignment of voting machines does not invalidate an election. 1967-68 Op Atty Gen, No. 2453, p. 114; 1967-68 Op Atty Gen, No. 2503, p. 183.

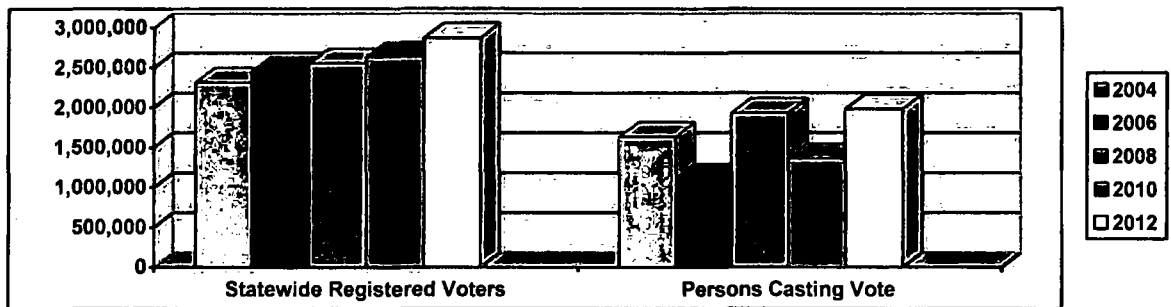
As has been previously reported, Richland County increased voter registration rolls by 17,692 votes during the period between January 2012 and leading up to the November General Election. The additional 17,692 registered Richland County voters resulted in a total registered voter list of 244,923 immediately before the election.



However, preparations for all elections begin well before the date of an election. Applying the state standard of one machine per 250 registered voters yields a statutory voting machine count of approximately 980 working voting machines needed for use in Richland County. The available data and information confirms that Richland County did not meet the

statutory guidelines when the first voters arrived at their voting precinct at 7 a.m. on November 6.

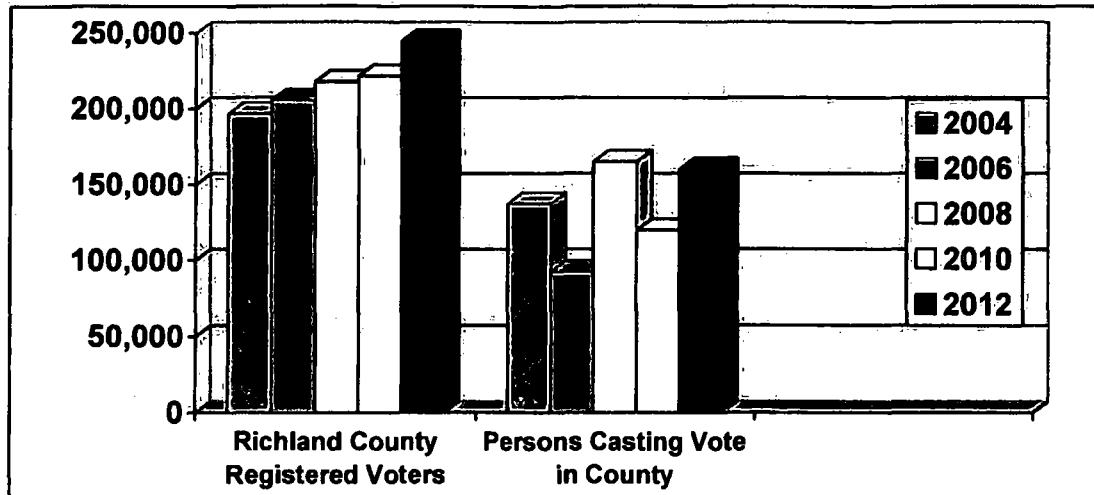
**South Carolina Registered Voters and Voter Participation
(2004 – 2012)**



Source: Website of the South Carolina State Election Commission found in their Statistics and Historical Data

It is a positive reflection on citizen interest in participating in voting that the total number of registered voters in South Carolina has steadily increased from 2,315,182 in the year 2004 to 2,874,496 registered voters in the year 2012. Similar increases in voter registration are reflected in Richland County voter registration rolls.

**Richland County Registered Voters and Voter Participation
(2004 – 2012)**



Source: Website of the South Carolina State Election Commission found in their Statistics and Historical Data

**Voting Machines Distributed To Precincts
Prior To The November 6th General Election**

The issue of the actual number of voting machines placed in the 124 precincts in Richland County has already been a matter of early and ongoing controversy. While it was previously reported that Richland County owns 970 voting machine,s I asked election staff to conduct a physical hand all count of voting machines. That count of voting machines owned by Richland County totaled 958. After my request to again count machines that were not in operating condition on the morning of the election, I was provided with the same number of 45, as previously reported. Prior to and immediately preceding the election, the information used in the warehouse for distributing voting machines states that 577 machines were allocated and distributed to the 124 precincts in Richland County for use beginning on November 6, 2012. However, the logs and information reports by poll managers, workers, technicians, and staff

indicate that where several machines that completed failed and other numerous others where only functioning for a part of the day due to mechanical, technical and battery issues.

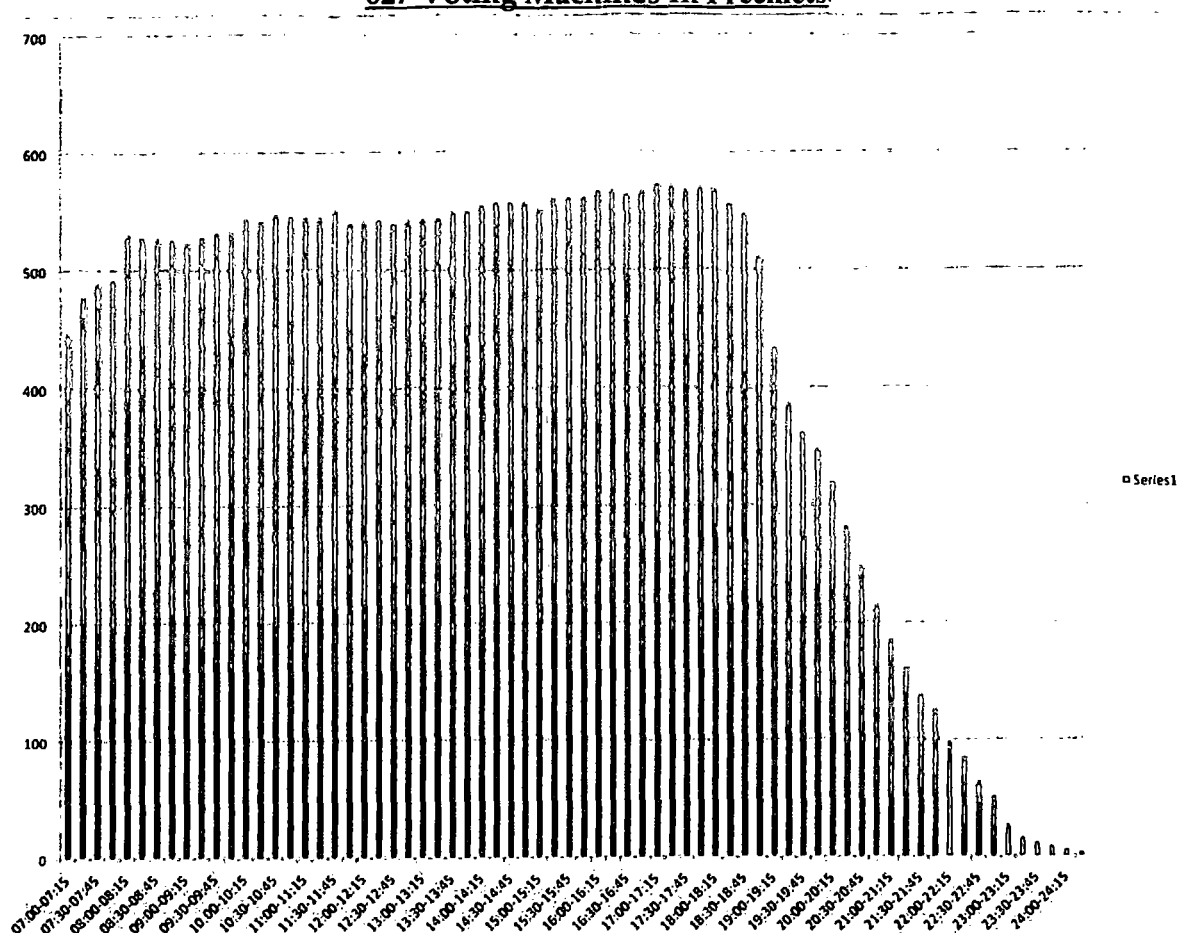
Despite a June Staff calculation showing a statutory-based need for 864 voting machines, the Election Division ultimately only distributed 577 voting machines to the 124 voting precincts in Richland County. In addition, 26 additional voting machines were designated for the absentee voting and another 11 voting machines were used at the Richland County Voter Registration Office on Election Day for voting. Due to many requests for additional voting machines from various precincts during election day, the Election Division delivered approximately 50 voting machines around the county in an attempt to address calls from precincts regarding problems with machines and the long waiting times for citizens seeking to cast their ballots.

As noted earlier, I sought assistance and election data analysis from USC Professor Duncan Buell. Based on our joint review of all available Richland County voting machine data and information, as well as staff interviews, I have concluded that a total of 627 voting machines placed in precincts at some point during the Election Day and recorded votes of Richland County voters on Election Day. That count of voting machines does not include the 26 machines used for absentee voting or the 11 machines that were in use at the Richland County Voter Registration Office on Election Day. The precinct voting machine data represents approximately 64% of the state standard of one machine per 250 registered voters. However, even that actual voting machine count does not fully address or explain all the voting problems encountered by voters and precinct workers throughout the entire day of the election. Voting lines and delays are the product of several factors that vary by weather, time of day and by the number of registered voters assigned to a particular precinct and when in the day they go to their precinct to vote.

Where the precinct is located in relation to where voters work during the day is also a factor that must be considered, as that issue greatly influences the times that voters choose to vote.

Professor Buell and I have examined what was actually happening with the 627 known voting machines placed in precincts during the course of Election Day. Professor Buell ran an analysis at my request to determine how many of the 627 voting machines were operating and collecting votes during fifteen-minute intervals throughout November 6. That machine voting time data merits attention. Dr. Buell's data provided another important perspective on the issue of the number voting machines delivered to precincts through Richland County for the General Election. In addition to deploying approximately 64% of the state voting machine use guidelines, we have jointly determined that an equally important question must be addressed. That important question is: How many voting machines were actually able to record votes at promptly 7 a.m. on November 6 and through the rest of the day? The answer varies by time of day. The following graph is based on data generated by the operating machines for 15-minute intervals until the last vote was recorded at approximately 12:15 a.m.

Election Day Interval Voting Activity For The 627 Voting Machines In Precincts



The above graph reflects that the very early hours of the election show some delays in voting machines being up and running and capable of recording citizen vote decisions. The highest total number of voting machines collection votes occurred later in the afternoon of November 6th. Professor Buell and I, as well as election staff, are continuing to examine voting machine performance data as compared to other counties and other state.

While I have frequently sought Professor Buell's assistance, I am solely responsible for the materials and views included or expressed in this initial Update.

Issue of Missing Votes

As the Board is aware, we have twice located additional paper ballots after the November 6, 2012 Election. Those ballots were counted, and included in the certified vote totals presented to the State Election Commission.

Professor Buell, during his review of voting machine vote data and based upon his observations, identified a problem with a voting machine in the Lincolnshire precinct. That review identified 27 votes that remained in a voting machine that was not included in the certified vote total.

With the assistance of Professor Buell, the election staff and I have reviewed several other precincts to determine if there are additional votes in voting machines that were not counted. It has been identified that there are at least two (2) other precincts with voting machines that either do or could have uncounted votes. Following an all-day review, one machine was located in the Spring Valley West precinct was discovered that currently suggests that another 102 votes were not counted. It was also discovered that one machine in the Sandlapper precinct was not properly closed due to technical problems and that it cannot be determined whether or not the machines does or does not have any uncounted votes with certainty as this time – even though the logs indicate that it is likely to not have any votes on the machine and that the machine never fully opened on Election Day. That review and examination continues and I will advise the Board and the public as soon as I conclude that I have a definitive answer.

Issue of Paper Ballots

The issue of voting machines not operating either during the entire day of election or not working at various times during the day merits reference to SC Code 57-13-1870. That Code Section provides that paper ballots may be used in that precinct and placed in an appropriate ballot receptacle and counted along with the votes recorded on voting machines. Upon my

inquiry to election staff, I have confirmed that some precincts utilized paper ballots on Election Day when voting machines were not operating. For example, Ward 29 used 30 paper ballots so those voters could vote was a voting machine was not operating. Based on my discussions with various pole managers and workers, the lawful use of paper ballots merits great attention and poll worker training for future elections.

Conclusion

This is an interim update on my assignment. I have written each member of the Richland County and the Richland County Legislative Delegation. During the Public Hearing conducted by the Richland County Legislative Delegation on November 26th, I advised that I would be contacting them as part of my review of the November 6th General Election to request any information for consideration or review. As discussed above, I am continuing the interview process with the Director and members of the staff in three divisions of the Office (i.e., elections, voter registration, and absentee), reviewing poll manager surveys, and logs and more. I intend to further examine:

- ▶ Current procedures and timetable for allocation, preparation, maintenance and tracking of voting machines and voting machine equipment, including PEBs, flash cards, and related contingency planning related to machine
- ▶ Procedures related to the decisions related to and the handling of paper ballots, including creation of the ballot, the number of printed paper ballots, how to resolve differences (if any) between printed paper ballots and in office printed “ballot on demand”, and compliance with state procedures and requirements
- ▶ Procedures related to the issuance of absentee ballots, including mailing, distribution, and receipt of absentee ballots
- ▶ Office contingency plan for Election Day issues, including structure for handling problems, logging information, information/education of poll managers and workers, and management of support technicians

- ▶ Procedures related to testing and maintaining voting machines between preparation and distribution and from the point of distribution and use on Election Day
- ▶ Procedures related to use of machines for curbside voting, including staffing needs as polls and education of poll managers and workers concerning procedures
- ▶ Internal office structure and communications between key staff and divisions in coordination of resources for election preparation, Election Day activities, and post-election requirements.
- ▶ Possible changes in laws and regulations

From:
Sent: Tuesday, July 03, 2012 10:20 AM
To:
Subject: Re: EXTRA MACHINES

Ok. I forgot to ask you what day you want work this week since you are off tomorrow.

From:
To:
Sent: Tue Jul 03 10:10:03 2012
Subject: EXTRA MACHINES

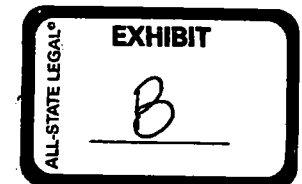
I just talked with Lillian and she gave me a revised list of the machines needed for the Nov 6 Election. She got the number down to 605 for machines. She also told me that we need to prepare 20-30 machines for 2020 Hampton and the Township Auditorium, but the Township is not approved as of yet.

Voter Representative
2020 Hampton Street
Columbia, SC 29202



Precinct	Precinct Name	Total Voters	# Machines	ZONES	# Machines
101	Ward 1	1,781	7	1	4
102	Ward 2	793	3	1	3
103	Ward 3	1,393	5	3	3
104	Ward 4	1,340	5	1	3
105	Ward 5	1,138	4	1	3
106	Ward 6	1,263	5	5	4
107	Ward 7	1,195	4	7	4
108	Ward 8	3,155	12	2	6
109	Ward 9	1,390	5	2	5
110	Ward 10	1,415	5	1	3
111	Ward 11	1,338	5	8	3
112	Ward 12	1,492	6	1	4
113	Ward 13	1,914	7	8	4
114	Ward 14	1,492	5	8	4
115	Ward 15	956	3	2	3
116	Ward 16	1,253	5	8	3
117	Ward 17	1,463	5	8	3
118	Ward 18	1,301	5	2	3
119	Ward 19	1,335	5	3	3
120	Ward 20	1,674	7	3	4
121	Ward 21	1,639	6	7	4
122	Ward 22	1,546	6	3	4
123	Ward 23	995	4	8	3
124	Ward 24	868	3	8	3
125	Ward 25	1,467	5	8	3
126	Ward 26	1,415	5	9	3
129	Ward 29	1,471	5	7	3
130	Ward 30	819	3	1	3
131	Ward 31	1,044	4	3	3
132	Ward 32	943	4	2	3
133	Ward 33	1,047	4	2	3
134	Ward 34	1,152	4	2	3
301	Arcadia	1,490	6	6	4
302	Ardincaple	336	2	3	3
303	Ballentine	2,736	10	12	8
304	Beatty Road	998	4	16	4
305	Bluff	2,082	8	1	6
306	Blythewood #1	1,025	4	10	3
307	Blythewood #2	1,594	6	10	4

06/21/2012



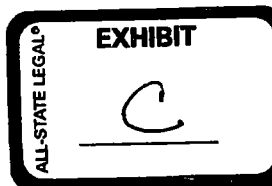
308	Brandon	3,359	13	9	8	
309	Briarwood	2,513	10	6	8	
310	Caughman Road	1,788	7		6	
311	College Place	1,608	6	7	4	
312	Cooper	1,159	4	6	3	
313	Dennyside	798	3	4	3	
314	Dentsville	2,288	9	6	4	
315	Dutch Fork #1	2,136	8	12	6	
316	Eastover	2,454	9	15	4	
317	Edgewood	1,808	7	7	4	
318	Estates	4,108	16	11	10	
319	Fairlawn	2,634	10	4	6	
320	Fairwold	938	4	7	3	
321	E Forest Acres	1,174	4	5	3	
322	N Forest Acres	1,326	5	5	3	
323	S Forest Acres	1,485	5	5	4	
324	Friarsgate #1	1,869	7	17	4	
325	Friarsgate #2	1,609	6	17	4	
326	Old Friarsgate	1,232	4	17	3	
327	Gadsden	1,903	7	15	4	
328	Garners	888	4	15	3	
329	Greenvview	1,778	7	7	6	
330	Gregg Park	1,722	7	5	4	
331	Hampton	1,712	7	9	4	
332	Harbison #1	2,312	9	17	6	
333	Hopkins	2,609	10	15	6	
334	Horrell Hill	2,157	8	14	6	
335	Hunting Creek	471	2	14	2	
336	Keels	3,086	12	6	6	
337	Keenan	1,754	7	5	4	
338	Killian	1,249	4	10	3	
339	Kingswood	2,726	10	16	6	
340	Lincolnshire	2,129	8	4	6	
341	Longcreek	3,249	12	10	8	
342	Lykesland	2,277	9	14	6	
343	McEntire	841	3	14	3	
344	Meadowfield	1,704	6	9	4	
345	Meadowlake	2,152	8	4	6	
346	Midway	2,795	11	6	6	
347	Mill Creek	1,694	6		4	

348	Monticello	2,174	8	4	6
349	North Springs #1	3,120	12	11	88
350	North Springs #2	2,703	10	11	8
351	Oakwood	963	3	5	3
352	Olympia	2,145	8	1	6
353	Parkway #1	5,217	20	11	12
354	Pennington	2,535	10	9	6
355	Pine Lakes	2,482	9	14	6
356	Pinewood	1,543	6	14	3
357	Polo Road	4,312	17	13	10
358	Pontiac	2,689	10	13	4
359	Rice Creek	3,984	15	11	7
360	Ridgewood	676	3	4	3
361	River Springs	3,444	13	12	10
362	Riverside	1,189	4	16	4
363	Riverwalk	2,761	11	17	6
364	Satchelford	1,308	5	5	4
365	Skyland	1,102	4	16	3
366	South Beltline	1,572	6	9	3
367	Spring Valley	2,399	9	17	6
368	Springville	3,291	13	12	10
369	St Andrews	1,230	4	16	3
370	Trenholm Road	852	3	6	3
371	Valhalla	2,299	9	13	6
372	Valley State Park	1,976	7		6
373	Walden	995	3	16	3
374	Westminster	1,837	7	16	4
375	Whitewell	1,753	7	16	4
376	Wildewood	2,692	10	13	5
377	Woodfield	2,607	10	6	8
378	Woodlands	2,093	8	9	5
379	Blythewood #3	1,366	5	10	4
380	Dutch Fork #2	2,915	11	12	4
381	Harbison #2	1,224	4	17	4
382	Kelly Mill	905	3	11	3
383	Lake Carolina	2,276	9	11	5
384	Oak Pointe	2,909	11	12	8
385	Parkridge	936	3	17	3
386	Parkway #2	2,716	10	11	6
387	Pine Grove	1,640	6	16	3

388	Ridge View	4,340	17	11	8
389	Round Top	652	2	10	2
390	Sandlapper	2,671	10	10	6
391	Spring Hill	1,178	4	12	4
392	Spring Valley west	2,559	10		6
	County Total	229,472	864		

08/21/2012

PRECINCT	MACHINES DISTRIBUTED PRIOR TO 11/6/12	Machines Added on 11/6/12 (estimate)	Total Number of Machines Working on 11/6/12	Machines Not Working Or Used at Polls (estimate)	6/21/12 RED NUMBERED DOCUMENT ALLOCATION
	577				576
WARD 1	4		4		4
WARD 2	3	1	4		3
WARD 3	3	1	4		3
WARD 4	3	1	4		3
WARD 5	3		3		3
WARD 6	4		4		4
WARD 7	4		4	1	4
WARD 8	6		5	1	6
WARD 9	5		5		5
WARD 10	3		3		3
WARD 11	3		3		3
WARD 12	4		4		4
WARD 13	4		4		4
WARD 14	4	1	5		4
WARD 15	3		3		3
WARD 16	3		3		3
WARD 17	3		3		3
WARD 18	3		3		3
WARD 19	3		3		3
WARD 20	4	2	6		4
WARD 21	3	2	5		4
WARD 22	4		4		4
WARD 23	3		3		3
WARD 24	3		3		3
WARD 25	3	2	5		3
WARD 26	3	1	4		3



PRECINCT	MACHINES DISTRIBUTED PRIOR TO 11/6/12	Machines Added on 11/6/12 (estimate)	Total Number of Machines Working on 11/6/12	Machines Not Working Or Used at Polls (estimate)	6/21/12 RED NUMBERED DOCUMENT ALLOCATION
WARD 29	3		3		3
WARD 30	3		3		3
WARD 31	3	1	4		3
WARD 32	3		3		3
WARD 33	3		3		3
WARD 34	3	1	4		3
ARCADIA	4		4		4
ARDINCAPLE	3		3		3
BALLENTINE	8		8		8
BEATTY ROAD	4		4		4
BLUFF	6		6		6
BLYTHEWOOD #1	3		3		3
BLYTHEWOOD #2	6		6		4
BRANDON	8	2	10		8
BRIARWOOD	8	1	8	1	8
CAUGHMAN ROAD	6		6		6
COLLEGE PLACE	4	1	5		4
COOPER	3		3		3
DENNYSIDE	3		3		3
DENTSVILLE	4	2	6		4
DUTCH FORK #1	6	1	7		6
EASTOVER	4	2	6		4
EDGEWOOD	4		4		4
ESTATES	10		10		10
FAIRLAWN	6	1	7		6
FAIRWOLD	3		3		3
E FOREST ACRES	3		3		3

PRECINCT	MACHINES DISTRIBUTED PRIOR TO 11/6/12	Machines Added on 11/6/12 (estimate)	Total Number of Machines Working on 11/6/12	Machines Not Working Or Used at Polls (estimate)	6/21/12 RED NUMBERED DOCUMENT ALLOCATION
N FOREST ACRES	3	2	5		3
S FOREST ACRES	4		4		4
FRIARSGATE #1	4		3	1	4
FRIARSGATE #2	4		4		4
OLD FRIARSGATE	3		3		3
GADSDEN	4		4		4
GARNERS	3		3		3
GREENVIEW	6	1	7		6
GREGG PARK	4		4		4
HAMPTON	4		4		4
HARBISON #1	6		6		6
HOPKINS	6		5	1	6
HORRELL HILL	6		3	3	6
HUNTING CREEK	2	4	6		2
KEELS	6		4	2	6
KEENAN	4		3	1	4
KILLIAN	3	3	6		3
KINGSWOOD	6		6		6
LINCOLNSHIRE	6		5	1	6
LONGCREEK	8	2	10		8
LYKESLAND	6		6		6
MCENTIRE	3		3		3
MEADOWFIELD	4	3	7		4
MEADOWLAKE	6		6		6
MIDWAY	6	1	7		6
MILL CREEK	4	2	6		4
MONTICELLO	6	1	7		6

PRECINCT	MACHINES DISTRIBUTED PRIOR TO 11/6/12	Machines Added on 11/6/12 (estimate)	Total Number of Machines Working on 11/6/12	Machines Not Working Or Used at Polls (estimate)	6/21/12 RED NUMBERED DOCUMENT ALLOCATION
NORTH SPRINGS #1	8		8		8
NORTH SPRINGS #2	8		8		8
OAKWOOD	3		3		3
OLYMPIA	6		6		6
PARKWAY #1	12		12		12
PENNINGTON	6		6		6
PINE LAKES	6	2	8		6
PINEWOOD	3	1	4		3
POLO ROAD	10		10		10
PONTIAC	4	4	8		4
RICE CREEK	7		7		7
RIDGEWOOD	3		3		3
RIVER SPRINGS	10		10		10
RIVERSIDE	4	1	4	1	4
RIVERWALK	6	1	7		6
SATCHELFORD	4		4		4
SKYLAND	3		2	1	3
SOUTH BELTLINE	3		3		3
SPRING VALLEY	6		6		6
SPRINGVILLE	10		10		10
ST ANDREWS	3		3		3
TRENHOLM ROAD	3		3		3
VALHALLA	6		6		6
VALLEY STATE PARK	6		6		6
WALDEN	3		3		3
WESTMINSTER	4		4		4
WHITEWELL	4		4		4

PRECINCT	Number of Voter Signatures At Polling Place on Election Day*	Number of Votes Cast*		REVISED EXHIBIT D			
WARD 1	660	659					
WARD 2	342	342					
WARD 3	840	841					
WARD 4	701	704					
WARD 5	579	582					
WARD 6	717	718					
WARD 7	608	611					
WARD 8	1140	1143					
WARD 9	658	660					
WARD 10	780	781					
WARD 11	689	690					
WARD 12	807	808					
WARD 13	1067	1068					
WARD 14	891	873					
WARD 15	595	595					
WARD 16	761	763					
WARD 17	895	894					
WARD 18	666	663					
WARD 19	674	674					
WARD 20	860	864					
WARD 21	812	826					
WARD 22	834	832					
WARD 23	563	569					
WARD 24	582	583					
WARD 25	875	875					
WARD 26	609	607					
WARD 29	748	719					
WARD 30	384	386					
WARD 31	542	545					
WARD 32	442	442					
WARD 33	517	516					
WARD 34	578	577					
ARCADIA	862	853					
ARDINCAPLE	247	247					
BALLENTINE	1807	1806					
BEATTY ROAD	505	509					
BLUFF	1155	1154					

PRECINCT	Number of Voter Signatures At Polling Place on Election Day*	Number of Votes Cast*					
BLYTHEWOOD #1	678	678					
BLYTHEWOOD #2	1044	1060					
BRANDON	1580	1577					
BRIARWOOD	1318	1306					
CAUGHMAN ROAD	946	937					
COLLEGE PLACE	893	891					
COOPER	696	697					
DENNYSIDE	480	479					
DENTSVILLE	1094	1080					
DUTCH FORK #1	1402	1395					
EASTOVER	1418	1421					
EDGEWOOD	965	967					
ESTATES	2227	2229					
FAIRLAWN	1400	1402					
FAIRWOLD	482	484					
E FOREST ACRES	683	680					
N FOREST ACRES	742	737					
S FOREST ACRES	839	836					
FRIARSGATE #1	947	944					
FRIARSGATE #2	933	918					
OLD FRIARSGATE	671	661					
GADSDEN	1112	1113					
GARNERS	516	518					
GREENVIEW	981	978					
GREGG PARK	901	900					
HAMPTON	865	858					
HARBISON #1	1125	1126					
HOPKINS	1221	1224					
HORRELL HILL	1214	1215					
HUNTING CREEK	300	298					
KEELS	1226	1213					
KEENAN	842	842					
KILLIAN	749	752					
KINGSWOOD	1441	1424					
LINCOLNSHIRE	1222	1195					
LONGCREEK	1864	1864					
LYKESLAND	1267	1274					
MCENTIRE	485	485					

PRECINCT	Number of Voter Signatures At Polling Place on Election Day*	Number of Votes Cast*					
MEADOWFIELD	940	940					
MEADOWLAKE	1152	1147					
MIDWAY	1278	1283					
MILL CREEK	1015	978					
MONTICELLO	1137	1142					
NORTH SPRINGS #1	1566	1554					
NORTH SPRINGS #2	1375	1377					
OAKWOOD	591	591					
OLYMPIA	1018	997					
PARKWAY #1	2408	2408					
PENNINGTON	1252	1250					
PINE LAKES	1232	1228					
PINEWOOD	855	855					
POLO ROAD	2248	2254					
PONTIAC	1307	1304					
RICE CREEK	1928	1928					
RIDGEWOOD	398	403					
RIVER SPRINGS	1947	1951					
RIVERSIDE	562	562					
RIVERWALK	1360	1358					
SATCHELFORD	818	816					
SKYLAND	553	554					
SOUTH BELTLINE	718	720					
SPRING VALLEY	1230	1229					
SPRINGVILLE	2189	2186					
ST ANDREWS	650	639					
TRENHOLM ROAD	586	586					
VALHALLA	1257	1249					
VALLEY STATE PARK	1152	1155					
WALDEN	456	455					
WESTMINSTER	839	835					
WHITEWELL	835	835					
WILDEWOOD	1227	1237					
WOODFIELD	1360	1370					
WOODLANDS	1290	1288					
BLYTHEWOOD #3	876	873					
DUTCH FORK #2	1447	1446					
HARBISON #2	638	638					

PRECINCT	Number of Voter Signatures At Polling Place on Election Day*	Number of Votes Cast*	REVISED EXHIBIT D			
KELLY MILL	616	618				
LAKE CAROLINA	1285	1288				
OAK POINT	1621	1612				
PARKRIDGE	467	467				
PARKWAY #2	1355	1351				
PINE GROVE	814	814				
RIDGE VIEW	1932	1932				
ROUND TOP	396	392				
SANDLAPPER	1576	1578				
SPRING HILL	814	813				
SPRING VALLEY WEST	1183	1083				
	121,510	121,206				
*NOTE: Does not Include Absentee Ballot Totals & Addressed Failsafe, Challenged Provisional Ballots on 11/16/12						
Revsied for typographical errors -- 12/7/12						

F

Richland County Legislative Delegation

CHAIRMAN, LEGISLATIVE DELEGATION
Darrell Jackson

VICE CHAIRMAN, LEGISLATIVE DELEGATION
John E. Courson

CHAIRMAN, HOUSE DELEGATION
Christopher R. Hart

VICE CHAIRMAN, HOUSE DELEGATION
Joseph H. Neal

EXECUTIVE DIRECTOR
James C. Brown



MEMBERS OF THE SENATE
Dist. 19- John L. Scott
Dist. 20- John E. Courson
Dist. 21- Darrell Jackson
Dist. 22- Joel Lourie

MEMBERS OF THE
HOUSE OF REPRESENTATIVE
Dist. 70- Joseph Neal
Dist. 71- Nathan Ballentine
Dist. 72- James E. Smith, Jr.
Dist. 73- Christopher R. Hart
Dist. 74- Todd Rutherford
Dist. 75- ~~James H. Howard~~ *Kirkman Finlay*
Dist. 76- Leon Howard
Dist. 77- Joseph A. McEachern
Dist. 78- ~~Joan Brady~~ *Beth Bernstein*
Dist. 79- Mia Butler Garrick
Dist. 80- Jimmy Bales

December 21, 2012

WHEREAS the right to vote is fundamental to whom we are as Americans and the right of the people of Richland County South Carolina to access the ballot must be protected and ensured;

WHEREAS it is clear that a multitude of failures at the Richland County Elections and Voter Registration office disenfranchised many voters in Richland County on November 6, 2012;

WHEREAS public confidence in the Richland County Elections and Voter Registration office is justifiably shattered and action must be taken to begin to restore public confidence;

BE IT RESOLVED THAT WE, the undersigned members of the Richland County Legislative Delegation, call on Richland County Elections and Voter Registration Director Lillian McBride to resign immediately. Should Ms. McBride fail to tender her resignation to the Richland County Board of Elections and Voter Registration no later than 4:00 PM December 21, 2012, we, the undersigned members of the Richland County Legislative Delegation call on the Richland County Board of Elections and Voter Registration to hold a special called meeting no later December 28, 2012 for the purpose of voting to remove Ms. McBride as Director.

Signature Attached
John E. Courson

Darrell Jackson

Joel Lourie (web)
Joel Lourie

John L. Scott, Jr.

Signature Attached
Thomas McElveen

Joseph Neal

Nathan Ballentine
Nathan Ballentine

Christopher R. Hart
Christopher R. Hart

J. Todd Rutherford

Signature Attached
Kirkman Finlay

Leon Howard

Joseph A. McEachern

Beth Bernstein
Beth Bernstein

Mia McLeod
Mia McLeod

Jimmy Bales

James E. Smith, Jr.
James E. Smith, Jr.

Richland County Legislative Delegation

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Dist. 74- Todd Rutherford
Dist. 75- James H. Harrison
Dist. 76- Leon Howard
Dist. 77- Joseph A. McEachern
Dist. 78- Joan Brady
Dist. 79- Mia Butler Garrick
Dist. 80- Jimmy Bales

December 21, 2012

WHEREAS the right to vote is fundamental to whom we are as Americans and the right of the people of Richland County South Carolina to access the ballot must be protected and ensured;

WHEREAS it is clear that a multitude of failures at the Richland County Elections and Voter Registration office disenfranchised many voters in Richland County on November 6, 2012;

WHEREAS public confidence in the Richland County Elections and Voter Registration office is justifiably shattered and action must be taken to begin to restore public confidence;

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A handwritten signature in black ink, appearing to read "John E. Courson".

John E. Courson

Darrell Jackson

Joel Lourie

John L. Scott, Jr.

Thomas McElveen

Joseph Neal

Nathan Ballentine

Christopher R. Hart

J. Todd Rutherford

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James E. Smith, Jr.

Richland County Legislative Delegation

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Darrell Jackson

VICE CHAIRMAN, LEGISLATIVE DELEGATION
John E. Courson

CHAIRMAN, HOUSE DELEGATION
Christopher R. Hart

VICE CHAIRMAN, HOUSE DELEGATION
Joseph H. Neal

EXECUTIVE DIRECTOR
James C. Brown



MEMBERS OF THE SENATE
Dist. 19- John L. Scott
Dist. 20- John E. Courson
Dist. 21- Darrell Jackson
Dist. 22- Joel Lourie

MEMBERS OF THE HOUSE OF REPRESENTATIVE
Dist. 70- Joseph Neal
Dist. 71- Nathan Ballentine
Dist. 72- James E. Smith, Jr.
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6

**Minutes of the
Richland County
Board of Elections and Voter Registration
2020 Hampton Street
Wednesday, January 9, 2013
4:00 p.m.**

Board Members in Attendance

Mr. Allen Dowdy, Vice Chair
Ms. Adell Adams
Ms. Elaine DuBose
Mr. Herbert W. Sims

Staff in Attendance

Ms. Lillian McBride, Executive Director
Mr. Garry Baum, Deputy Director
Ms. Rebecca Brown
Ms. Chelle Epps
Ms. Amie Brunson

Others in Attendance

Dr. Jasper Salmond
Mr. Steve Hamm, Esquire
Mr. John Nichols, Esquire
Ms. Joann Wessinger-Hill, Esquire

Call to Order

- The meeting was called to order at 4:07 p.m. It was noted that a quorum was present to allow the meeting to proceed and that the meeting had been properly noticed in accordance with the Freedom of Information Act requirements.

Approval of Minutes from January 3, 2013 Meeting

- The Board Members reviewed the minutes from January 3, 2013. A motion was made to approve the meeting minutes. Seconded. Approved 4-0.

Update on Interim Report from Steven Hamm, Esquire on Investigation into Issues and Problems regarding November 6, 2012 General Election

- Mr. Steve Hamm presented an update to his interim investigation into the issues and problems regarding the 2012 General Election. At the end of his presentation, Mr. Hamm provided the Board Members and members of the media with copies of the report.
- Mr. Hamm indicated that a final report will be issued within the upcoming weeks.

- A motion was made to adopt the updated report provided by Mr. Hamm. Seconded. Approved 4-0.

Executive Session

- A motion was made to proceed into Executive Session to receive legal advice regarding personnel matters. Seconded. Approved 4-0. The Board entered into Executive Session at 5:54 pm.
- A motion was made to come out of Executive Session at 7:57 pm. Seconded. Approved 4-0. The Board indicated that no action was taken and the Board Members only received legal advice during the Executive Session.
- A motion was made for the Board to begin the process of restructuring and improving accountability mentioned in Mr. Hamm's report by creating the position of Deputy Director for Voter Registration and Absentee. Seconded. Approved 4-0.
- A motion was made that the Board recommend and request that the new Acting Director, Dr. Salmond, appoint Ms. Lillian McBride to the new position of Deputy Director of Voter Registration and Absentee. Seconded. Approved 4-0.
- A motion was made that the Board establish and set the salary for the new Deputy Director of Voter Registration and Absentee at the annual salary of \$74,600. Seconded. Approved 4-0.
- A motion was made that the Board direct Dr. Salmond (new Acting Director) to look at and review the efficiencies of the Elections & Voter Registration office to further restructure and improve accountability as referenced in Mr. Hamm's report. Seconded. Approved 4-0.
- A motion was made that the Board grant Dr. Salmond the immediate authority necessary to complete and provide any paperwork necessary to the County in order to effectuate a smooth transition on January 12, 2013. Seconded. Approved 4-0.

Old Business

- None indicated.

New Business

- Mr. Garry Baum informed the Board that the Elections & Voter Registration office will host a Photo ID Training on Wednesday, January 16, 2013 at 6:00 pm.
- The Board agreed to meet on Wednesday, January 16, 2013 at 4:00pm.

Adjournment

- There being no further business, the meeting adjourned at 8:04 pm.

**REPORT ON THE RICHLAND COUNTY NOVEMBER 6, 2012
GENERAL ELECTION FOR THE RICHLAND COUNTY BOARD OF
ELECTION AND VOTER REGISTRATION
INVESTIGATIVE AUDIT OF ISSUES
WITH THE NOVEMBER 6, 2012 GENERAL ELECTION**

January 9, 2013

Overview

As outside legal counsel to the Board of Elections and Voter Registration of Richland County ("Board"), Steven W. Hamm was retained on the morning of Monday, November 12, 2012, by Richland County to represent the Board in pending legal matters that were a result of the recent General Election on November 6, 2012. Following Chairman Crum obtaining authorization from the County to obtain outside legal counsel, Steve Hamm and his law firm was initially asked to immediately respond to an Order issued by the South Carolina Supreme Court on November 9, 2012 in matter related to the filings by the South Carolina Democratic Party in the Court of Common Pleas and to address the Petition filed by the South Carolina Republican Party in the original jurisdiction of the South Carolina Supreme Court, as well as provide legal advice and assistance the Board in its matters related to and concerning the General Election held in Richland County that was conducted by the Board and its staff. The Supreme Court Order stayed the lower court Order and stopped the counting process that was underway by the South Carolina Election Commission of the votes cast in Richland County using the election ballots, PEBs, Flash Cards and materials seized by SLED as a result of the lower court Order. Approximately twenty-four hours following engagement, with the active help of my law partner, Jo Anne Wessinger Hill, two filings responding to these actions were submitted on behalf of the Board with the South Carolina Supreme Court. Those filings requested that the Court issue an Order directing that all Richland County materials and voting data seized by SLED pursuant to an Order issued by Judge Manning on November 8, 2012, be returned to the Board and Election staff so that the required canvass of the vote in Richland County could be completed as required by state law. The second filing was a Motion to Dismiss the proceeding before the South Carolina Supreme Court due to the Stipulation of Dismissal by the South Carolina Democratic Party of the underlying circuit court action.

On the afternoon of Tuesday, November 13, the South Carolina Supreme Court issued an Order directing SLED to immediately return all seized Richland County voting materials to the Board and Election staff. In the following days, outside counsel assisted the Board in completing the preliminary canvass of the vote and assisted the Board in addressing issues of misaligned ballots and counting newly discovered ballots. The certified election results for Richland County were submitted to the State Election Commission late on the afternoon of Friday, November 16, following the statutorily required hearing by the Board resolving (and counting) a few hundred challenged, fail safe and provisional ballots. During the very early days of working with the Board, outside legal was asked to begin examining election data and meeting with staff in order to prepare a comprehensive report to the Board addressing the problems related to the General Election.

Throughout this examination into the problems occurring on election day, the Board has requested and been provided with written and oral updates during its public meetings in 2012 as reflected in their agendas and minutes. The purpose of these updates by the Board were to advise the Richland County Council, the Richland County Delegation and the members of the public on the status of its examination and review of the problems and issues occurring on election day. This final report builds upon the information provided in these updates as well as provides additional material and detail. As with the prior updates, this Report is the result of a tremendous amount of man-hours reviewing data; reviewing documents and information produced by County Council members, County Legislative Delegation members, staff, experts and others; conducting interviews of staff, poll managers/workers, interested and affected county citizens of their experience; review of precinct worker surveys, poll locations technician report/data sheets, examination of machines, PEBs, and Flash Cards; requesting certain testing or analysis; and more.

Due to the limited time period provided, best practices were engaged to examine and review the data or information in order to maintain a reasonable degree of certainty as to its accuracy. While there are most probably nearly every person voting on Election Day at the 124 precincts in the County who can provide valuable information into the events of election day, it is believed that given the time constraints and awareness of the cost to these same taxpayers that with the random sampling of interviews of persons throughout the County, the testimonies provided during election protests, talking with elected officials of what they collected, and review of data, this Report reasonably addresses a broad spectrum of issues experienced or occurring on Election Day.

There is an observed need for the Election and Voter Registration Office to develop a better process to track and account the return and receipt of voting data, voting machines, flash cards, PEBs and tapes on evening of Election Day or following close of the polls so that the Board and staff can be certain that all data was returned and collected in the preliminary tallies and certified results, and thus, have the checks and balances in place to be in a position to discover the problems associated with uncounted machines votes due to improper opening or close of a voting machine with the wrong PEB or the possibility of software or technical issues. It is noted that the initial machine shortages at poll locations, machines failures, and related issues may have exacerbated this problem since there were numerous machines added throughout the course of Election Day. While some PLTs did follow existing documentation procedures in place, there needs to be enhancement of these procedures so that Poll Location Technicians (PLTs) or workers can confirm and track serial numbers for machines, flash cards, or PEBs distributed or added to precincts to repair or fix problems, and/or to attempt to resolve lengthy lines and wait times for voters at the polls. Also, throughout the course of this examination with staff, many processes were reviewed and some new approaches or checks are planned to be implemented which include tracking who prepares the voting machine. This will be helpful to the Board and County to track the efficiency of the process and to provide input to the Board and County related to use of staff. However, it is recommended that a check sheet or sheets – other than on one person's computer – whereby election material and items since as the voting machines, flash cards, and PEBs (including any replaced or added) can be tracked as delivered to polling place, received from polling place, and confirmed whether election data (votes) has been collected and included in results along with any indication of "no vote data"

contained or collected by the machine, flash card or PEB when it is not used, when there is a failure or other problem.

Issues

On November 6, 2012, the staff of the Richland County Office of Elections and Voter Registration, including the four Board members of the Richland County Board of Elections and Voter Registration, became aware of the problems not only with voting machines failures or inoperability, but also long lines and extended wait times for registered voters at the 124 polling places and precincts in the County. It was discovered at some point either during the day or the next few days that the issues experienced by the public and poll workers was not the result of increased voter turnout, large precincts, or voting machine related failures or issues, but were compounded by the insufficient number of voting machines actually being prepared and allocated for the General Election at the direction and oversight of the Executive Director and her staff. Not only were there failures to show or late arrivals of some poll workers and technicians trained to work on Election Day, but also there were numerous incidences where technicians were called to resolve voting machine problems on election day and as well as problems with the ES&S 650 Optical Scanner reading the paper ballots and the problem discovered on or about November 9, 2012 of the alignment issues between commercially printed paper ballots and internally printed ballots on demand from the Election Office. Over the course of the investigation into these election issues, there were discoveries of two bags of uncounted paper ballots totaling 150 ballots, an additional 44 paper absentee ballots in Election and Voter Registration Office was not included in the preliminary results in November 14, 2012. Then, there was the discovery of 129 uncounted votes from two voting machines in two different precincts (Lincolnshire and Spring Valley West) that were not included in the certified results totals sent by the County to the State Election Commission. These 129 uncounted votes were discovered as a result of this investigation process in seeking answers to the questions of the Board, the Richland County Delegation and the public as to the number of additional iVotronic voting machines added on election day and to verify that all votes cast on election day were included in the certified results by the Board.

The Board members voted to engage Steven W. Hamm and his law firm to examine the issues and investigate the problems experienced during the 2012 General Election. He was asked to determine:

- 1) the underlining causes of the long wait times and machines failures;
- 2) whether counting and certifying the vote on all of the voting machine votes would have resulted in a change in the results of any of the races or ballot questions;
- 3) meet with and interview the Executive Director and staff to understand what the process was that they used to determine the number of voting machines allocated on election day, to understand the process whereby machines, PEBs, and flash cards are stored, prepared and maintained, including but not limited to the process of capturing data from the machines, PEBs and flash cards, what procedures are used to verify that all election data from machines

(i.e., machines, flash cards, and PEBs) is captured and returned to the Office, and the process and procedures in place to audit and detect problems prior to vote certification;

- 4) to enlist the expertise of those necessary with the knowledge related to the iVotronic voting machines, PEBs, flash cards, and data from these items to determine any issues related to voting machines process, including the State Election Commission ("SEC") staff, County staff, software and voting machine vendor and technicians used by the County, and other experts needed in reviewing the data and processes used by the County;
- 5) the recount of the precinct voting machines for the Elections conducted by the RCEC staff to assure that the recount was properly conducted, that all of the votes on the voting machines were accounted for and to determine whether the results of any of the races or ballot questions changed;
- 6) study the checks and balances currently in place to help prevent or catch voting machine and PEB allocation errors prior to election day and to see what additional measures should be undertaken to prevent or catch allocation problems prior to election day in the future;
- 7) study the checks and balances currently in place to help prevent or catch any poll manager or poll worker misinformation or error prior to election day and to see what additional measures in training procedures and communications on election day should be undertaken to prevent or catch misinformation and miscommunication problems prior to and on election day in the future;
- 8) study the checks and balances currently in place to help prevent or catch tabulation errors, and retrieval of election data prior to certification and to see what additional measures should be undertaken to prevent or catch tabulation problems prior to certification in the future; and
- 9) report the findings and recommendations of the examination to the Richland County Council, the Richland County Legislative Delegation and the SEC.

EXAMINATION PROCESS

I. Questions To Be Answered

The five (5) top unanswered questions initially following the General Election are:

- (1) Who was responsible for planning and implementing the election process? What does the allocation plan say?
- (2) How many machines were at each of 124 precincts? What was the allocation plan based on?

- (3) Why did machines at precincts not work? How many didn't work and where were they?
- (4) How many emergency machines were deployed and where? Which precincts received emergency technicians help?
- (5) How did two styles of paper absentee ballots get printed?

The attached exhibit or chart provides information concerning these questions. Some of the figures are an estimate because certainty as the exact number of additional machines added or deployed is not readily 100% certain due to a lack of a clear procedure at the time (and not after the fact) to confirm and track on Election Day of the voting machines serial number and flash card serial number by staff. There were clearly procedures used and in place to track on computer spreadsheets these items by precincts that is available to the staff; however, the Board and/or Executive Director should consider utilizing also a manual, hard copy, paper system with or without the use of pre-printed serial number labels for a PLT or staff person to affix to a paper sheet for use at the precinct to indicate what machine, PEB or Flash Card by serial numbers is added to polling location for use by voters. Then, this sheet would be returned by the poll manager with precinct materials to indicate the addition of the election equipment. This will assist in collection of votes cast or contained in such materials, assist in an increased degree of certainty of complete data collection during busy election evening times, and would be in conjunction with the written notes and logs required and used by the PLT on Election Day. It should be noted that all PLTs did not follow procedure in providing serial number information that was required in their logs or notes as instructed by the Election System Coordinator.

As mentioned in prior updates and herein, the reasons for voting machine failures appear to have been a combination of events ranging from human error or handling, battery issues, PEB issues, calibration issues, and even internal power supply failures with the transformer that converts the electricity supply into the correct voltage for the machine. None of information data recorded on the machine's internal memory indicates any unusual or high incidences of battery issues, calibration issues, or PEB problems. The data did indicate a high incident of internal power supply failures. Regardless of the procedures and practices used by the staff in charging the voting machines, if a machine had issues with its internal power supply system, this is not readily detectable.

The members of the Board, as well as the Executive Director and designated staff of the Richland County Office of Election and Voter Registration, are required to participate and to receive training and certification by the State Election Commission. See S.C. Code §§ 7-5-10, 7-5-35 and 7-13-70 (must complete within 18 months after the Board member's initial appointment or his reappointment after a break in service, or within 18 months after a staff person's initial employment or reemployment following a break in service, a training and certification program conducted by the State Election Commission).

The State Election Commission establishes the program and provides that County Election and Voter Registration Executive Directors must complete the complete the four core courses, two voter registration/election electives, and two additional electives before certification

is provided by the State Election Commission. These core courses for a Director are: (1) Directors: Roles and Responsibilities; (2) Duties of the Voter Registration Board; (3) Duties of the Election Commission; and (4) Budgeting/Reimbursement of Election Expenses. The Executive Director had received prior training in the past related to voter registration, but she also completed the required training and received certification by the State Election Commission which was required for a County Executive Director.

The State Election Commission establishes the program and provides that each County Election and Voter Registration Board Member must complete the complete the three core courses, two voter registration/election electives, and two additional electives before certification is provided by the State Election Commission. These core courses for a Board member are: (1) Duties of the Voter Registration Board; (2) Duties of the Election Commission; and (3) Budgeting/Reimbursement of Election Expenses. With the appointment or reappointment of the new combined Board, the four members of the Board at the time of the General Election on November 6, 2012 had completed the required training and obtained certification from the State Election Commission.

The purpose of this training is to provide the Executive Director and Board members with an overview of his/her responsibilities and duties as provided by state and federal law and in compliance with state statutory requirements.

Please see the attached organizational Chart for the Office. Exhibit E (note Exhibit C and D are from the Interim Report dated 12/6/12 and this exhibit follows thereafter).

II. Interviews of Director, Election Staff and Others

As a preliminary matter, I met and interviewed Lillian McBride on numerous occasions, as well as the Elections System Coordinator and all other election staff members involved in preparing for the November 6, 2012 General Election. Lillian McBride and her staff have fully cooperated with me and provided me with all materials and data I requested. In addition, I have also had both telephone and other discussions and a meeting with the former Election Director to discuss and explore election preparation procedures employed in previous elections. I wanted to independently determine if written procedures and checklists were created and utilized by the election staff in the preparation and conduct of prior elections. Those conversations confirm that a specific election procedure guidelines addressing all steps necessary to prepare for an election does not exist as a single, discreet document.

The Director and Election System Coordinator met in June, 2012, to discuss the specific issue of the number of voting machines needed for the November General Election. The Election System Coordinator assigned the initial task of calculating the proper number of voting machines to a Voter Representative on June 21, 2012. That same day, the Precinct Coordinator, at the request of the Voter Representative, generated an election spreadsheet that included all precincts, current voter registration totals for each precinct and applied the correct statutory standard of one voting machine per 250 registered voters. That Precinct Coordinator spreadsheet calculated that a total of 864 voting machines would be needed for the General Election based on their current voter registration data. For reasons, I have still not been able to establish, the Voter

Representative did not provide that voting machine spreadsheet with the calculated 864 voting machines to the Director or to the Election System Coordinator. Notably, in an email to the Election System Coordinator dated July 3, 2012, and not cc'd to the Director, the Voter Representative stated that the Director

“... gave me a revised list of the machines needed for the November 6 election. She got the number down to 605 machines....”

Exhibit A, email of Voter Representative.

The above email reflects the beginning step leading to a shortage of voting machines on November 6, 2012. Despite my best efforts, I have not located or confirmed the existence of any written directive issued by the Director or the Election System Coordinator establishing that 605 machines would be used on Election Day or how those 605 would be allocated to the 124 Richland County precincts. During my many meetings with the Director, I was repeatedly told that she did not establish or approve orally or in writing regarding the use of 605 machines for the election as referenced in the July 3, 2012 email, instead of the 864 machines calculated last summer by the Precinct Coordinator. During several meetings and interviews with the Voter Representative, I asked for the “revised list of machines” he referenced in his July 3, 2012 email. An examination of office files did not yield a copy of the “revised list” of machines. The Director stated to me that she did not create a “revised list” of voting machines referenced in the Voter Representative email.

Please recall that during the Richland County Legislative Delegation meeting on November 26, 2012, Board Chairman Crum produced “Exhibit B” that included a hand-written list of red numbers on the right side of the printout. The total of the listed red numbers is 576. That number total of 576 closely matches the number of voting machines actually distributed to precincts prior to Election Day.

Exhibit B reflects a total internal office communication disconnect between the properly calculated voting machine requirements established in June and the actual distribution of 577 voting machines prior to the general election. So what happened? I now draw on my 35 years as an attorney, my many years of involvement in election disputes and challenges and on my personal staff interviews and examination of November election documents. The printed columns and numbers of registered voters in each precinct at that time -- with a printed column reflecting the proper application of the 1 to 250 ratio established by the General Assembly -- are the exact numbers of calculated voting machines produced by the Precinct Coordinator on June 21, 2012. The two hand-written columns guide me to the following conclusions: (1) The Voter Representative, who issued the July 3, 2012 email referencing 605 machines was also the individual staffer assigned the responsibility to arrange for a systematic delivery of voting machines to precincts prior to the General Election. The Voter Representative assigned the zone numbers as a method of grouping voting machines for delivery to precincts located in the same general areas of Richland County. (2) I have concluded that the red numbers listed under the hand-written column entitled “# Machines” were numbers written by the Voter Representative and used for delivering voting machines to precincts. Ultimately, the issue of delivering the

correct number of voting machines to each precinct was the responsibility of the Director and not a part-time employee.

The list of red numbers, which totals 576 and bears an almost direct relationship to voting machines actually delivered to voting precincts reflects the absence of a coordinated election preparation and procedure plan. This is no record of on-going and regular Director and staff reviews of voting machines allocations in the months and weeks leading up to the General Election despite the fact that the voter registrations for Richland County were continuing to increase right up to the day of the Election. It is hard to reach any other conclusion or judgment other than the fact that a part-time election staff worker was allowed to proceed and to establish the distribution of the number of voting machines without any system of checks and balances as part of the election preparation process. This situation reflects an unfortunate application of the concept of an assumption "someone else" had specifically approved a voting machine usage number well below the 864 machines total initially identified in June.

My interviews with the Director and other members of staff reflect an ongoing confusion as to which document identifying precincts, number of voting machines, and number of PEBs represented the controlling election planning document for purpose of making sure that the appropriate number of machines were prepared and ready for delivery to the precincts prior to the November 6, 2012 Election. While the Director and staff thought they were making decisions in good faith, this confusion continued up to the November 6, 2012. The application of almost any procedure designed to review and follow up on on-going election preparations would have very likely identified this significant problem months before the election.

III. Precinct Overview

In the following precinct, some examples of voting data from several precincts are provided that vary by size to give the reader a better overview of what happened in Richland County during the General Election on November 6, 2012.

A. PARKWAY I

The largest precinct by number of registered voters is Parkway 1 and voting takes place at Summit Parkway Middle School. That precinct had 5,690 registered voters and collected 2,408 votes during the November 6th election. The precinct voter turnout was 42.32% of registered voters compared to the average County turnout of 65.34%. Applying the voting machine ratio established by the General Assembly results in a calculation of 5,690 divided by 250 equals 22.76 potential machines, or 23 when rounding the calculation up. Despite that calculation, Parkway I was provided 12 voting machines or roughly 52% of the statutory standard for the November 6th general election.

Just as important as the number of machines delivered, it is also important to examine voting machine operating performance. Of the 12 voting machines assigned to Parkway I, a review of voting machine performance data shows that one machine had operating problems during the day as reflected by the fact that the first vote on that particular machine was cast at

about 9:30 a.m., that same machine only recorded fifty-five votes during the entire election day, and the remaining eleven voting machines recorded a total of 2,353 votes.

Parkway I represents what is viewed by many as a vivid example of what happened in most precincts in Richland County. However, that generalization does not reflect or serve as an accurate example of the wide range of events taking place in the other 123 precincts. Parkway I does provide an example of the impact of the general relationship of the number of voting machines actually present in a precinct as compared to the state standard of one voting machine per 250 votes. The number of machines in place in a precinct is important and must also be examined and compared to the number of voting machines capable of recording votes throughout the day. As a practical matter, Parkway I was operating with eleven operating machines, not twelve, and that issue had a direct impact on the time needed to allow citizens waiting in line at 7 a.m. to vote, voters who cast votes during the day and the number of voters still in line to vote at 7 p.m. who had to continue to wait until they were able to actually stand before a voting machine and cast votes. Voting data shows that 29.651% of all votes cast at Parkway I were cast after 7 p.m. For some broader perspective, twenty-five of the Richland County 124 precincts show no votes cast after 7 p.m. which represents about 20% of all precincts. Thus, the generalization that long lines and late voting was common in all precincts is not accurate. The last vote cast in Parkway I occurred at 10:51 p.m., or three hours and fifty-one minutes after the 7 p.m. close of precincts.

B. ARCINCAPLE

The smallest voting precinct in Richland County is Arcincaple. Voters in that precinct voted at EE Taylor Elementary School. I have seen various spellings ("Ardincaple"), and I accept responsibility if I have somehow used the wrong spelling for this precinct. Arcincaple has only 399 registered voters and recorded 247 votes during the election. Voter turnout for Arcincaple was 61.9% which is much closer to the County average of 65.34% than the Parkway I voting turnout average of 42.32%.

Applying the statutory standard of one voting machine per 250 registered voters results in a calculation of 1.596, or the need for 2 voting machines in the precinct for the general election if you round up the calculation. However, Arcincaple was provided a total of 3 voting machines, which had several results. First, the three machines assigned to Arcincaple operated without problems. Unlike Parkway I, Arcincaple recorded no votes after 7 p.m., suggesting that the three machines handled the flow of precinct voters in a reasonable fashion and that long line problems were avoided in that precinct.

C. LINCOLNSHIRE

I now turn to the Lincolnshire precinct for several reasons. Lincolnshire had several problems during the course of the election. The precinct was located at Forest Heights Elementary School. Lincolnshire has 2,330 registered voters and 1,222 of those voters came to the precinct to vote on November 6 with a resulting turnout of 52.57%. Applying the statutory standard of one voting machine per 250 registered voters results in a calculation of 9.352 and the need for ten machines *if the calculated number is rounded up*. Lincolnshire was

provided with six voting machines or 60% of the statutory standard. However, just as important 1 voting machine was essentially dead during much of the voting day. This individual machine was first identified by USC Professor Buell during his review of election data after the election. As a practical matter, it was only because Professor Buell had volunteered to observe the Lincolnshire precinct for part of the day that the issue of possible "uncounted votes" first emerged and came to my attention. While at the precinct for several hours, Professor Buell observed six voting machines present in the precinct as the voting day started. During his examination of election data, he noticed only five voting machines in Lincolnshire were identified as recording votes.

Professor Buell invited me to examine and discuss the data associated with that voting machine that was physically located at the precinct to determine what might have occurred. The voting machine data shows that it was first serviced by a voting technician at about 9:30 a.m. and the first vote cast on that machine happened twenty-four minutes later, at 9:54 a.m. I have confirmed that this particular machine was used as a curbside voting machine and was taken outside by precinct workers on multiple occasions to allow curbside voting.

It should be noted that all voting machines used in South Carolina are designed to operate for up to two to three hours on battery power alone if the machine is needed to allow a voter to cast votes outside in a parking lot when electric plug-in power is not available. I have confirmed that all voting machines can operate without a batter in place if it is properly plugged into an appropriate electrical socket. As a result, I have currently concluded that reported "battery problems" do not fully explain problems reported by precinct workers on machines inside the precinct that were plugged into an electrical socket. A more likely explanation for some voting machine problems may properly be attributed to "power supply" problems. The term "power supply" generally refers to the small power transformer placed inside each voting machine and used to reduce or "transform" the 120 voltage that comes from an electrical outlet down to a much lower voltage needed to properly operate the electronic equipment inside the voting machine. A quick examination of almost all laptop computers will reveal a small black box between the electrical cord plugged into a wall socket and the cord connected to the laptop. That small device serves a power supply or transformer similar to the device used in Richland County voting machines. Simply stated, a power supply unit that cannot property reduce voltage to the required level will result in a machine failure after any available electrical energy in the voting machine battery is fully consumed even if the voting machine is properly attached to an electric outlet.

During the course of my interviews with election staff that I conducted as part of my on-going election review process and after several trips to the County warehouse where voting machines are stored and prepared for an upcoming election, *I confirmed that proper steps to charge voting machine batteries were employed prior to the general election.* So, what is the likely answer to the claim of battery problems? Election staff has already taken steps to obtain electric testing equipment capable of testing the voltage output of a voting machine power supply unit. The results of those tests, when fully completed, may provide a clearer answer as to whether existing power supply units have now reached a stage in their expected performance cycle where they must now be replaced.

I now return to the issue of the sixth voting machine that Professor Buell identified as potentially containing "uncounted votes". The machine in question recorded its first vote at 9:54 a.m. and the last vote at 2:15 p.m. Apparently, precinct workers concluded that the machine could not operate properly shortly after 2:15 p.m. and was not used again. At the end of Election Day, precinct workers are trained to tape the "zero" tape for each machine opened prior to the 7 a.m. voting start time. A zero tape confirms that a machine was tested and checked on election morning before polls opened to confirm no votes from another election remained in the machine. Perhaps for the very simple reason that there was no available tape to adhere the zero vote tape on the wall to confirm that the individual machine had been opened and cleared to operate and collect votes at the start of Election Day. The "zero" tape for that machine was lost and was never returned to the County Election Office. The Office received a zero tape for the other five voting machines and proceeded to take the normal steps required to collect and count votes for those five machines. The votes in the sixth machine were not counted because election records showed only five machines were used. Some basic accounting process was not in place to identify this problem.

Professor Buell, after an extended review of voting machine data and discussions with election staff, concluded that the sixth voting machine was opened using the wrong "PEB" ("Personalized Electronic Ballot"). Compounding that problem, there was an effort at the end of the day to close that same voting machine with another PEB, which creates problem messages produced by the machine software that were likely understood by precinct workers to mean that the machine recorded no votes. Professor Buell examined the paper closing tape which states that the voting machine was not opened which is not accurate and also does not accurately describe the actual operating problem encountered by the machine on Election Day. Unfortunately, the machine actually contained a total of twenty-seven votes that were not included in the certified Richland County vote total. Even more disheartening, those twenty-seven votes were cast by curbside voters who took time to vote despite whatever problems they were confronting that made it difficult or impossible to enter the precinct itself to cast a vote. They voted on that machine brought outside by a precinct worker. Their votes were not counted in the final vote tally.

After our review of the Lincolnshire precinct machine problem, I took steps to conduct an extended examination of precinct voting machine data to determine if any other "missing" votes might still remain in a voting machine that had been treated as not being opened in a manner similar to Lincolnshire. That detailed after-election review, led by Professor Buell, resulted in the identification of a second machine containing uncounted votes in the Spring Valley West precinct. That review concluded that a machine, thought be unopened and not used due to a misunderstanding of the voting machines error message, contained 102 votes that were not included in the Richland County certified vote total. Our after-election review and examination of data concluded that a total of 127 votes were cast in Spring Valley West and not counted or included in the certified vote totals for the 2012 Richland County General Election reported to the State Election Commission. After continuing examination, my earlier statements that while uncounted votes are always an unacceptable occurrence, those 127 uncounted votes did not change any election results remains accurate. *Even though one uncounted vote is one too many for the Board who has repeated affirmed that it wanted each and every vote cast to be counted, the one ray of good news on this uncounted vote problem is that the 2012 Richland County*

uncounted vote total of 127 was substantially lower than the 2010 Richland County uncounted vote total of 1,127 votes. The 2012 uncounted vote total for Richland County was reduced by approximately 87% or 1,000 fewer uncounted votes. Even one uncounted vote is too many and if measures to check and confirm return of the machines or flash cards or PEBs by serial number from each precinct – check them out and check them in – could have assisted in preventing this problem appearing to be a human error in using the wrong PEB to open and close the machine.

D. SPRING VALLEY WEST

I turn to Spring Valley West because it is one of two precincts that my review with Professor Buell identified as having uncounted votes. This precinct has 2,776 registered voters and recorded votes from 1,185 voters, which represents a voter turnout of 42.69% - lower than the County-wide voter turnout of 65.34%. Applying the statutory standard of one voting machine per 250 registered voters yields a calculation of 11.104 or twelve voting machines if you round up the calculation. Rather than twelve voting machines, Spring Valley West was provided with six voting machines, or 50% of the state standard. Notably, one of the six machines placed in the precinct did not open for use until 3:31 p.m. on the afternoon of Election Day.

Spring Valley West clearly had long lines and delays in voting that are directly associated with only 50% of machines being placed in the precinct for use during the general election. Unlike Arcincaple precinct, which recorded no votes after 7 p.m., Spring Valley West had 30% of all votes cast take place after 7 p.m. The last recorded vote was cast at 10:43 p.m., or three hours and forty-three minutes after the 7 p.m. precinct closing.

While one must be cautious in using various percentage calculations as a means of attempting to explain an occurrence, there is no dispute that 102 Spring Valley West votes were not counted and included in the certified vote total. Those 102 votes represents a failure to properly account for 18.6% of votes cast in that precinct on November 6th. Under any analysis, 18.6% is a very sobering number for the voters that took the time to travel to their precinct to cast votes. As before, this very unfortunate and unacceptable number of uncounted votes did not impact any elections in that precinct or impact the outcome of any county wide voting issue.

E. SPRINGVILLE

I turn to Springville precinct because it is a large precinct with 3,465 registered voters, of which 2,186, or 63.09% of voters turned out to vote, and also because the statutory standard of voting machines totaled fourteen and only ten voting machines were provided to that precinct. Despite the large size of the Springville precinct and the shortage of voting machines, the last recorded vote for Springville did not take place late in the evening as might be expected based on earlier discussions of other precincts. Springville had a strong voter turnout of 63.09% and still was able to conclude voting shortly after 7:00 p.m. The last recorded vote took place at 7:04 p.m. despite almost 2,200 voters arrived at the precinct during the day. What explains this large precinct closing shortly after the 7:00 p.m. closing time when so many voters came to vote at that precinct? With the assistance of Professor Buell, we examined machine performance data. Notably, machine data reflects that Springville did not encounter any significant voting machine

operating problems like other precincts. All 10 machines reflect that they were opened and available to immediately record votes at 7:00 a.m. It is clear that machine reliability in each precinct has a major impact on the movement of voters through a precinct. Voting machine problems immediately create a ripple impact and delay factor on later voters throughout Election Day. While Springville was only provided approximately 71% of required voting machines, they were able to consistently operate and move a large volume of voters through the precinct throughout the day.

Despite being a large precinct with a big turnout of voters and fewer than the statutory standard of voting machines, Springville recorded the last vote of the day at 7:04 p.m. This voting performance suggests that more attention must be focused on the absolute necessity to take steps to have a much lower rate of voting machines that have operation problems if elections in Richland County have any hope of improving the long delays that some voters in Richland County encountered in some precincts. I earlier reported that 25 precincts recorded no votes after 7:00 p.m. Just as important, sixteen precincts recorded 25% or more of all votes cast after 7:00 p.m. In that group, Wildwood precinct had 25.061% of all votes cast after 7:00 p.m. Keels precinct had the highest percentage of votes cast after 7:00 p.m. at 35.779%. The last vote at Kell was cast after midnight. My wife and I voted in Spring Valley precinct, which is a large precinct and has 2,577 registered voters. Spring Valley had a voter turnout of 1,229 voters or a 47.69% voter turnout. However, only about 7% of all votes cast in the Spring Valley precinct took place after 7:00 p.m. My votes were cast at approximately 7:20 p.m. after a wait of two hours and twenty minutes. I would note that I have waited to vote for a longer period in a previous election. My review of available election data suggests that size of a precinct does not alone accurately predict potential voting delays. However, the number of machines delivered to a precinct is not more important than the number of those machines present and capable of recording votes on a consistent basis throughout the day.

F. MEADOWFIELD

I turn to Meadowfield precinct to examine the impact of voting machine operating problems. Meadowfield had 1,821 registered voters and had 940 voters appear to vote. Meadowfield's voter turnout was 51.62%. Applying the statutory standard of 1 voting machine per 250 registered voters yields a calculation of 7.284 or eight voting machines if you round up and seven voting machines if you round down. Regardless of rounding up or down, Meadowfield received seven voting machines which is either exactly correct according to state law if you round down or 88% of the state standard of eight machines if you round up. How did Meadowfield do with a relatively high percentage of voting machines when you apply the statutory standard? Meadowfield presents a very mixed picture of voting machine reliability during the course of Election Day. Three of the seven voting machines recorded a majority of votes cast and total 727 or 77.3% of all votes in that precinct. A review of voting machine performance for the remaining 4 machines, conducted by Professor Buell at my request, shows one machine only recording thirteen votes, one machine recording sixty-one votes, one machine recording sixty-two votes and the fourth machine only recorded a total of 213 votes. Those 4 machines recorded only 22.6% of all votes cast. This example provides the reader with some evidence of the impact of machines not operating properly on other available voting machines. If all seven voting machines had been available to record votes throughout the day, each machine

would have only needed to record about 134 votes if the voters were spread out evenly among 7 machines. Instead, voters were forced to wait for additional periods of time to use the three fully-available machines which is reflected in the fact that those three machines recorded an average of about 242 votes rather than 134 votes if all machines were available to voters. This is exactly the circumstance that produces time delays for waiting voters. Here, the total number of machines assigned to a precinct does not necessarily predict potential voting delay outcomes. Instead, the percentage of available machines that are actually operating properly provides a clearer measure for precinct voting efficiency. As a result of voting machine operational performance in Meadowfield, 13.61 % or 127 votes of all votes were cast after 7 p.m.

G. WARD 11

I now turn to Ward 11 in order to incorporate many comments provided to me by various precinct workers who I contacted to ask questions or who contacted me to share their views on the conduct of the November 6th election. I received calls from precinct workers who reported that the election went smoothly in their precinct and wanted me to report that the Executive Director and her staff did an excellent job preparing poll workers and that the claim that all precincts encountered serious problems was not an accurate or a fair description. There is no question that many precincts did conduct a successful and timely election without the need for late evening voting beyond 7 p.m. I also spoke to precinct workers who told me they repeatedly attempted to secure additional voting machines for their precinct prior to the election with no success. Precinct workers who had worked in previous elections reported that they immediately recognized that the number of machines assigned to their precinct for the November 6th election was lower than in previous elections and were concerned about voter delays. They reported that their direct requests during precinct training sessions, phone calls and emails prior to the election did not yield additional voting machines. When I questioned election office staff, they confirmed that they had received requests, phone calls, and emails requesting additional voting machines prior to the November 6th election. However, the office had no coordinated procedure to examine the basis for repeated requests for additional machines nor maintain a detailed list as to why no additional machines were provided prior to the election.

I had a detailed discussion with Michael Sullivan on these issues since his name came up in the media and was identified during an election protest hearing. Mr. Sullivan confirmed that he was a poll worker who raised concerns about the number of voting machines assigned to Ward 11 during a training session. He advised that Ward 11 was provided five voting machines for the April primary and questioned why his precinct was only assigned three voting machines for the general election. Mr. Sullivan provided me with a series of emails leading up to an email dated September 27, 2012, raising concerns with election staff about the number of voting machines that Ward 11 would receive. He asked if the office had checked on the number of voting machines assigned to Ward 11 for the 2008 presidential election. His email reflects that Ward had as many as ten voting machines in 2008 and questioned why only three machines were assigned in 2012. He received no response to his email inquiries.

Ward 11 has 1,509 registered voters and 690 voters arrived to vote on November 6th. Ward 11 has a voter turnout rate of 45.73%. Applying the statutory standard of 1 voting machine for each 250 registered voters yields a calculation of 6.036. If that calculation is

rounded up the standard would suggest 7 voting machines be placed in Ward 11; if you round that calculation down, 6 voting machines would be assigned to Ward 11. Instead, despite requests in the months before the election for additional machines, only 3 machines were delivered for the general election. So, what happened at Ward 11? Mr. Sullivan reported that approximately 75 voters were lined up and waiting to vote at 7 a.m. He reported that delays in voting started immediately at 7 a.m. and continued throughout the day. Like Arcincaple precinct, which also had 3 machine for only 399 registered voters, Ward 11 had 3 machines for 1,509 registered voters assigned to that precinct. Arcincaple recorded no votes after 7 p.m. and Ward 11 recorded 11.74% of all votes cast after 7 p.m. Mr. Sullivan reported that the last vote in Ward 11 happened around 9 p.m.

It should be noted that I also asked Mr. Sullivan about statements I had seen in the media regarding how election staff determined how many machines would be assigned to a precinct. He reported that election staff said that prior actual voter turnout in previous elections was used to apply the 1 machine per 250 voters. I did not have any other precinct worker say they were advised about a similar method to assign voting machines to a precinct. A review of Richland County election data and information confirms that the state statutory standard, first and properly recognized in a printed report from the election staff on June 21, 2013, the office maintained no procedures to confirm the correct statutory standard was being applied to assign voting machines. Just as important, no effort was made to examine and recognize the rising voter registration total's impact on the need to assign additional machines to precincts. My continuing review since my initial report confirms a total absence of an integrated management system and a clear line of authority addressing election preparation steps and staff communication requirement that sure

FINDINGS

Checks and Balances Needed Regarding Capturing Votes on All Machines and for Return of Machines, PEBs, and Flash Cards to Election Office; Probable Human Error Caused the Uncounted Voting Machine Data

While the iVotronics machine voting data is stored on 3 redundant locations on the iVotronics machine itself, there appears to be a potential flaw in knowing whether all machines in a precinct are closed if the wrong PEB is used to open another machine or the same PEB is not used to open all machines at a polling location. The Green PEB is supposed to be used to open and close so that the tape will indicate all machines opened were closed. After all precinct machines are closed, the Green PEB is inserted into the communication pack ("Compak") which reads the PEB(s) and prints a tape ("Tape") showing results from all machines, a serial number for each voting machine, the public count (the number of voters voting on the machine) and

whether each machine was closed so that the vote total was recorded. Each precinct is furnished with a Compak, which is returned to the RCEC when the precinct results are returned.

This is clearly what happened in the Lincolnshire and it was not discoverable due to contradicting statements by the PLT that the same and correct PEB was used to open the additional machine, and the failure by the poll manager to either print or return the opening tape the additional machine – unless the tape was misplaced during the SLED seizure and recount that begun by the SEC and was stopped.

It is understood that the County Office is considering changes to the manner in which the Voting Machines and Flash cards are inventoried by serial number. It may be useful to have complementing numbering so that the numerical number is the same for the machine and the flash card. This may be it easier for tracking purposes in the field by PLTs delivering extra machines or items on a busy, hectic election day. For example, machines --- VM1234567 -- and Flash cards – FC1234567A – using letters to track and change when a new card is needed and old card is worn out. Other thoughts for tracking have been provided herein.

Human Error Caused the Voting Machines Underallocation

The Board should consider reviewing the data related to the number of votes cast after 7:00 p.m. This is a consideration for any plan or discussion on whether or not split any large precinct having more than 1500 registered voters, as well as considerations for financial costs (if any) of additional poll managers, poll workers, training, machines, PEBs, flash cards, and other materials or items needed and used by the polling places or other considerations.

However, a referenced in the Interim Report, there was lack of communication and related checks and balances to confirm the application of the statutory allocation formula. In addition to checks by Senior Staff responsible for this area, a review of the job responsibilities for the permanent positions should be reviewed to see if there is logical correlation as to the matters needed in preparation for an election. The current staff did engage in several elections of differing scale – municipal elections and a presidential preference primary – however, this was the first Presidential General Election that had record number of absentee ballots cast and additional registered voters. Measures in any check list should account for consideration of additional registered voters as machines and resources exist to help ensure smooth implementation of procedures and training at polling locations.

From:
Sent: Tuesday, July 03, 2012 10:20 AM
To:
Subject: Re: EXTRA MACHINES

Ok. I forgot to ask you what day you want work this week since you are off tomorrow.

From:
To:
Sent: Tue Jul 03 10:10:03 2012
Subject: EXTRA MACHINES

I just talked with Lillian and she gave me a revised list of the machines needed for the Nov 6 Election. She got the number down to 605 for machines. She also told me that we need to prepare 20-30 machines for 2020 Hampton and the Township Auditorium, but the Township is not approved as of yet.

Voter Representative
2020 Hampton Street
Columbia, SC 29202



Precinct	Precinct Name	Total Voters	# Machines	ZONES	# Machines
101	Ward 1	1,781	7	1	4
102	Ward 2	793	3	1	3
103	Ward 3	1,393	5	3	3
104	Ward 4	1,340	5	1	3
105	Ward 5	1,138	4	1	3
106	Ward 6	1,263	5	5	4
107	Ward 7	1,195	4	7	4
108	Ward 8	3,155	12	2	6
109	Ward 9	1,390	5	2	5
110	Ward 10	1,415	5	1	3
111	Ward 11	1,338	5	8	3
112	Ward 12	1,492	6	1	4
113	Ward 13	1,914	7	8	4
114	Ward 14	1,492	5	8	4
115	Ward 15	956	3	2	3
116	Ward 16	1,253	5	8	3
117	Ward 17	1,463	5	8	3
118	Ward 18	1,301	5	2	3
119	Ward 19	1,335	5	3	3
120	Ward 20	1,674	7	3	4
121	Ward 21	1,639	6	7	4
122	Ward 22	1,548	6	3	4
123	Ward 23	995	4	8	3
124	Ward 24	868	3	8	3
125	Ward 25	1,467	5	8	3
126	Ward 26	1,415	5	9	3
129	Ward 29	1,471	5	7	3
130	Ward 30	819	3	1	3
131	Ward 31	1,044	4	3	3
132	Ward 32	943	4	2	3
133	Ward 33	1,047	4	2	3
134	Ward 34	1,152	4	2	3
301	Arcadia	1,490	6	6	4
302	Ardincaple	336	2	3	3
303	Ballentine	2,736	10	12	8
304	Beatty Road	998	4	16	4
305	Bluff	2,082	8	1	6
306	Blythewood #1	1,025	4	10	3
307	Blythewood #2	1,594	6	10	4



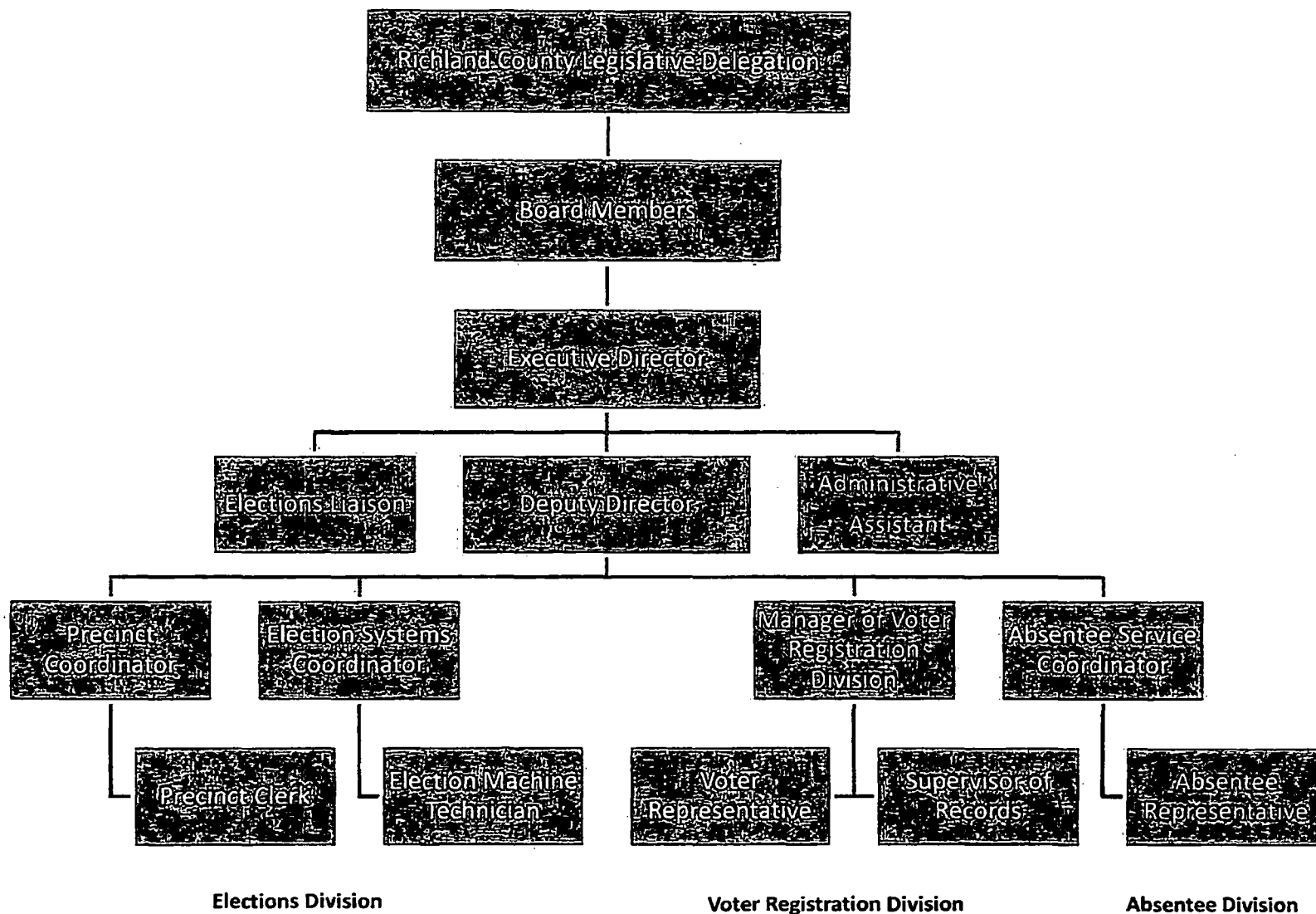
308	Brandon	3,359	13	9	8
309	Briarwood	2,513	10	6	8
310	Caughman Road	1,788	7		6
311	College Place	1,608	6	7	4
312	Cooper	1,159	4	6	3
313	Dennyside	798	3	4	3
314	Dentsville	2,288	9	6	4
315	Dutch Fork #1	2,136	8	12	6
316	Eastover	2,454	9	15	4
317	Edgewood	1,808	7	7	4
318	Estates	4,108	16	11	10
319	Fairlawn	2,634	10	4	6
320	Fairwold	938	4	7	3
321	E Forest Acres	1,174	4	5	3
322	N Forest Acres	1,326	5	5	3
323	S Forest Acres	1,485	5	5	4
324	Friarsgate #1	1,869	7	17	4
325	Friarsgate #2	1,609	6	17	4
326	Old Friarsgate	1,232	4	17	3
327	Gadsden	1,903	7	15	4
328	Garners	888	4	15	3
329	Greenvew	1,778	7	7	6
330	Gregg Park	1,722	7	5	4
331	Hampton	1,712	7	9	4
332	Harbison #1	2,312	9	17	6
333	Hopkins	2,609	10	15	6
334	Horrell Hill	2,157	8	14	6
335	Hunting Creek	471	2	14	2
336	Keels	3,086	12	6	6
337	Keenan	1,754	7	5	4
338	Killian	1,249	4	10	3
339	Kingswood	2,726	10	16	6
340	Lincolnshire	2,129	8	4	6
341	Longcreek	3,249	12	10	8
342	Lykesland	2,277	9	14	6
343	McEntire	841	3	14	3
344	Meadowfield	1,704	6	9	4
345	Meadowlake	2,152	8	4	6
346	Midway	2,795	11	6	6
347	Mill Creek	1,694	6		4

348	Monticello	2,174	8	4	6
349	North Springs #1	3,120	12	11	8
350	North Springs #2	2,703	10	11	3
351	Oakwood	963	3	5	3
352	Olympia	2,145	8	1	6
353	Parkway #1	5,217	20	11	12
354	Pennington	2,535	10	9	6
355	Pine Lakes	2,482	9	14	6
356	Pinewood	1,543	6	14	3
357	Polo Road	4,312	17	13	10
358	Pontiac	2,689	10	13	4
359	Rice Creek	3,984	15	11	7
360	Ridgewood	676	3	4	3
361	River Springs	3,444	13	12	10
362	Riverside	1,189	4	16	4
363	Riverwalk	2,761	11	17	6
364	Satchelford	1,308	5	5	4
365	Skyland	1,102	4	16	3
366	South Beltline	1,572	6	9	3
367	Spring Valley	2,399	9	17	6
368	Springville	3,291	13	12	10
369	St Andrews	1,230	4	16	3
370	Trenholm Road	852	3	6	3
371	Valhalla	2,299	9	15	6
372	Valley State Park	1,976	7		6
373	Walden	995	3	16	3
374	Westminster	1,837	7	16	4
375	Whitewell	1,753	7	16	4
376	Wildewood	2,692	10	13	5
377	Woodfield	2,607	10	6	8
378	Woodlands	2,093	8	9	5
379	Blythewood #3	1,366	5	10	3
380	Dutch Fork #2	2,915	11	12	6
381	Harbison #2	1,224	4	17	4
382	Kelly Mill	905	3	11	3
383	Lake Carolina	2,276	9	11	5
384	Oak Pointe	2,909	11	12	8
385	Parkridge	936	3	17	3
386	Parkway #2	2,716	10	11	6
387	Pine Grove	1,640	6	16	3

388	Ridge View	4,340	17	11	8	
389	Round Top	652	2	10	2	
390	Sandlapper	2,671	10	10	6	
391	Spring Hill	1,178	4	12	4	
392	Spring Valley west	2,559	10		6	
	County Total	229,472	864			

08/21/2012

Richland County Board of Elections & Voter Registration



Warehouse Distribution List for Voting Machines by Zone

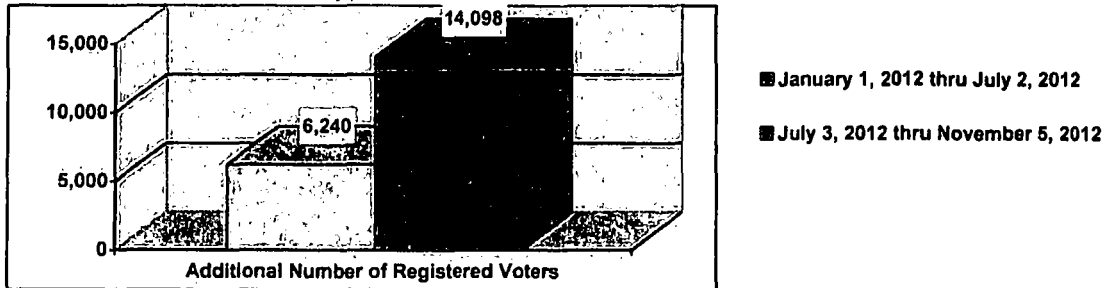
PRECINCT	PRECINCT NAME	ADDRESS	ZONE	#ASSIGNED
101	Ward 1	1650 Park Circle	1	4
102	Ward 2	1930 Marion St.	1	3
104	Ward 4	815 Elmwood Ave.	1	3
105	Ward 5	200 Wayne St.	1	3
110	Ward 10	333 Etiwan Ave.	1	3
112	Ward 12	2600 Wheat St.	1	4
130	Ward 30	1800 Lincoln St.	1	3
305	Bluff	148 Carswell Dr	1	6
352	Olympia	621 Bluff Road	1	6
103	Ward 3	1016 Oak St.	2	6
109	Ward 9	2324 Geneva St.	2	6
115	Ward 15	1510 Fairview Dr.	2	3
118	Ward 18	2352 Covenant Rd.	2	3
122	Ward 22	2101 Walker Solomon Way	2	3
123	Ward 23	2300 Green St.	2	3
124	Ward 24	2300 Birchurst Rd.	2	3
108	Ward 8	1158 Union St.	3	3
119	Ward 19	1001 1st Circle	3	3
120	Ward 20	941 Jackson Ave.	3	4
122	Ward 22	4800 Monticello Rd.	3	4
131	Ward 31	4200 Main St.	3	3
302	Ardincaple	200 Murray St.	6	3
313	Dennyside	6429 Bishop Ave.	4	3
319	Fairlawn	361 Pisgah Church Rd.	4	6
340	Lincolnshire	2500 Blue Ridge Terrace	4	6
345	Meadowlake	600 Beckman Rd.	4	6
360	Ridgewood	5326 Ridgeway St.	4	3
348	Monticello	280 Campground Rd.	4	6
106	Ward 6	3032 Pine Belt Rd.	5	4
337	Keenan	3455 Pine Belt Rd.	5	4
321	E Forest Acres	2245 Montclair Dr.	5	3
322	N Forest Acres	3900 Covenant Rd.	5	3
323	S Forest Acres	5000 Clemson Ave.	5	4
330	Gregg Park	5250 Forest Dr.	5	4
351	Oakwood	6904 Satchelford Rd.	5	3
364	Satchelford	5901 Satchelford Rd.	5	4
301	Arcadia	6320 Wedgetalk Rd.	6	4
309	Briarwood	2740 Alpine Rd.	6	3
312	Cooper	6408 Bridgewood Rd.	6	6
336	Keels	7500 Springerest Dr.	6	6
346	Midway	3040 Hunt Club Rd.	6	6
314	Dentsville	2721 Decker Blvd.	6	4
370	Trenholm Road	6515 North Trenholm Rd.	6	3



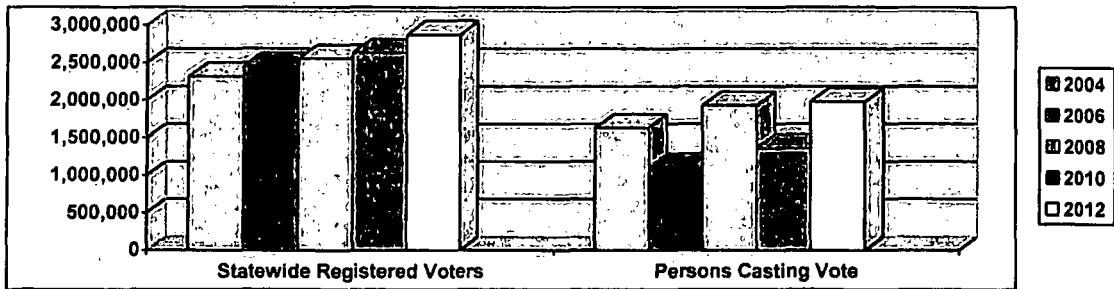
377	Woodfield	7900 Brookfield Rd.	6	8
311	College Place	6001 Weston Ave	7	4
121	Ward 21	1300 Ashley St.	7	3
320	Fairwold	5935 Token St.	7	3
317	Edgewood	111 Garden Dr.	7	4
129	Ward 29	5125 Fairfield Rd.	7	3
329	Greenview	6700 David St	7	6
107	Ward 7	2600 Barhamville Rd.	7	4
123	Ward 23	2847 Davine St.	8	3
111	Ward 11	1160 S. Holly St.	8	3
113	Ward 13	3100 Rosewood Dr.	8	4
114	Ward 14	3500 Duncan St.	8	4
116	Ward 16	3119 Millwood Ave	8	3
117	Ward 17	4438 Devereaux Rd.	8	3
124	Ward 24	4205 Kilbourne Rd.	8	3
125	Ward 25	4205 Kilbourne Rd.	8	3
126	Ward 26	1117 Brandon Ave.	8	3
308	Brandon	7300 Patterson Rd.	9	8
331	Hampton	1400 S. Kilbourne Rd.	9	4
344	Meadowfield	525 Galway Lane	9	4
354	Pennington	1005 Asbury Dr.	9	6
366	South Beltline	534 South Beltline Blvd.	9	3
378	Woodlands	6500 Old Knight Parkway	9	5
306	Blythewood #1	125 Boney Rd.	10	3
307	Blythewood #2	126 Boney Rd.	10	6
379	Blythewood #3	10901 Wilson Blvd.	10	4
338	Killian	1424 Marthan Rd	10	3
341	Longcreek	2351 Longtown Road East	10	8
318	Estates	1245 Bookman Rd.	10	10
389	Round Top	449 Rimer Pond Rd.	10	2
390	Sandlapper	1001 Longtown Rd.	10	6
372	Valley State Park	2621 Clemson Road	11	6
382	Kelly Mill	1141 Kelly Mill Rd.	11	3
383	Lake Carolina	1151 Kelly Mill Rd.	11	5
349	North Springs #1	4210 Clemson Rd.	11	8
350	North Springs #2	1300 Clemson Rd.	11	8
353	Parkway #1	200 Summit Parkway	11	12
386	Parkway #2	200 Summit Parkway	11	6
359	Rice Creek	4751 Hard Scrabble Rd.	11	7
388	Ridge View	4801 Hard Scrabble Rd.	11	8
361	River Springs	115 Connie Wright Rd.	12	10
391	Spring Hill	1007 West Shady Grove Rd.	12	4
368	Springville	1531 Three Dog Road	12	10
315	Dutch Fork #1	1400 Old Tamah Rd.	12	6
380	Dutch Fork #2	1528 Old Tamah Rd.	12	4
303	Ballentine	1040 Bickley Rd.	12	8
384	Oak Pointe	1 River Bottom Rd.	12	8

357	Polo Road	730 Polo Rd.	13	10
358	Pontiac	500 Spears Creek Rd.	13	4
376	Wildewood	100 Polo Rd.	13	5
367	Spring Valley	225 North Brickyard Road	13	6
371	Valhalla	120 Sparkleberry Lane	13	6
392	Spring Valley West	306 Flora Dr.	13	6
355	Pine Lakes	2612 Lower Richland Blvd.	14	6
356	Pinewood	2615 Lower Richland Blvd.	14	3
334	Horrell Hill	517 Horrell Hill Blvd.	14	6
335	Hunting Creek	2615 Lower Richland Blvd.	14	2
343	McEntire	731 Horrell Hill Rd.	14	3
342	Lykesland	7725 Caughman Rd.	14	6
310	Caughman Road	7725 Caughman Road	15	6
333	Hopkins	150 Hopkins Park Rd.	15	6
347	Mill Creek	925 Universal Drive	15	4
327	Gadsden	1660 S. Goodwin Circle	15	4
316	Eastover	1031 Main St.	15	4
328	Garners	2750 McCord's Ferry Rd.	15	3
339	Kingswood	1701 Westchester Dr.	16	6
387	Pine Grove	111 Huffstetler Rd.	16	3
362	Riverside	1500 Broad River Rd.	16	4
365	Skyland	901 Skyland Dr.	16	3
369	St Andrews	1231 Bluefield Rd.	16	3
373	Walden	111 Huffstetler Dr.	16	3
374	Westminster	1715 Broad River Rd.	16	4
304	Beatty Road	920 Beatty Rd.	16	4
375	Whitewell	1230 St. Andrews Rd.	16	4
324	Friarsgate #1	1712 Chadford Rd.	17	4
325	Friarsgate #2	1500 Chadford Rd.	17	4
326	Old Friarsgate	7900 Broad River Rd.	17	3
332	Harbison #1	106 Hill Pine Rd.	17	6
381	Harbison #2	5501 Broad River Rd.	17	4
385	Parkridge	131 Lake Murray Blvd.	17	3
363	Riverwalk	1110 Kinley Rd.	17	6

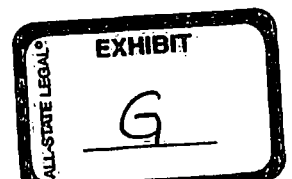
**Richland County Registered Voter Changes
(January 1, 2012 thru November 5, 2012)**



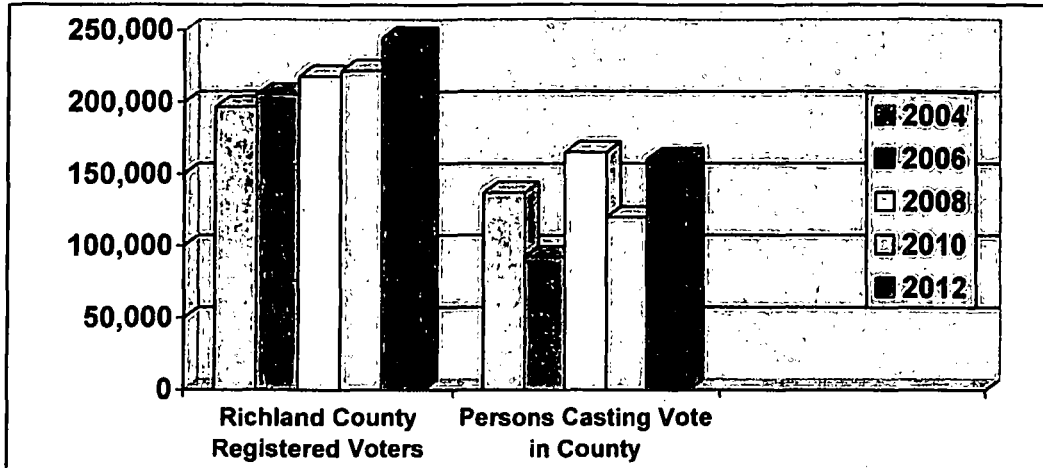
**South Carolina Registered Voters and Voter Participation
(2004 – 2012)**



Source: Website of the South Carolina State Election Commission found in their Statistics and Historical Data

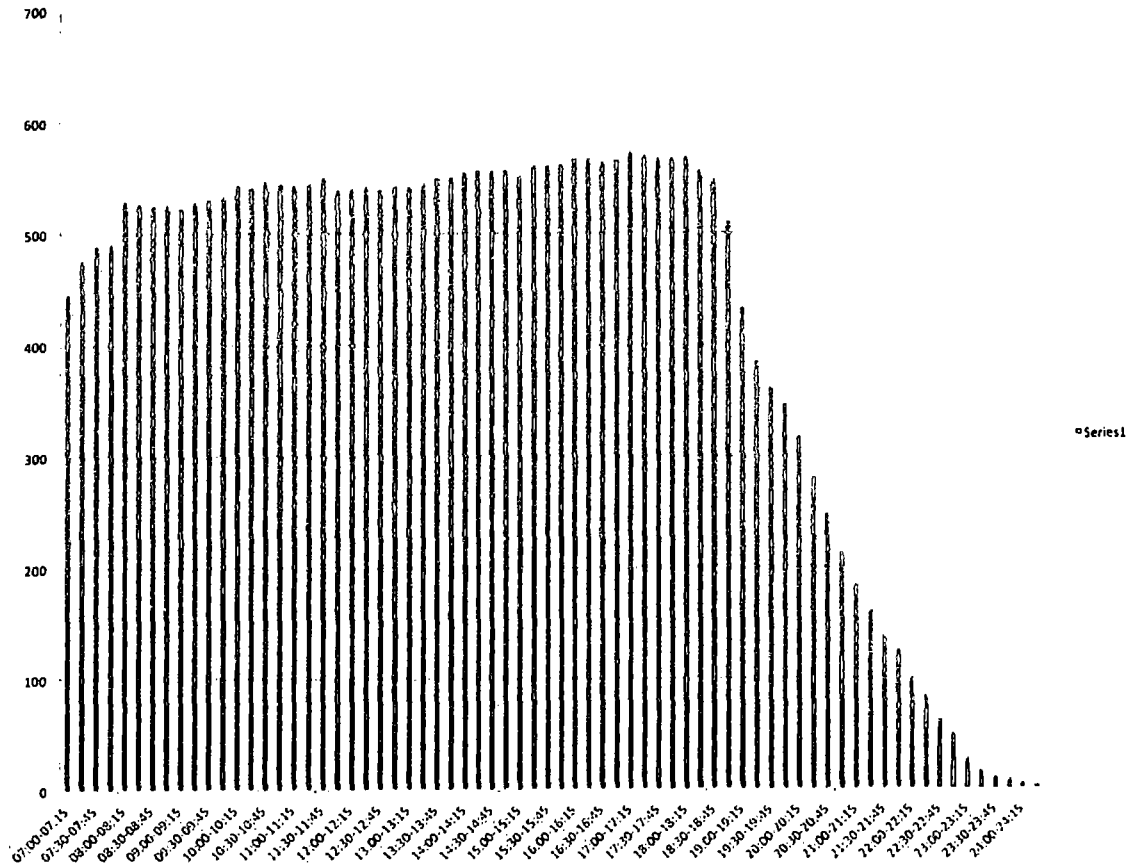


**Richland County Registered Voters and Voter Participation
(2004 – 2012)**



Source: Website of the South Carolina State Election Commission found in their Statistics and Historical Data

Election Day Interval Voting Activity For The
627 Voting Machines In Precincts



ILL. STATE LEGAL
EXHIBIT
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PRECINCT	CODE	# OF NEW VOTERS BETWEEN 7-3- 12 AND 11-5- 2012	# of Registered Voters for General Election	Machines Distributed and Used for 2010 General Election	Machine Distribution Based on 1 per 250 standard (no rounding up or down*).	Machine Distribution Based on 1 per 250 standard (rounding up > .5 or down < .5*)	Correct # VM @ Beginnin g of Day	MACHINES DISTRIBUTED PRIOR TO 11/6/12 (2012 GENERAL ELECTION)	Machines Added on 11/6/12 (estimate)	Total Number of Machines Working on 11/6/12	Machines Not Working Or Used at Polls (estimate)	6/21/12 RED NUMBERED DOCUMENT PRE-ELECTION MACHINE ALLOCATION	Number of Voter Signature s	Number of Votes Cast	DIFFERENCE (Signatures vs. Votes)
				811	947.44	947	7	577	70	629		576			
WARD 1	101	158	1,871	6	7.48	7		4		4		4	660	659	-1
WARD 2	102	90	837	3	3.35	3	✓	3	1	4		3	342	342	0
WARD 3	103	73	1,435	4	5.74	6		3	1	4		3	840	841	1
WARD 4	104	63	1,387	5	5.55	6		3	1	4		3	701	704	3
WARD 5	105	233	1,186	4	4.74	5		3		3		3	579	582	3
WARD 6	106	43	1,314	5	5.26	5		4		4		4	717	718	1
WARD 7	107	95	1,248	6	4.99	5		4	1	4	1	4	608	611	3
WARD 8	108	593	3,493	10	13.97	14		6		5	1	6	1140	1143	3
WARD 9	109	133	1,486	5	5.94	6		5		5		5	658	660	2
WARD 10	110	59	1,472	5	5.89	6		3		3		3	780	781	1
WARD 11	111	88	1,387	5	5.55	6		3		3		3	689	690	1
WARD 12	112	67	1,537	6	6.15	6		4		4		4	807	808	1
WARD 13	113	63	1,978	7	7.91	8		4		4		4	1067	1068	1
WARD 14	114	47	1,532	6	6.13	6		4	2	5		4	891	873	-18
WARD 15	115	44	973	3	3.89	4		3		3		3	595	595	0
WARD 16	116	26	1,272	5	5.09	5		3		3		3	761	763	2
WARD 17	117	54	1,491	6	5.96	6		3		3		3	895	894	-1
WARD 18	118	104	1,374	5	5.50	6		3		3		3	666	663	-3
WARD 19	119	120	1,405	5	5.62	6		3		3		3	674	674	0
WARD 20	120	114	1,740	5	6.96	7		4	2	6		4	860	864	4
WARD 21	121	111	1,726	6	6.90	7		3	2	5		4	812	826	14
WARD 22	122	122	1,622	6	6.49	6		4		4		4	834	832	-2
WARD 23	123	49	1,012	4	4.05	4		3		3		3	563	569	6
WARD 24	124	20	874	4	3.50	4		3		3		3	582	583	1
WARD 25	125	45	1,488	5	5.95	6		3	3	5		3	875	875	0
WARD 26	126	137	1,485	5	5.94	6		3	1	4		3	609	607	-2
WARD 29	129	108	1,527	5	6.11	6		3		3		3	748	719	-29
WARD 30	130	66	763	2	3.05	3	✓	3		3		3	384	386	2
WARD 31	131	86	1,095	3	4.38	4		3	1	4		3	542	545	3
WARD 32	132	48	983	3	3.93	4		3		3		3	442	442	0
WARD 33	133	82	1,092	4	4.37	4		3		3		3	517	516	-1
WARD 34	134	44	1,189	4	4.76	5		3	1	4		3	578	577	-1
ARCADIA	301	65	1,530	6	6.12	6		4		4		4	862	853	-9
ARDINCAPLE	302	17	345	2	1.38	1	More	3		3		3	247	247	0
BALLENTINE	303	121	2,777	9	11.11	11		8		8		8	1807	1806	-1
BEATTY ROAD	304	67	1,048	4	4.19	4	✓	4		4		4	505	509	4
BLUFF	305	155	2,190	8	8.76	9		6		6		6	1155	1154	-1

PRECINCT	CODE	# OF NEW VOTERS BETWEEN 7-3- 12 AND 11-5- 2012	# of Registered Voters for General Election	Machines Distributed and Used for 2010 General Election	Machine Distribution Based on 1 per 250 standard (no rounding up or down*)	Machine Distribution Based on 1 per 250 standard (rounding up > .5 or down < .5*)	Correct # VM @ Beginnin g of Day	MACHINES DISTRIBUTED PRIOR TO 11/6/12 (2012 GENERAL ELECTION)	Machines Added on 11/6/12 (estimate)	Total Number of Machines Working on 11/6/12	Machines Not Working Or Used at Polls (estimate)	6/21/12 RED NUMBERED DOCUMENT PRE-ELECTION MACHINE ALLOCATION	Number of Voter Signatures	Number of Votes Cast	DIFFERENCE (Signatures vs. Votes)	
BLYTHEWOOD #1	306	47	1,040	4	4.16	4		3		3			3	678	678	0
BLYTHEWOOD #2	307	103	1,626	5	6.50	7		6		6			4	1044	1060	16
BRANDON	308	233	3,468	10	13.87	14		8	3	10			8	1580	1577	-3
BRIARWOOD	309	136	2,589	8	10.36	10		8	1	8	1		8	1318	1306	-12
CAUGHMAN ROAD	310	82	1,841	5	7.36	7		6		6			6	946	937	-9
COLLEGE PLACE	311	137	1,690	5	6.76	7		4	1	5			4	893	891	-2
COOPER	312	38	1,171	5	4.68	5		3		3			3	696	697	1
DENNYSIDE	313	37	821	3	3.28	3	✓	3		3			3	480	479	-1
DENTSVILLE	314	146	2,367	8	9.47	9		4	2	6			4	1094	1080	-14
DUTCH FORK #1	315	97	2,173	8	8.69	9		6	1	7			6	1402	1395	-7
EASTOVER	316	140	2,546	10	10.18	10		4	2	6			4	1418	1421	3
EDGEWOOD	317	192	1,911	6	7.64	8		4		4			4	965	967	2
ESTATES	318	245	4,227	13	16.91	17		10		10			10	2227	2229	2
FAIRLAWN	319	123	2,720	10	10.88	11		6	1	7			6	1400	1402	2
FAIRWOLD	320	46	979	4	3.92	4		3		3			3	482	484	2
E FOREST ACRES	321	29	1,190	5	4.76	5		3		3			3	683	680	-3
N FOREST ACRES	322	51	1,357	5	5.43	5		3	2	5			3	742	737	-5
S FOREST ACRES	323	60	1,504	5	6.02	6		4		4			4	839	836	-3
FRIARSGATE #1	324	71	1,939	7	7.76	8		4		3	1		4	947	944	-3
FRIARSGATE #2	325	70	1,659	6	6.64	7		4		4			4	933	918	-15
OLD FRIARSGATE	326	37	1,247	5	4.99	5		3		3			3	671	661	-10
GADSDEN	327	93	1,974	7	7.90	8		4		4			4	1112	1113	1
GARNERS	328	41	925	3	3.70	4		3		3			3	516	518	2
GREENVIEW	329	110	1,849	7	7.40	7		6	2	7			6	981	978	-3
GREGG PARK	330	126	1,766	7	7.06	7		4		4			4	901	900	-1
HAMPTON	331	73	1,789	7	7.16	7		4		4			4	865	858	-7
HARBISON #1	332	124	2,368	8	9.47	9		6	1	6			6	1125	1126	1
HOPKINS	333	155	2,715	9	10.86	11		6		5	1		6	1221	1224	3
HORRELL HILL	334	109	2,237	8	8.95	9		6		3	3		6	1214	1215	1
HUNTING-CREEK	335	17	486	2	1.94	2	✓	2	1	6			2	300	298	-2
KEELS	336	222	3,154	10	12.62	13		6		4	2		6	1226	1213	-13
KEENAN	337	116	1,790	7	7.16	7		4		3	1		4	842	842	0
KILLIAN	338	94	1,276	4	5.10	5		3		6			3	749	752	3
KINGSWOOD	339	152	2,810	9	11.24	11		6		6			6	1441	1424	-17
LINCOLNSHIRE	340	151	2,220	8	8.88	9		6		6	1		6	1222	1195	-27
LONGCREEK	341	155	3,286	10	13.14	13		8	2	10			8	1864	1864	0
LYKESLAND	342	114	2,350	8	9.40	9		6		6			6	1267	1274	7
MCENTIRE	343	51	865	3	3.46	3	✓	3		3			3	485	485	0

PRECINCT	CODE	# OF NEW VOTERS BETWEEN 7-3- 12 AND 11-5- 2012	# of Registered Voters for General Election	Machines Distributed and Used for 2010 General Election	Machine Distribution Based on 1 per 250 standard (no rounding up or down*)	Machine Distribution Based on 1 per 250 standard (rounding up > .5 or down < .5*)	Correct # VM @ Beginnin g of Day	MACHINES DISTRIBUTED PRIOR TO 11/6/12 (2012 GENERAL ELECTION)	Machines Added on 11/6/12 (estimate)	Total Number of Machines Working on 11/6/12	Machines Not Working Or Used at Polls (estimate)	6/21/12 RED NUMBERED DOCUMENT PRE-ELECTION MACHINE ALLOCATION	Number of Voter Signature s	Number of Votes Cast	DIFFERENCE (Signatures vs. Votes)	
MEADOWFIELD	344	63	1,740	7	6.96	7		4	3	7			4	940	940	0
MEADOWLAKE	345	211	2,231	8	8.92	9		6		6			6	1152	1147	-5
MIDWAY	346	159	2,871	9	11.48	11		6	1	7			6	1278	1283	5
MILL CREEK	347	105	1,733	6	6.93	7		4	2	6			4	1015	978	-37
MONTICELLO	348	151	2,254	7	9.02	9		6	1	7			6	1137	1142	5
NORTH SPRINGS #1	349	150	3,324	10	13.30	13		8		8			8	1566	1554	-12
NORTH SPRINGS #2	350	187	2,776	10	11.10	11		8		8			8	1375	1377	2
OAKWOOD	351	43	991	4	3.96	4		3		3			3	591	591	0
OLYMPIA	352	283	2,235	6	8.94	9		6	3	6			6	1018	997	-21
PARKWAY #1	353	291	5,354	16	21.42	21		12		12			12	2408	2408	0
PENNINGTON	354	127	2,583	7	10.33	10		6		6			6	1252	1250	-2
PINE LAKES	355	151	2,569	9	10.28	10		6	2	8			6	1232	1228	-4
PINEWOOD	356	104	1,575	5	6.30	6		3	1	4			3	855	855	0
POLO ROAD	357	328	4,487	15	17.95	18		10		10			10	2248	2254	6
PONTIAC	358	203	2,749	8	11.00	11		4	4	8			4	1307	1304	-3
RICE CREEK	359	279	4,123	14	16.49	16		7		7			7	1928	1928	0
RIDGEWOOD	360	45	640	3	2.56	3		3		3			3	398	403	5
RIVER SPRINGS	361	124	3,496	12	13.98	14		10		10			10	1947	1951	4
RIVERSIDE	362	68	1,252	5	5.01	5		4	1	4	1		4	562	562	0
RIVERWALK	363	111	2,797	10	11.19	11		6	1	7			6	1360	1358	-2
SATCHELFORD	364	36	1,333	5	5.33	5		4		4			4	818	816	-2
SKYLAND	365	73	1,134	4	4.54	5		3		2	1		3	553	554	1
SOUTH BELTLINE	366	136	1,600	6	6.40	6		3		3			3	718	720	2
SPRING VALLEY	367	101	2,438	8	9.75	10		6		6			6	1230	1229	-1
SPRINGVILLE	368	99	3,333	12	13.33	13		10		10			10	2189	2186	-3
ST ANDREWS	369	80	1,277	5	5.11	5		3		3			3	650	639	-11
TRENHOLM ROAD	370	52	879	4	3.52	4		3		3			3	586	586	0
VALHALLA	371	125	2,352	8	9.41	9		6		6			6	1257	1249	-8
VALLEY STATE PARK	372	180	2,029	7	8.12	8		6		6			6	1152	1155	3
WALDEN	373	83	1,032	4	4.13	4		3		3			3	456	455	-1
WESTMINSTER	374	141	1,912	6	7.65	8		4		4			4	839	835	-4
WHITEWELL	375	103	1,830	6	7.32	7		4		4			4	835	835	0
WILDEWOOD	376	126	2,753	9	11.01	11		5		5			5	1227	1237	10
WOODFIELD	377	154	2,721	9	10.88	11		8	1	9			8	1360	1370	10
WOODLANDS	378	64	2,144	8	8.58	9		5	1	6			5	1290	1288	-2
BLYTHEWOOD #3	379	77	1,395	5	5.58	6		4		4			4	876	873	-3
DUTCH FORK #2	380	113	2,974	10	11.90	12		4	3	7			4	1447	1446	-1
HARBISON #2	381	51	1,247	5	4.99	5		4		3	1		4	638	638	0

PRECINCT	CODE	# OF NEW VOTERS BETWEEN 7-3-12 AND 11-5-2012	# of Registered Voters for General Election	Machines Distributed and Used for 2010 General Election	Machine Distribution Based on 1 per 250 standard (no rounding up or down*)	Machine Distribution Based on 1 per 250 standard (rounding up > .5 or down < .5*)	Correct # VM @ Beginning of Day	MACHINES DISTRIBUTED PRIOR TO 11/6/12 (2012 GENERAL ELECTION)	Machines Added on 11/6/12 (estimate)	Total Number of Machines Working on 11/6/12	Machines Not Working Or Used at Polls (estimate)	6/21/12 RED-NUMBERED DOCUMENT PRE-ELECTION MACHINE ALLOCATION	Number of Voter Signature	Number of Votes Cast	DIFFERENCE (Signatures vs. Votes)	
KELLY MILL	382	86	926	3	3.70	4		3		3			3	616	618	2
LAKE CAROLINA	383	159	2,311	8	9.24	9		5		5			5	1285	1288	3
OAK POINT	384	115	3,000	10	12.00	12		8		7	1		8	1621	1612	-9
PARKRIDGE	385	63	956	4	3.82	4		3		3			3	467	467	0
PARKWAY #2	386	166	2,763	10	11.05	11		6	1	7			6	1355	1351	-4
PINE GROVE	387	97	1,702	6	6.81	7		3		3			3	814	814	0
RIDGE VIEW	388	297	4,413	14	17.65	18		8	2	10			8	1932	1932	0
ROUND TOP	389	24	672	3	2.69	3		2	1	3			2	396	392	-4
SANDLAPPER	390	287	2,713	8	10.85	11		6	7	12	1		6	1576	1578	2
SPRING HILL	391	51	1,197	4	4.79	5		4		4			4	814	813	-1
SPRING VALLEY WEST	392	143	2,956	9	11.82	12		6		6	1		6	1183	1083	-100
		14,098	236,861	811	947.44	947		577	70	629	18		576	121,510	121,206	-304
			total registered voters	total machines at precincts in 2010	total machines needed in 2012 at precincts w/out rounding			total machines at precincts in 2012				RED NUMBER LIST TOTAL				net overall difference
				811				577	627*			52 MACHINES ADDED				
			+ Absentee Machines	26				26	Absentee	*NUMBER OF MACHINES		THAT WORKED TO	NOTE: 627 voting			
				837				603	*	DATA CAPTURED AND SENT		COLLECT VOTES	machine data does not			
			Fallsafe Machines	25				11	RCEC Office	TO STATE ELECTION COMM.		OR WORKING FOR	include 1 machine at Lincolnshire			
			at RCEC Office	862				614		AND PER DUNCAN BUELL		VOTING AT POLLS	(27 votes) and 1 machine at			
										IN 2012		ON ELECTION DAY	Spring Valley West (102 votes)			
			7 precincts with accurate number of voting machines at beginning of election day													
			1 precinct with more than statutory standard													
			Several precincts close or near statutory standard during day with additional machines, but for other machine failures or non-use for some reason.													

DISCLAIMER: The Information contained herein is a compilation of data obtained from the Board, the Executive Director and staff, the State Election Commission and other public sources and therefore I am relying on the accuracy of such information. Please note that typographical errors may be possible for any given source of information. However, the Board certified results on 11/16/12 to the State Election Commission provided counted election vote data from 627 iVotronic voting machines and there were 2 machines -- one machine from Lincolnshire with 27 votes and one machine from Spring Valley West with 102 contained uncounted votes --- not included in this certified total of votes or total number of machines used and collecting ballots cast by registered voters arrival at the polling precinct. The source of additional machines on election day were from PLT log notes, staff notes, poll worker information, review of precinct data return pouches, spreadsheets from staff, and related sources; note some notes or logs are not complete and there was no consistently used check and balance system to track such data. Many of these materials have been moved and handled more than normal due to SLED seizure pursuant to a Circuit Court Order.

TIME LINE

May 19, 2011	► 2011 Act No. 17 becomes effective; Merges Boards and creates Board of Elections and Voter Registration of Richland County
June 1, 2011	► Meeting of the Richland County Delegation hires Initial Executive Director per SC Code Section 7-27-405.¹ Delegation names and approves attorney Liz Crum as Chairman of the new Board ► Executive Director McBride to assume control of elections as well as voter registration, from Mike Cinnamon, who previously had run the county elections office.
June 30, 2011	► US Justice Department provides preclearance approval of 2011 Act No. 17 ► Organizational (and first) Meeting of the new Board of Election & Voter Registration of Richland County. Board member, Allen Dowdy, elected Vice Chairman. ► Board recognizes Ms. McBride as the new Executive Director of the Board of Elections and Voter Registration Office. ► New Executive Director McBride provides Board with a copy of the FY2012 Budget for review; provides Board with list of proposed staff titles; advises that job descriptions and salary ranges still under review and finalization with County Human Resources; advised that all positions posted, advertised and interviews conducted; and that all positions filled except Elections Liaison and Executive Assistant. ► Board sought clarification concerning budget from Executive Director, and advised that money is available to repair voting machines, and for the funding of program maintenance and license agreement for voting machines ► Board noted that currently there were 7 full-time and 5 part-time positions in Voter Registration. With the consolidation of Elections and Voter Registration, 2 additional full-time positions are created along with some part-time positions ► Board recognizes Mike Cinnamon for his years of services as Richland County's Director of Elections
July 20, 2011	► Board of Election & Voter Registration Meeting. ► New Executive Director McBride provides and updates Board members

	as requested with job titles and descriptions for positions in new Office, including salary ranges, and advises that County Human Resource Department has not approved or finalized them; Board to review and discuss at next meeting. ► Board advised by County Attorney Smith that amended Code Section 7-27-405 provides that the new Executive Director had the authority to hire the Office employees and that the Board the authority to approve the job descriptions and salary ranges for Office employees ► Board adopts motion to ask County staff to assist the new Executive Director in developing a document retention schedule consistent with local, state and federal law; List of deleted Cinnamon and Blewer deleted files that were recovered provided
August 3, 2011	► Board of Election & Voter Registration Meeting. ► Executive Director McBride provides Board members with report on Staff Positions, Descriptions, Salary Ranges and Implementation of Joining Boards ► Board adopts motion approving all job descriptions and positions, except for Elections Liaison, as presented by Executive Director ► Report the areas the Board may need additional help carried over to be addressed at next meeting
August 24, 2011	► Board of Election & Voter Registration Meeting. ► Board adopts motion revising and approving job description and position for Elections Liaison requested by Executive Director ► Board questions Director McBride and Deputy Director Baum about what types of assistance and from whom the staff may need assistance and for what elections; Board advised by McBride and Baum that they had not finished their assessment; Chairman Crum noted that this matter had been on the agenda since the first meeting of the Board on July 20, 2011 ► Board adopts motion setting September 30th as deadline for staff to provide the Board with a report explaining what, if any additional assistance that may be needed, either for the upcoming local elections, the presidential preference primaries, the primaries or the general

	election. ► Board discussed development of retention schedule and in follow up asked Director to advise on state and federal election law requirements concerning retention of election voter materials, and asked Director McBride to renew the Board's request made previously to the County Attorney to provide staff with a copy of the County retention schedule for incorporation by staff into a retention schedule to present to the Board for consideration
September 20, 2011	► New Executive Director McBride advises Board that she and her staff do not see any need for additional assistance or engagement of outside consultants. Memorandum from Director to Board states: "At the August 24th Board meeting, Ms. Herbert motioned to set Friday, September 30 as the deadline for staff to provide the Board a report explaining any additional assistance that may be needed. Discussion was held with Executive Director Lillian McBride, Garry Baum, and the division heads. It was determined that, at this time, the Elections and Voter Registration office does not see the need for outside contract work."4
September 27, 2011	► Board of Election & Voter Registration Meeting. ► Board addresses carried over item of Director's report on areas of needed additional assistance; however, prior to meeting, Board provided staff memo addressing this issue and stating no need for any outside contracted assistance. Following Board discussion, it was determined by staff that additional assistance, in the form of temporary help, may be needed for next year's countywide elections. ► Board sets certification date for Town of Blythewood election ► Board adopts motion to approve conducting Republican Presidential Preference Primary provided funding provided
September – October 2011	► Director makes renovations to office and implements new procedural ideas
October 25, 2011	► Board of Election & Voter Registration Meeting. ► Board reviews previously received county retention schedule and recommended staff follow schedule, and properly dispose of dated

	materials.
December 27, 2011	► Board of Election & Voter Registration Meeting. ► Board receives update by Director McBride regarding funding for January 2012 Presidential Preference Primary (PPP) and advising that Republican Party not to fund the PPP; Director asked Board for funding suggestions for PPP and Director advised that Board has no funding source and suggested Director approach County Council concerning funding for the PPP ► Board receives update of Voter ID law by Deputy Director Baum ► Chairman Crum clarifies the Board Member's responsibilities for the Blythewood Election in January 2012 with Director McBride and Deputy Director Baum and states that the Board has no authority to delegate matters it is required by law to do; Chairman Crum advised Board members of past election practice by Board members on election day.
January 10, 2012	Town of Blythewood General Election (conducted by Richland County)
January 12, 2012	Board certifies election results for Town of Blythewood General Election conducted by Richland County
January 21, 2012	Republican Presidential Preference Primary
February 2, 2012	► Board of Election & Voter Registration Meeting. ► Board adopts motion to conduct upcoming future City of Columbia elections and run-offs (if any) and for City of Columbia to reimburse for election expense
April 3, 2012	City of Columbia General Election (conducted by Richland County)
April 17, 2012	City of Columbia Run-off Election (conducted by Richland County)
June 5, 2012	Town of Eastover General Election (conducted by Richland County)
June 7, 2012	► Board of Election & Voter Registration Meeting. ► Board approved motion granting Director permission to proceed with requesting information and to make a decision regarding combining and moving all municipal elections (Blythewood, Eastover, and Columbia) to an odd year. ► Board adopts motion to allow voters requesting to vote absentee the option of a paper ballot when coming into the office to vote absentee and still have option to use voting machine

	► Board advised by Deputy Director Baum on possible failsafe voting issues for June Primary due to redistricting and how issues may affect voters
June 12, 2012	► Democratic and Republican Primary Election – 85 Precincts in Richland County used for voting ► Board of Election & Voter Registration Meeting to open and count Absentee Ballots are required by state statute.
June 18, 2012	► Democratic and Republic Primary Election Results Certified by Richland County Board of Canvassers to the State Election Commission for all 85 Precincts on or about 4:47 p.m.
June 21, 2012	► Election System Coordinator assigns an employee with the title of Voter Representative with the initial task of calculating the proper number of voting machines to be allocated to each precinct for the General Electionⁱⁱ ► Precinct Coordinator, at request of Voter Representative, calculates General Election Voting Machine Allocation using the 1 to 250 ratio established by the General Assembly; based on them current voter registration information, the Precinct Coordinator calculated that 864 voting machines were needed for distribution to precincts on election day; provides this information to Voter Representative which was a Temporary/Part-time employee.ⁱⁱⁱ
June 26, 2012	► Primary Election Run-Off (Richland County One of Nineteen Counties statewide holding Primary Election Run-Offs in 4 precincts (203 votes cast – Estates, Pontiac, Kelly Mill and Lake Carolina)
June 28, 2012	► Primary Election Run-off Results Certified by Richland County Board of Canvassers to the State Election Commission (for SC Senate Dist. 35 and SC House Dist. 41)
July 2, 2012	► Office begins assigning PLTs to precincts (i.e., technicians to be used on election day if machines and poll issues arise)^{iv}

July 3, 2012	► Voter Representative in office sends email to Election System Coordinator without copying Executive Director stating that Executive Director has allocated 605 machines for the General Election as indicated below: "... gave me a revised list of the machines needed for the November 6 election. She got the number down to 605 machines...." NOTE: During interview, Voter Representative was unable to provide "revised list."
July 25, 2012	► Election System Coordinator and at least two (2) other temporary and part-time employees (Voter Representatives) continue preparing voting machines for election (i.e., cleaning, calibrating, etc) and assigning flash cards (memory cards) by serial number to each precinct per machine
July 2012-October 2012	► Election System Coordinator and her staff continue to prepare voting machines for General Election using the same number of voting machines designate in June or on July 3, 2012 – 605 voting machines
September 11, 2012	Special Election for Town of Eastover Council Seat
September 27, 2012	► Poll worker (Ward 11) Michael Sullivan sends email to contact a Richland County Election and Voter Registration Office advising too few machines revealed to him during training in September; sends the following email to which no response was provided: "Did I understand correctly that we are getting just 3 for this November? It would seem we might run into very long lines with even fewer machines for this election. Perhaps I misunderstood? - Mike "
October 18, 2012	► Board of Election & Voter Registration Public Hearing on the Richland County Special Sales & Use Tax ► Board requested citizen input and comment but no one signed up to speak.
November 1, 2012	► Board of Election & Voter Registration Meeting. ► Executive Director McBride advised Board of high number of voters voting absentee which had surpassed the totals in 2008 with days

	remaining for people to vote absentee; advises of four categories or batches of ballots due to varying styles for purpose of optical machines scanning ▶ Board discusses its plan on what Board members will do in handling absentee ballots and certification to be held on November 9, 2012 ▶ Board is not advised of any broken iVotronics Voting Machines prior to election or in warehouse and no request for funding from County to fix machines
November 6, 2012	▶ General Election Day – 576 machines distributed throughout the 124 precincts, 26 voting machines used for absentee ballot voting, and 11 voting machines at the Election & Voter Registration Office ▶ Very early calls from precincts beginning around 9:00 a.m. and throughout day regarding shortage of voting machines, voting machines failures and voting machines in precincts not working properly; People stand in line to vote, many for 4 or 5 hours, and some wait for 7 hours; One precinct still voting people in line after midnight ▶ Board meets to begin opening and sorting Absentee Ballots at 9:00 a.m. ▶ Board, Director and her staff experience difficulties in optical scanning of paper ballots with ES&S 650 machine where machines stopped pulling ballots for reading; collection of election data from precincts and tabulation of electronic data; Board arranges with assistance of State Election Commission for technician to fix machine
November 7, 2012	▶ Technician arrives to repair ES&S 650 at 10:00 a.m. and replaces pick so that ballots will be pulled through and read by machine; Technician also assist with voting machines that could not be read ▶ Several precincts did not close all voting machines so that PEBs could be read; Staff dispatched to retrieve and close machines so that preliminary results could be tabulated ▶ Board posts preliminary results in the afternoon, but statistical irregularity with absentee ballot preliminary totals in State House Dist. 75 raises questions about vote tabulation by ES&S 650 reading paper

	absentee ballots after problems earlier with pick. Board decides to begin internal review and check on 11/8/12 to determine issue with ES&S 650
November 8, 2012	▶ Technician arrives from PrintElect to work on ES&S 650 and staff is working internal review and check on 11/8/12 ▶ SC Democratic Party files action in Circuit Court and seeks TRO ▶ SC Democratic Party obtains TRO and for SLED to seize and impound all election materials and ballots, and recount to be conducted by State Election Commission on 11/9/12; TRO amended to reference correct items to be seized by SLED ▶ SLED seizes and takes materials from Office into custody
November 9, 2012	▶ Petition for Writs of Prohibition and Injunction filed by the South Carolina Republican Party seeking a stay of enforcement of the lower court order due to a lack of jurisdiction ▶ SLED returns election materials (i.e., ballots, data) to 2020 Hampton Street for tabulation and recount by the State Election Commission which had secured a new optical scanner (ES&S 650) to scan and read the paper ballots ▶ SC Supreme Court issues Order staying the Order of the lower court in order for parties to file responses to the Petition by noon 11/13/2012; State Election Commission ceases recount and tabulation; SLED takes and retains possession of election materials seized from Richland County ▶ PrintElect Technician determine problem reading paper absentee ballots is not mechanical but another issue – possible software issue. ES&S hired to come to SC for examination of problem with ES&S 650
November 10 -11, 2012	▶ ES&S Technicians work over weekend to resolve paper ballot reading problem; discover issue is misalignment of ovals with scanner; discovery problem with in-office printed Ballot On Demand versus commercially printed paper ballots
November 12, 2012	▶ ES&S Technicians continue to work on databases and testing to assure that they can resolve the alignment issue; Provided report to County and State Election Commission

	▶ SC Democratic Party files Stipulation of Dismissal in Circuit Court action; thus, nullifying TRO and Order of Seizure by SLED
November 13, 2012	▶ Parties (including the Richland County Board of Election and Voter Registration) file responses to the SC Republican Party Petition for Writ in SC Supreme Court. Richland County Board of Election and Voter Registration moves for dismissal of action ▶ SC Supreme Court dismisses action, vacated lower court order and orders (1) return disks/ballots to County Commission by 5 pm 11/13/2012 so that the County Board can complete its canvassing; (2) that election results must be declared and certified by 11/16/2012 at 12 pm; and (3) that any election challenges or protects must be filed by noon 11/21/2012 ▶ SLED returns election materials seized from the County Office to 2020 Hampton Street so that County Board can complete its canvassing process
November 14, 2012	▶ Testing begins with ES&S technicians at 9:00 a.m. to make database issue corrected ▶ Board resumes canvassing of the ballots cast in the election, including resolution of misaligned ballots for reading with optical scanner; Canvassing continues into the late night or early morning hour before Board provides preliminary results
November 15, 2012	▶ Staff discover two (2) unopened, red SLED evidence bags on carts used by SLED and staff to transport ballots, PEBs, and flash cards/tapes and election materials to and from SLED and 4th floor for counting; these bags contain uncounted ballots ▶ Steve Hamm instructs staff to thoroughly check office for any other uncounted ballots returned by SLED ▶ Absentee Office staff located an additional _____ uncounted paper absentee ballots that were not included in the preliminary results provided by the Board on or about November 14th. ▶ Staff assures Board and legal counsel that office has been searched and that all ballots had been accounted for and counted

November 16, 2012	► Board conducts certification hearing and resolves challenged, fail safe and provisional ballots ► Board seeks extension from SC Supreme Court of deadline at noon to 4:00 p.m. to certify results to the State Election Commission due to time required to run and resolve misaligned paper ballots; SC Supreme Court grants extension and provides additional time than requested to November 19th to certify results to SEC ► General Election Results Certified by Richland County Board of Canvassers to the State Election Commission – 124 precincts; 627 voting machines
November 26, 2012	► Richland County Delegation Meeting in which Board Chairwoman Crum and Executive Director McBride testify before Delegation; Board Chairwoman Crum advises Delegation that Steve Hamm and his law firm engaged to conduct investigation into General Election issues and problems, including recommendations for consideration by Board and Delegation ► Attorney General Issues Opinion in response to request by Senator addressing who have authority to terminate Richland County Election & Voter Registration Director
November 29, 2012	► Board of Election & Voter Registration Meeting. ► Board adopts Attorney General Opinion concerning authority to terminate initial Executive Director appointed by Richland County Delegation in accordance with SC Code Section 7-27-405
December 3, 2012	► Board holds and hears three Election Protests ► While performing audit procedures, staff suspects that there is possible machine in Lincolnshire precinct with 27 votes that was not counted and included in certified election results by Board on November 16, 2012
December 4, 2012	► Staff with legal counsel review auditing process and look for discrepancy in machine data reported against machines allocated or used on election day. It is discovered that there is a possibility that another voting machine with 102 votes from the Spring Valley West precinct was not counted or included in certified results. Information and analysis suggested possible software or machines issues, as well as human error

	at precinct level by PLT in opening machine with incorrect PEB. Staff and expert instructed by counsel to confirm whether or not these two machines are included in results
December 6, 2012	► Board of Election & Voter Registration Meeting and Executive Session. ► Steven W. Hamm provides Initial and Limited Report and Update on the Richland County November 6, 2012 General Election as requested by the Board. Report announces and confirms two voting machines in two different precincts were not included in the total certified by the Board to the State Election Commission
December 17, 2012	► Board of Election & Voter Registration Meeting and Executive Session. ► Chairman Liz Crum resigns following statement of lack of confidence in Executive Director Lillian McBride
December 19, 2012	► Richland County Delegation Meeting and Executive Session ► Director McBride issues press release stating that she has not submitted her "resignation to the Board...or to the members of the Richland County Legislative Delegation. Any discussion of this is entirely premature and erroneous."
December 21, 2012	► Eleven of the Sixteen Richland County Delegation Members ask Executive Director to resign position by 4:00 p.m. ► Acting Board Chairman issues announcement that he will call a Board meeting as soon as possible to consider and address Delegation's request.
January 3, 2013	► Board of Election & Voter Registration Meeting. ► Board accepts Executive Director Lillian McBride's Letter relinquishing position as Executive Director effective January 12, 2013 ► Board adopts motion to name a part-time Interim Acting Executive Director and announces Dr. Salmond as such Acting Director as of January 12th ► Board adopts motion to engage in process to search for new Executive

	Director ► Board adopts motion to have Mrs. McBride placed in a voter registration position by new Acting Director
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ⁱ Source: June 1, 2011 Minutes of the Richland County Delegation indicate that 12 members of the 15-member delegation were present at the meeting when McBride's hiring was approved.

ⁱⁱ Source: Interview of Office staff.

ⁱⁱⁱ Source: Interviews with Office staff.

^{iv} Source: Voter Registration staff spreadsheet modified on 7/2/12 @ 9:54 a.m.

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An Analysis of the 11/06/2012 Richland County General Election For the Legislative Delegation of Richland County

Duncan Buell
League of Women Voters of South Carolina
and
University of South Carolina
11/25/2012

Main Findings

About 90 of the 124 non-absentee precincts had fewer terminals for 2012 than for 2010. A total of 813 terminals appear in the data for 2010, but only 628 terminals appear in the data for 2012. (See Appendix A)

In 2010 there were 132 of 813 non-absentee terminals that closed after 7:30pm, but only nine of these were closed after 8:30pm and the latest was 9:26pm.

In 2012 there were 384 of 628 non-absentee terminals closed after 7:30pm, with 291 of these closing after 8:30pm and 62 closing after 11pm. The last of these was closed at 1:30am the morning of November 7.

In all, the data show 14784 of the 121206 non-absentee votes, more than 12% of the total, cast after 7pm. The detailed breakdown of votes by hour after 7pm is shown in Appendix D, with comparisons to 2010.

The election could only have been conducted in 12 hours under an absolutely perfect distribution of voter arrivals and terminal allocations.

Finally, we note that the average "last vote time" for a terminal still being used at 7:30pm was 9:45pm. The average voter in line at 7:30pm would still have had an additional wait of an hour and eight minutes before voting.

Summary

It has been widely reported that the election process on 11/06/2012 in Richland County did not go well and that extremely long lines, broken voting machines, etc., were more prevalent than in previous elections. The purpose of this analysis is to provide *quantitative* statements rather than anecdotal evidence regarding the election process and to compare the 2012 election with the 2010 general election.

I have obtained from the South Carolina State Election Commission the "audit data" for the general election of 11/6/2012. Following the 2010 election I wrote computer programs for analyzing the data from our ES&S election system, and I have upgraded the programs and run them on both the 2012 and 2010 election data. Because the current controversy surrounds the election *process*, I have

concentrated this report on what can be said about the process, especially such things as numbers of iVotronic terminals, numbers of votes per terminal, frequency of votes during the day, and numbers of votes cast after closing time.

Acknowledgment

I am grateful to the State Election Commission for being able to provide the data quickly so that this analysis can be done in time for the delegation's hearing.

Disclaimer

I have to announce up front that I make no claims that this report will be 100% correct. There isn't time to make sure that every detail is correct. Also, the crucial issue involves long lines and allocation of terminal resources, but the timestamps in the terminals can be incorrect. There may be a few terminals that look as if they are anomalous but in fact it is just that the time set in the terminal is wrong. There was one terminal set to 11/06/2014 and one to 11/06/2015, for example. I believe the number of such terminals whose data is thus misleading is no more than half a dozen, but this can't be determined without looking individually at the data rather than relying on the output of a computer program.

Personal

I am a computer science professor at the University of South Carolina, and I have lectured and published on the analysis of election data as part of my professional work. I have since 2004 been a member of the League of Women Voters of South Carolina and serving the League as a consultant regarding election technology. This work comes at no charge and my software is freely available to all. I have often assigned parts of this data processing as student assignments in my classes.

Introduction

The files used in my analysis are the following standard output files from the ES&S election system.

- EL30A – this is a “results” file that I use to get precinct names, number of registered voters, and number of ballots cast. Although I could extend the processing to compare my own vote counts in detail against the 30A results, I don't do this.
- EL68A – this is the “system” log. This file shows the time and serial numbers of the PEBs whose data is uploaded to the county master files, as well as the time and serial numbers of the memory cards when their data is uploaded. This file provides much of the verification that the hardware used during the election has all been accounted for after the election is over.
- EL155 – this is the actual cast vote record. Each vote cast in an iVotronic is recorded in detail (in a somewhat randomized order). This is the file I use to count votes.
- EL152 – this is the “event log” for each of the iVotronic terminals. This records the existence of votes cast, the opening and closing of the terminal,

collection of the totals, calibrations and re-calibrations, errors, and other events. Each event comes with a timestamp.

Timestamps:

On the one hand, one would like event timestamps to be reliable pieces of information. On the other hand, it would probably be disastrous for a fielded terminal not to be able to collect votes on election day simply because its internal timer was set to the wrong day. One would surmise it is for this reason that the timestamps do not affect the operation of the terminal. There was one terminal in Richland set to 11/06/2014, and one set to 11/06/2015. There was at least one terminal that was off by an hour at the beginning of election day (probably this was a Daylight Savings Time issue) and had its time reset to the correct time during the day. For this reason, timestamp processing is not perfect. I have attempted to check timestamp anomalies, but this is a manual process and I probably have not found all the exceptions. I do not think that the small number of anomalies has a significant effect on the analysis I provide here.

Analysis

The primary output of my software is an exceptions file, which in this case is named richland_20121106_EXCEPTIONS.txt. (The corresponding file for the 2010 data is named richland2010_20101102_EXCEPTIONS.txt, and this naming convention occurs throughout.) This file contains a list of the various exceptions to what would be "correct" data.

The first thing to note is that the 152 and the 155 files corroborate each other in terms of the vote count. There are 145861 votes in the 155 cast vote record, and there are the same number of "vote cast" events in the 152 file. This indicates that all the data has been collected from at least the terminals from which some data was collected.

The second grouping in the exceptions file concerns PEBs used for opening and closing terminals. The SCSEC protocol is that a single PEB is to be used for opening all terminals in a precinct and then used to close the terminals and collect vote totals at the end of the day. It was the failure to observe this protocol that led to some votes not being counted in the 2010 election.

In this case, although there are a few instances of a violation of the protocol, other records show that this error did not lead to the failure to count votes. One would assume that the election officials would look at these violations of protocol and either educate or replace, prior to the next election, the poll managers who were responsible.

At the end of the exceptions file I look at the time when the memory card data was collected into the county master file and the existence of any missing memory cards. In this case, all the cards were collected, as one would have expected given the scrutiny under which the votes were counted.

Summary Counts of Votes and Terminals by Precinct

The primary file that I produce that indicates the totals of numbers of votes is the richland_20111106_IvosAndPcts.txt file. This lists precincts, terminals in that precinct by serial number, and votes per terminal. I also have produced a line of output showing the number of terminals for each precinct with the number of votes. A comparison of 2010 against 2012 is Appendix A of this report.

What Appendix A shows is that about 90 of the 124 non-absentee precincts had fewer terminals for 2012 than for 2010. A total of 813 terminals appear in the data for 2010, but only 628 terminals appear in the data for 2012.

I say “about” because raw numbers can fail to tell the whole story. One could argue that Ward 8, for example, had more terminals than it needed in 2010 (based on the number of votes per terminal being very much lower than the county average) and that Sandlapper, although it shows 10 terminals in 2012, didn’t actually have 10 terminals most of the day for most of the day (see below where four terminals were opened at about 8pm in that precinct).

Opening, Closing, and Timing of Votes

Most important for the current discussion is the timing during the day of the opening and closing of terminals and the votes collected.

My software specifically excludes the 750+ and 850+ precincts (absentee, failsafe, provisional, etc.). This is because the absentee terminals are opened and closed all the time during absentee voting, and their collection of votes is not an election day event. I could have looked at the provisional/failsafe terminals, given that long lines were reported at county headquarters on election day, but I did not do that.

I show four terminals opened prior to 5:30am on 11/06/2012, in four different precincts. Three of these obviously were one hour off (again, daylight time?) and had their timers set forward an hour prior to being closed. The fourth terminal shows being opened at 13:25:24 on 11/05/2012 and then having its timer set immediately to 6:58am on 11/06/2012 before collecting votes as one would expect for the rest of the day.

There were twelve terminals that opened late. Four of these show being opened just before 8pm on 11/06/2012 in precinct 390 (Sandlapper), and one more was similarly opened after closing time in precinct 125 (Ward 25). Five of the twelve had timestamps set to 2014 when they opened, but the time of day (between 6 and 7am) would be correct.

It is the late closing times that tell the real story of this election. In 2010 there were 132 of 813 non-absentee terminals that closed after 7:30pm, but only nine of these were closed after 8:30pm and the latest was 9:26pm. In 2012 there were 384 of 628 terminals closed after 7:30pm, with 291 of these closing

after 8:30pm and 62 closing after 11pm. The last of these was closed at 1:30am the morning of November 7.

In all, the data show 14784 of the 121206 non-absentee votes, more than 12% of the total, cast after 7pm. The detailed breakdown of votes by hour after 7pm is shown in Appendix D, with comparisons to 2010.

The counts in the paragraph above do not include the fact that an additional 16 terminals were not closed until the middle of the day on November 7, one not until November 8, and three more not until November 9. These represent a different process problem from that of long lines at the polls.

I present in Appendix B a spreadsheet of the votes cast after closing time in 2010 and in 2012. Of all the numerical data that could be presented, this perhaps illustrates best what happened on November 6. For each precinct, the table has

- the number of votes cast in 2010
- the percent of votes cast in 2010 that were cast after 7pm
- the number of votes cast in 2012,
- the quotient of 2012 votes divided by 2010 votes in the precinct
- the percent of votes cast in 2012 that were cast after 7pm

I have put in bold face all percentages of late votes larger than 10% and have put those larger than 30% in red.

Disclaimer: The totals in Appendix B and Appendix D for late votes differ by six votes. I attribute this to my having computed the numbers in slightly different ways and not accounting properly for a timestamp anomaly in some terminal.

Votes per Terminal

Finally, we present the data of votes per terminal for 2010 for the counties for which electronic data is available. There are two counties with votes per terminal in the high 150 range. Richland was somewhat above average with 129 votes per terminal in 2010. But in Richland in the 2012 election just conducted, the average number of votes per terminal was 193, about 50% more votes per terminal than in 2010 and 25% larger than the high water marks anywhere in the state in 2010.

Duration of Voting Events

I am given to understand that one of the harder things to predict is the length of time needed for each voter. We do not have event log messages for the time when a terminal is opened for voting by an individual, so we cannot separate a voter's duration in the actual voting process from possible slack time with no one in line.

After closing, however, we ought to be able to assume that voting is a steady state activity, and thus the times between "vote cast" events on the terminals is a good

measure of the actual time spent for a voter to be voting, including the time spent by the poll manager opening the terminal, etc.

Appendix E is a very crude histogram of the time between "vote cast" events after closing time in Richland County, with times rounded to the nearest five second intervals. The 14,000 plus voters who cast votes after 7pm spent an average of just over three minutes and thirty seconds in walking to the voting booth, having the terminal opened for them, and casting their ballots. If we extrapolate from the late voter durations, we would have needed just over 600 terminals in steady state to have enough "vote minutes" in a 12-hour period of election day. When one discounts from the 628 total in the data for terminals with only a very small number of votes collected, the 600 terminal count is about right.

What this means in round numbers is that the allocation of terminals to the election could have been completed in the 12 hours of election day if voters had arrived at precincts exactly five voters per precinct every 3-1/2 minutes nonstop throughout the day. Any bursty arrivals (the morning, noon, and evening rush, for example) would necessarily have caused lines to form. Any underallocation of terminals to precincts would have caused lines to form. **The election could only have been conducted in 12 hours under an absolutely perfect distribution of voter arrivals and terminal allocations.**

Finally, we note that the average "last vote time" for a terminal still being used at 7:30pm was 9:45pm. The average voter in line at 7:30pm would still have had an additional wait of an hour and eight minutes before voting.

Appendix A -- Votes by terminal by precinct, 2010 and 2012

2010	6	WARD_#1 0101	546:	87	95	91	84	86	103
2012	4	WARD_1 0101	659:	199	114	187	159		
2010	3	WARD_#2 0102	227:	70	85	72			
2012	4	WARD_2 0102	342:	75	89	111	67		
2010	4	WARD_#3 0103	612:	154	154	157	147		
2012	4	WARD_3 0103	841:	87	253	256	245		
2010	5	WARD_#4 0104	652:	135	127	124	132	134	
2012	4	WARD_4 0104	704:	249	88	119	248		
2010	4	WARD_#5 0105	325:	80	79	96	70		
2012	3	WARD_5 0105	582:	185	192	205			
2010	5	WARD_#6 0106	655:	132	121	127	138	137	
2012	4	WARD_6 0106	718:	186	178	168	186		
2010	6	WARD_#7 0107	472:	86	86	67	52	93	88
2012	4	WARD_7 0107	611:	195	29	200	187		
2010	10	WARD_#8 0108	432:	50	23	19	72	34	37 57 28
59 53									
2012	5	WARD_8 0108	1143:	226	231	231	235	220	
2010	5	WARD_#9 0109	440:	108	101	53	101	77	
2012	5	WARD_9 0109	660:	151	92	166	134	117	
2010	5	WARD_#10 0110	731:	146	140	149	142	154	
2012	3	WARD_10 0110	781:	237	269	275			
2010	5	WARD_#11 0111	530:	107	113	93	110	107	
2012	3	WARD_11 0111	690:	244	248	198			
2010	6	WARD_#12 0112	715:	121	122	118	118	124	112
2012	4	WARD_12 0112	808:	211	219	222	156		
2010	7	WARD_#13 0113	937:	134	120	126	141	145	132 139
2012	4	WARD_13 0113	1068:	277	262	274	255		
2010	6	WARD_#14 0114	855:	143	140	146	136	152	138
2012	5	WARD_14 0114	873:	247	150	118	119	239	
2010	3	WARD_#15 0115	587:	204	189	194			
2012	3	WARD_15 0115	595:	202	212	181			
2010	5	WARD_#16 0116	769:	148	163	144	149	165	
2012	3	WARD_16 0116	763:	261	253	249			
2010	6	WARD_#17 0117	830:	156	87	153	143	141	150
2012	3	WARD_17 0117	894:	308	285	301			

2010	5		WARD_#18 0118	500:	111	97	110	82	100			
2012	3		WARD_18 0118	663:	209	218	236					
2010	5		WARD_#19 0119	492:	116	111	54	102	109			
2012	3		WARD_19 0119	674:	218	230	226					
2010	5		WARD_#20 0120	740:	158	153	134	144	151			
2012	6		WARD_20 0120	864:	170	151	102	85	183	173		
2010	6		WARD_#21 0121	694:	121	101	130	104	112	126		
2012	5		WARD_21 0121	826:	232	68	148	157	221			
2010	6		WARD_#22 0122	638:	113	83	112	119	108	103		
2012	4		WARD_22 0122	832:	224	209	188	211				
2010	4		WARD_#23 0123	478:	109	138	89	142				
2012	3		WARD_23 0123	569:	198	187	184					
2010	4		WARD_#24 0124	539:	130	135	140	134				
2012	3		WARD_24 0124	583:	192	199	192					
2010	5		WARD_#25 0125	905:	187	185	180	174	179			
2012	5		WARD_25 0125	875:	327	319	189	20	20			
2010	5		WARD_#26 0126	360:	76	53	69	83	79			
2012	4		WARD_26 0126	607:	153	163	127	164				
2010	5		WARD_#29 0129	588:	122	119	109	112	126			
2012	3		WARD_29 0129	719:	255	255	209					
2010	2		WARD_#30 0130	287:	134	153						
2012	3		WARD_30 0130	386:	140	132	114					
2010	3		WARD_#31 0131	392:	141	129	122					
2012	4		WARD_31 0131	545:	178	154	198	15				
2010	3		WARD_#32 0132	410:	159	166	85					
2012	3		WARD_32 0132	442:	147	141	154					
2010	4		WARD_#33 0133	424:	127	124	125	48				
2012	3		WARD_33 0133	516:	168	182	166					
2010	4		WARD_#34 0134	555:	150	144	124	137				
2012	4		WARD_34 0134	577:	216	158	179	24				
2010	6		ARCADIA 0301	774:	127	141	127	130	124	125		
2012	4		ARCADIA 0301	853:	141	226	236	250				
2010	2		ARDINCAPLE 0302	195:	97	98						
2012	3		ARDINCAPLE 0302	247:	86	98	63					
2010	9		BALLENTINE 0303	1436:	171	168	85	177	165	163	165	168
174												
2012	8		BALLENTINE 0303	1806:	217	237	222	239	232	222	201	236

2010	4	BEATTY_ROAD 0304	293:	84	46	77	86						
2012	4	BEATTY_ROAD 0304	509:	135	127	118	129						
2010	8	BLUFF 0305	1026:	133	133	121	115	136	128	139	121		
2012	6	BLUFF 0305	1154:	199	210	222	205	130	188				
2010	4	BLYTHEWOOD_#1 0306	545:	139	133	133	140						
2012	3	BLYTHEWOOD_1 0306	678:	217	231	230							
2010	5	BLYTHEWOOD_#2 0307	819:	167	163	162	166	161					
2012	6	BLYTHEWOOD_2 0307	1060:	177	177	171	166	179	190				
2010	10	BRANDON 0308	1235:	118	125	121	119	125	123	123	128		
125	128												
2012	10	BRANDON 0308	1577:	131	124	147	179	210	186	177	160		
177	86												
2010	8	BRIARWOOD 0309	1083:	138	138	135	155	135	147	133	102		
2012	8	BRIARWOOD 0309	1306:	161	181	166	155	148	174	185	136		
2010	5	CAUGHMAN_ROAD 0310	852:	165	185	166	172	164					
2012	6	CAUGHMAN_ROAD 0310	937:	158	171	156	142	148	162				
2010	5	COLLEGE_PLACE 0311	713:	157	163	123	157	113					
2012	5	COLLEGE_PLACE 0311	891:	186	56	240	237	172					
2010	5	COOPER 0312	673:	143	130	134	129	137					
2012	3	COOPER 0312	697:	229	239	229							
2010	3	DENNYSIDE 0313	390:	128	140	122							
2012	3	DENNYSIDE 0313	479:	147	178	154							
2010	8	DENTSVILLE 0314	1079:	137	135	146	160	130	140	115	116		
2012	6	DENTSVILLE 0314	1080:	237	270	76	31	205	261				
2010	8	DUTCH_FORK_#1 0315	1111:	94	147	149	146	147	135	141	152		
2012	7	DUTCH_FORK_1 0315	1395:	228	234	235	13	245	211	229			
2010	10	EASTOVER 0316	1172:	74	89	111	118	121	119	137	148		
127	128												
2012	6	EASTOVER 0316	1421:	295	212	91	273	283	267				
2010	6	EDGEWOOD 0317	761:	144	149	137	64	135	132				
2012	4	EDGEWOOD 0317	967:	231	246	233	257						
2010	13	ESTATES 0318	1928:	151	155	142	144	160	141	163	145		
151	115	150 160 151											
2012	10	ESTATES 0318	2229:	238	33	216	251	265	257	223	236		
244	266												
2010	10	FAIRLAWN 0319	1284:	124	134	133	140	116	120	128	137		
122	130												
2012	7	FAIRLAWN 0319	1402:	109	242	253	248	255	255	40			

2010	4	FAIRWOLD 0320	462:	108	120	118	116				
2012	3	FAIRWOLD 0320	484:	171	161	152					
2010	5	E_FOREST_ACRES 0321	622:	125	120	125	130	122			
2012	3	E_FOREST_ACRES 0321	680:	234	231	215					
2010	5	N_FOREST_ACRES 0322	646:	136	136	128	128	118			
2012	5	N_FOREST_ACRES 0322	737:	210	169	158	191	9			
2010	5	S_FOREST_ACRES 0323	770:	152	147	165	152	154			
2012	4	S_FOREST_ACRES 0323	836:	220	206	196	214				
2010	7	FRIARSGATE_#1 0324	927:	139	139	126	127	132	135	129	
2012	3	FRIARSGATE_1 0324	944:	274	354	316					
2010	6	FRIARSGATE_#2 0325	753:	132	122	124	128	119	128		
2012	4	FRIARSGATE_2 0325	918:	226	246	229	217				
2010	5	OLD_FRIARSGATE 0326	654:	131	134	126	122	141			
2012	3	OLD_FRIARSGATE 0326	661:	276	120	265					
2010	7	GADSDEN 0327	1049:	164	175	175	152	160	145	78	
2012	4	GADSDEN 0327	1113:	303	291	217	302				
2010	3	GARNERS 0328	447:	157	139	151					
2012	3	GARNERS 0328	518:	170	161	187					
2010	7	GREENVIEW 0329	970:	138	124	148	125	149	146	140	
2012	7	GREENVIEW 0329	978:	172	164	82	163	149	153	95	
2010	7	GREGG_PARK 0330	739:	126	43	109	109	118	121	113	
2012	4	GREGG_PARK 0330	900:	230	228	224	218				
2010	7	HAMPTON 0331	710:	102	108	98	93	96	112	101	
2012	4	HAMPTON 0331	858:	248	228	262	120				
2010	8	HARBISON_#1 0332	878:	107	114	116	113	97	116	116	99
2012	6	HARBISON_1 0332	1126:	207	236	222	20	225	216		
2010	9	HOPKINS 0333	1332:	153	141	146	151	158	151	141	148
143											
2012	5	HOPKINS 0333	1224:	273	261	233	232	225			
2010	8	HORRELL_HILL 0334	1007:	131	115	134	145	147	136	70	129
2012	6	HORRELL_HILL 0334	1215:	168	217	199	206	211	214		
2010	2	HUNTING_CREEK 0335	283:	141	142						
2012	3	HUNTING_CREEK 0335	298:	107	27	164					
2010	10	KEELS 0336	1144:	134	128	129	144	119	119	3	127
114	127										
2012	6	KEELS 0336	1213:	223	181	200	217	174	218		

2010 7	KEENAN 0337	848:	117	139	130	117	113	117	115	
2012 4	KEENAN 0337	842:	201	203	210	228				
2010 4	KILLIAN 0338	604:	146	155	150	153				
2012 3	KILLIAN 0338	752:	265	263	224					
2010 9	KINGSWOOD 0339	1221:	144	138	130	138	126	132	141	127
145										
2012 6	KINGSWOOD 0339	1424:	257	250	248	168	243	258		
2010 8	LINCOLNSHIRE 0340	997:	125	132	103	118	131	133	128	127
2012 5	LINCOLNSHIRE 0340	1195:	259	228	235	251	222			
2010 10	LONGCREEK 0341	1683:	171	173	176	162	163	165	166	166
162 179										
2012 10	LONGCREEK 0341	1864:	4	216	152	242	238	239	244	47
239 243										
2010 8	LYKESLAND 0342	1189:	151	140	143	147	158	159	145	146
2012 6	LYKESLAND 0342	1274:	256	256	232	75	207	248		
2010 3	MCENTIRE 0343	403:	139	141	123					
2012 3	MCENTIRE 0343	485:	161	154	170					
2010 7	MEADOWFIELD 0344	957:	142	137	145	112	132	142	147	
2012 7	MEADOWFIELD 0344	940:	77	62	13	245	226	61	256	
2010 8	MEADOWLAKE 0345	1098:	140	129	141	112	148	150	141	137
2012 6	MEADOWLAKE 0345	1147:	219	217	86	207	234	184		
2010 9	MIDWAY 0346	1113:	139	131	109	94	144	85	139	135
137										
2012 7	MIDWAY 0346	1283:	209	201	20	226	201	200	226	
2010 6	MILL_CREEK 0347	739:	135	134	68	142	123	137		
2012 6	MILL_CREEK 0347	978:	56	201	223	215	49	234		
2010 7	MONTICELLO 0348	995:	141	142	116	144	145	149	158	
2012 7	MONTICELLO 0348	1142:	211	217	4	184	249	257	20	
2010 10	NORTH_SPRINGS_#1 0349	1523:	151	150	140	152	159	157	152	161
159 142										
2012 8	NORTH_SPRINGS_1 0349	1554:	224	223	148	233	201	117	209	199
2010 10	NORTH_SPRINGS_#2 0350	1340:	142	119	134	149	113	140	128	142
134 139										
2012 8	NORTH_SPRINGS_2 0350	1377:	175	200	192	204	28	191	181	206
2010 4	OAKWOOD 0351	506:	124	128	119	135				
2012 3	OAKWOOD 0351	591:	188	200	203					
2010 6	OLYMPIA 0352	654:	101	108	106	115	121	103		
2012 6	OLYMPIA 0352	997:	134	117	214	192	141	199		

2010	16				PARKWAY_#1	0353	2395:	168	144	145	137	158	151	158	149
	141	146	152	145	154	149 148 150									
2012	12					PARKWAY_1	0353	2408:	222	41	234	185	208	218	203 199
	221	233	231	213											
2010	7					PENNINGTON	0354	1254:	173	185	177	186	159	190	184
2012	6					PENNINGTON	0354	1250:	275	247	268	142	41	277	
2010	9					PINE_LAKES	0355	1124:	132	117	121	140	121	119	119 124
	131														
2012	8					PINE_LAKES	0355	1228:	177	14	58	222	207	194	144 212
2010	5					PINEWOOD	0356	708:	142	143	143	135	145		
2012	4					PINEWOOD	0356	855:	78	271	287	219			
2010	15					POLO_ROAD	0357	1817:	125	102	121	128	124	131	127 134
	133	117	121	129	114	124 87									
2012	10					POLO_ROAD	0357	2254:	231	240	217	229	246	202	225 213
	215	236													
2010	8					PONTIAC	0358	1186:	154	150	148	141	146	149	144 154
2012	8					PONTIAC	0358	1304:	251	156	203	122	127	52	129 264
2010	14					RICE_CREEK	0359	1828:	134	134	132	139	139	133	129 126
	127	106	137	123	131	138									
2012	7					RICE_CREEK	0359	1928:	288	266	287	273	272	290	252
2010	3					RIDGEWOOD	0360	331:	118	97	116				
2012	3					RIDGEWOOD	0360	403:	129	160	114				
2010	12					RIVER_SPRINGS	0361	1770:	162	147	153	145	145	152	136 145
	138	156	139	152											
2012	10					RIVER_SPRINGS	0361	1951:	223	219	175	208	183	163	198 184
	209	189													
2010	5					RIVERSIDE	0362	405:	93	78	75	87	72		
2012	4					RIVERSIDE	0362	562:	165	153	98	146			
2010	10					RIVERWALK	0363	1373:	142	134	140	139	149	92	144 143
	138	152													
2012	7					RIVERWALK	0363	1358:	73	272	264	249	159	102	239
2010	5					SATCHELFORD	0364	724:	145	149	143	141	146		
2012	4					SATCHELFORD	0364	816:	199	205	204	208			
2010	4					SKYLAND	0365	367:	104	92	68	103			
2012	2					SKYLAND	0365	554:	285	269					
2010	6					SOUTH_BELTLINE	0366	554:	105	107	87	96	60	99	
2012	3					SOUTH_BELTLINE	0366	720:	235	252	233				
2010	8					SPRING_VALLEY	0367	1154:	142	142	143	143	150	148	138 148
2012	6					SPRING_VALLEY	0367	1229:	202	207	196	217	200	207	

2010	12		SPRINGVILLE 0368	1791:	149	154	142	127	161	134	149	164
156	141	159	155									
2012	10		SPRINGVILLE 0368	2186:	209	226	234	230	224	210	228	207
209	209											
2010	5		ST_ANDREWS 0369	489:	107	103	79	100	100			
2012	3		ST_ANDREWS 0369	639:	211	216	212					
2010	4		TRENHOLM_ROAD 0370	521:	130	130	127	134				
2012	3		TRENHOLM_ROAD 0370	586:	201	192	193					
2010	8		VALHALLA 0371	1089:	137	134	145	143	140	101	148	141
2012	6		VALHALLA 0371	1249:	204	224	210	166	220	225		
2010	7		VALLEY_STATE_PARK 0372	861:	120	130	118	127	124	122	120	
2012	6		VALLEY_STATE_PARK 0372	1155:	183	193	206	196	194	183		
2010	4		WALDEN 0373	335:	72	76	99	88				
2012	3		WALDEN 0373	455:	156	139	160					
2010	6		WESTMINSTER 0374	647:	102	113	113	111	104	104		
2012	4		WESTMINSTER 0374	835:	223	207	220	185				
2010	6		WHITEWELL 0375	547:	105	91	72	80	96	103		
2012	4		WHITEWELL 0375	835:	212	224	198	201				
2010	9		WILDEWOOD 0376	1297:	155	142	139	147	159	138	133	141
143												
2012	5		WILDEWOOD 0376	1237:	264	270	264	168	271			
2010	9		WOODFIELD 0377	1063:	126	114	126	122	114	119	115	114
113												
2012	9		WOODFIELD 0377	1370:	161	72	170	187	187	15	197	192
189												
2010	8		WOODLANDS 0378	1289:	165	149	157	149	166	169	164	170
2012	6		WOODLANDS 0378	1288:	73	294	175	288	193	265		
2010	5		BLYTHEWOOD_#3 0379	639:	134	117	128	132	128			
2012	4		BLYTHEWOOD_3 0379	873:	213	220	219	221				
2010	10		DUTCH_FORK_#2 0380	1466:	146	141	160	144	156	83	170	150
150	166											
2012	7		DUTCH_FORK_#2 0380	1446:	299	131	117	306	127	145	321	
2010	5		HARBISON_#2 0381	584:	118	127	119	107	113			
2012	3		HARBISON_2 0381	638:	218	201	219					
2010	3		KELLY_MILL 0382	416:	131	152	133					
2012	3		KELLY_MILL 0382	618:	200	197	221					
2010	8		LAKE_CAROLINA 0383	1059:	128	138	122	131	133	136	136	135
2012	5		LAKE_CAROLINA 0383	1288:	242	263	256	255	272			

2010 10	OAK_POINTE 0384	1447:	161	151	146	148	147	151	134	124
151 134										
2012 7	OAK_POINTE 0384	1612:	210	243	198	259	260	242	200	
2010 4	PARKRIDGE 0385	291:	71	77	74	69				
2012 3	PARKRIDGE 0385	467:	154	155	158					
2010 10	PARKWAY_#2 0386	1222:	122	133	107	126	115	135	110	120
124 130										
2012 7	PARKWAY_2 0386	1351:	62	227	210	246	242	120	244	
2010 6	PINE_GROVE 0387	737:	124	102	116	144	128	123		
2012 3	PINE_GROVE 0387	814:	257	268	289					
2010 14	RIDGE_VIEW 0388	1843:	128	132	120	143	124	144	118	125
138 137 140 128 138 128										
2012 10	RIDGE_VIEW 0388	1932:	171	235	242	62	229	188	137	238
187 243										
2010 3	ROUND_TOP 0389	320:	100	113	107					
2012 3	ROUND_TOP 0389	392:	85	161	146					
2010 8	SANDLAPPER 0390	1166:	139	155	146	152	151	139	144	140
2012 12	SANDLAPPER 0390	1578:	227	40	11	221	255	47	203	218
45 41 226 44										
2010 4	SPRING_HILL 0391	669:	171	165	171	162				
2012 4	SPRING_HILL 0391	813:	184	216	209	204				
2010 9	SPRING_VALLEY_WEST 0392	1177:	144	152	141	135	132	150	75	130
118										
2012 5	SPRING_VALLEY_WEST 0392	1083:	210	202	214	230	227			
2010 13	ABSENTEE_1 0750	3661:	273	73	707	902	666	627	284	743
383 882 421 239 656										
2012 26	ABSENTEE_1 0750	5330:	720	409	437	609	816	496	2036	1377
303 753 396 1806 570 1466 23 30		772 1604	1624	1610	1615	671	708	1444	2064	296
2010 13	ABSENTEE_2 0751	2825:	273	73	707	902	666	627	284	743
383 882 421 239 656										
2012 26	ABSENTEE_2 0751	10510:	720	409	437	609	816	496	2036	1377
303 753 396 1806 570 1466 23 30		772 1604	1624	1610	1615	671	708	1444	2064	296
2012 26	ABSENTEE_3 0752	5736:	720	409	437	609	816	496	2036	1377
303 753 396 1806 570 1466 23 30		772 1604	1624	1610	1615	671	708	1444	2064	296
2012 26	ABSENTEE_4 0753	2542:	720	409	437	609	816	496	2036	1377
303 753 396 1806 570 1466 23 30		772 1604	1624	1610	1615	671	708	1444	2064	296
2010 13	FAILSAFE_1 0850	227:	273	73	707	902	666	627	284	743
383 882 421 239 656										
2012 11	FAILSAFE_1 0850	175:	496	2036	1377	1806	1466	1604	1624	1610
1615 1444 2064										
2012 11	FAILSAFE_2 0851	194:	496	2036	1377	1806	1466	1604	1624	1610

1615 1444 2064

2012 11 FAILSAFE_3 0852 110: 496 2036 1377 1806 1466 1604 1624 1610
1615 1444 2064

Appendix B -- Late votes, 2010 and 2012

	2010 Votes	2010 Late	2012 Votes	2012/2010	2012 Late
WARD_#1 0101	546	0.366	659	1.21	0.152
WARD_#2 0102	227	1.322	342	1.51	0.000
WARD_#3 0103	612	2.124	841	1.37	0.595
WARD_#4 0104	652	0.153	704	1.08	2.841
WARD_#5 0105	325	0.923	582	1.79	2.921
WARD_#6 0106	655	1.221	718	1.10	0.000
WARD_#7 0107	472	1.483	611	1.29	13.748
WARD_#8 0108	432	0.694	1143	2.65	20.385
WARD_#9 0109	440	0.682	660	1.50	0.303
WARD_#10 0110	731	0.410	781	1.07	1.536
WARD_#11 0111	530	0.755	690	1.30	11.739
WARD_#12 0112	715	0.140	808	1.13	0.371
WARD_#13 0113	937	0.854	1068	1.14	8.333
WARD_#14 0114	855	0.702	873	1.02	3.322
WARD_#15 0115	587	0.852	595	1.01	0.000
WARD_#16 0116	769	0.260	763	0.99	0.131
WARD_#17 0117	830	0.361	894	1.08	6.935
WARD_#18 0118	500	0.400	663	1.33	15.385
WARD_#19 0119	492	0.203	674	1.37	0.000
WARD_#20 0120	740	0.946	864	1.17	0.000
WARD_#21 0121	694	0.576	826	1.19	20.702
WARD_#22 0122	638	0.470	832	1.30	11.058
WARD_#23 0123	478	0.418	569	1.19	0.000
WARD_#24 0124	539	0.186	583	1.08	0.172
WARD_#25 0125	905	0.331	875	0.97	17.600
WARD_#26 0126	360	1.111	607	1.69	0.000
WARD_#29 0129	588	0.000	719	1.22	13.491
WARD_#30 0130	287	0.697	386	1.34	0.259
WARD_#31 0131	392	1.276	545	1.39	0.000
WARD_#32 0132	410	0.244	442	1.08	0.000
WARD_#33 0133	424	1.179	516	1.22	0.000
WARD_#34 0134	555	0.000	577	1.04	8.319
ARCADIA 0301	774	0.000	853	1.10	0.000
ARDINCAPLE 0302	195	0.000	247	1.27	0.000
BALLENTINE 0303	1436	1.671	1806	1.26	0.055
BEATTY_ROAD 0304	293	2.048	509	1.74	0.000
BLUFF 0305	1026	0.000	1154	1.12	0.000
BLYTHEWOOD_#1 0306	545	0.734	678	1.24	0.590
BLYTHEWOOD_#2 0307	819	6.227	1060	1.29	0.000
BRANDON 0308	1235	3.077	1577	1.28	9.258
BRIARWOOD 0309	1083	4.247	1306	1.21	0.000
CAUGHMAN_ROAD 0310	852	11.854	937	1.10	0.000
COLLEGE_PLACE 0311	713	1.543	891	1.25	3.928
COOPER 0312	673	0.149	697	1.04	1.291
DENNYSIDE 0313	390	0.256	479	1.23	0.000
DENTSVILLE 0314	1079	3.892	1080	1.00	19.444

Appendix B -- Late votes, 2010 and 2012

DUTCH_FORK_#1 0315	1111	0.270	1395	1.26	9.677
EASTOVER 0316	1172	0.597	1421	1.21	14.638
EDGEWOOD 0317	761	3.285	967	1.27	20.786
ESTATES 0318	1928	4.149	2229	1.16	21.714
FAIRLAWN 0319	1284	2.960	1402	1.09	17.475
FAIRWOLD 0320	462	1.948	484	1.05	0.207
E_FOREST_ACRES 0321	622	0.161	680	1.09	0.000
N_FOREST_ACRES 0322	646	0.619	737	1.14	3.392
S_FOREST_ACRES 0323	770	2.727	836	1.09	0.000
FRIARSGATE_#1 0324	927	6.472	944	1.02	32.733
FRIARSGATE_#2 0325	753	1.594	918	1.22	7.190
OLD_FRIARSGATE 0326	654	0.917	661	1.01	21.180
GADSDEN 0327	1049	1.144	1113	1.06	31.806
GARNERS 0328	447	2.013	518	1.16	1.351
GREENVIEW 0329	970	0.309	978	1.01	0.102
GREGG_PARK 0330	739	0.135	900	1.22	2.778
HAMPTON 0331	710	0.282	858	1.21	9.907
HARBISON_#1 0332	878	0.683	1126	1.28	6.661
HOPKINS 0333	1332	0.976	1224	0.92	23.284
HORRELL_HILL 0334	1007	0.497	1215	1.21	1.070
HUNTING_CREEK 0335	283	0.353	298	1.05	0.336
KEELS 0336	1144	4.108	1213	1.06	35.779
KEENAN 0337	848	0.825	842	0.99	20.546
KILLIAN 0338	604	0.662	752	1.25	10.771
KINGSWOOD 0339	1221	1.884	1424	1.17	18.961
LINCOLNSHIRE 0340	997	2.307	1195	1.20	11.548
LONGCREEK 0341	1683	2.258	1864	1.11	14.539
LYKESLAND 0342	1189	2.523	1274	1.07	17.661
MCENTIRE 0343	403	0.248	485	1.20	0.000
MEADOWFIELD 0344	957	0.418	940	0.98	13.617
MEADOWLAKE 0345	1098	1.730	1147	1.04	8.806
MIDWAY 0346	1113	2.965	1283	1.15	17.927
MILL_CREEK 0347	739	0.000	978	1.32	17.996
MONTICELLO 0348	995	2.412	1142	1.15	19.352
NORTH_SPRINGS_#1 0349	1523	5.384	1554	1.02	14.221
NORTH_SPRINGS_#2 0350	1340	0.000	1377	1.03	14.379
OAKWOOD 0351	506	0.000	591	1.17	0.000
OLYMPIA 0352	654	0.000	997	1.52	7.121
PARKWAY_#1 0353	2395	5.219	2408	1.01	29.651
PENNINGTON 0354	1254	8.373	1250	1.00	18.800
PINE_LAKES 0355	1124	2.936	1228	1.09	26.059
PINEWOOD 0356	708	3.672	855	1.21	26.082
POLO_ROAD 0357	1817	1.211	2254	1.24	11.934
PONTIAC 0358	1186	0.759	1304	1.10	31.825
RICE_CREEK 0359	1828	3.665	1928	1.05	28.164
RIDGEWOOD 0360	331	0.906	403	1.22	0.248
RIVER_SPRINGS 0361	1770	1.582	1951	1.10	12.096

Appendix B -- Late votes, 2010 and 2012

RIVERSIDE 0362	405	0.247	562	1.39	0.178
RIVERWALK 0363	1373	2.185	1358	0.99	27.614
SATCHELFORD 0364	724	0.276	816	1.13	0.000
SKYLAND 0365	367	0.000	554	1.51	10.469
SOUTH_BELTLINE 0366	554	0.361	720	1.30	15.139
SPRING_VALLEY 0367	1154	0.173	1229	1.06	7.079
SPRINGVILLE 0368	1791	1.117	2186	1.22	0.046
ST_ANDREWS 0369	489	0.204	639	1.31	1.408
TRENHOLM_ROAD 0370	521	0.000	586	1.12	0.000
VALHALLA 0371	1089	0.643	1249	1.15	1.121
VALLEY_STATE_PARK 0372	861	5.923	1155	1.34	5.714
WALDEN 0373	335	1.493	455	1.36	9.011
WESTMINSTER 0374	647	1.855	835	1.29	7.665
WHITEWELL 0375	547	0.914	835	1.53	6.707
WILDEWOOD 0376	1297	0.000	1237	0.95	25.061
WOODFIELD 0377	1063	0.847	1370	1.29	5.036
WOODLANDS 0378	1289	0.155	1288	1.00	14.053
BLYTHEWOOD_#3 0379	639	0.782	873	1.37	1.604
DUTCH_FORK_#2 0380	1466	3.411	1446	0.99	31.743
HARBISON_#2 0381	584	0.514	638	1.09	9.091
KELLY_MILL 0382	416	0.962	618	1.49	4.854
LAKE_CAROLINA 0383	1059	0.755	1288	1.22	17.624
OAK_POINTE 0384	1447	1.866	1612	1.11	17.308
PARKRIDGE 0385	291	1.718	467	1.60	0.214
PARKWAY_#2 0386	1222	3.764	1351	1.11	25.167
PINE_GROVE 0387	737	3.121	814	1.10	27.027
RIDGE_VIEW 0388	1843	3.690	1932	1.05	29.037
ROUND_TOP 0389	320	0.313	392	1.23	0.255
SANDLAPPER 0390	1166	0.000	1578	1.35	32.953
SPRING_HILL 0391	669	3.587	813	1.22	0.000
SPRING_VALLEY_WEST 0392	1177	1.274	1083	0.92	25.023
	104904		121206	1.16	

Appendix C

Votes per Terminal, 2010 General Election, by County

Hampton	83.774
Marlboro	85.085
Greenwood	96.709
Marion	97.000
Allendale	97.261
Colleton	98.891
Dillon	99.704
Cherokee	100.869
Union	101.233
Barnwell	102.155
Chester	102.238
Laurens	110.836
Aiken	111.259
Bamberg	111.650
Darlington	114.817
Horry	115.754
Abbeville	116.268
Pickens	117.371
Edgefield	117.582
McCormick	118.167
Lee	119.140
Saluda	120.224
Chesterfield	123.417
Newberry	123.787
Greenville	123.813
Sumter	125.169
Calhoun	125.220
Florence	125.232
York	126.185
Anderson	126.388
Lexington	126.731
Richland	129.225
Fairfield	130.270
Kershaw	133.319
Beaufort	134.657
Georgetown	135.234
Oconee	136.103
Dorchester	138.458
Clarendon	140.164
Jasper	140.564

Spartanburg	156.351
Berkeley	157.496

Appendix D
Late Votes by Hour after 7pm

	2010	2012
7pm - 8pm	1888	6297
8pm - 9pm	43	4544
9pm - 10pm		2520
10pm - 11pm		1145
11pm - 12M		255
12M - 1am		29

Appendix E

CRUDE HISTOGRAM OF VOTING TIMES AFTER 7PM

COUNT MINS SECS

0	0	50	:
0	0	55	:
1	1	0	:
1	1	5	:
2	1	10	:
3	1	15	:
3	1	20	:
5	1	25	:
6	1	30	:
10	1	35	:
13	1	40	:
15	1	45	:
20	1	50	:
22	1	55	:
23	2	0	:
31	2	5	:
32	2	10	:
42	2	15	:
42	2	20	:
45	2	25	:
50	2	30	:
52	2	35	:
45	2	40	:
50	2	45	:
46	2	50	:
45	2	55	:
44	3	0	:
44	3	5	:
46	3	10	:
41	3	15	:
37	3	20	:
41	3	25	:
36	3	30	:
34	3	35	:
33	3	40	:
29	3	45	:
27	3	50	:
29	3	55	:
24	4	0	:
26	4	5	:
21	4	10	:
22	4	15	:
17	4	20	:
19	4	25	:
17	4	30	:
15	4	35	:
14	4	40	:
15	4	45	:
12	4	50	:
11	4	55	:
11	5	0	:

9	5	5	:	*****
9	5	10	:	*****
8	5	15	:	*****
8	5	20	:	*****
9	5	25	:	*****
7	5	30	:	*****
7	5	35	:	*****
5	5	40	:	*****
5	5	45	:	*****
6	5	50	:	*****
5	5	55	:	*****
5	6	0	:	*****
5	6	5	:	*****
4	6	10	:	****
4	6	15	:	****
3	6	20	:	***
4	6	25	:	****
3	6	30	:	***
3	6	35	:	***
3	6	40	:	***
2	6	45	:	**
2	6	50	:	**
2	6	55	:	**
2	7	0	:	**
1	7	5	:	*
2	7	10	:	**
1	7	15	:	*
2	7	20	:	**
1	7	25	:	*
1	7	30	:	*
1	7	35	:	*
1	7	40	:	*
1	7	45	:	*
0	7	50	:	
1	7	55	:	*
1	8	0	:	*
1	8	5	:	*
1	8	10	:	*
1	8	15	:	*
1	8	20	:	*
0	8	25	:	
1	8	30	:	*
1	8	35	:	*
0	8	40	:	
1	8	45	:	*
0	8	50	:	
1	8	55	:	*
0	9	0	:	
0	9	5	:	
0	9	10	:	
1	9	15	:	*
0	9	20	:	
1	9	25	:	*
1	9	30	:	*

1	9	35	:	*
1	9	40	:	*
1	9	45	:	*
0	9	55	:	
22	10	0	:	*****

I

Update and Further Analysis

Duncan Buell

12/02/2012

One of the things that I have learned from this election is that there are many problem conditions that my programs were not originally written to be able to diagnose. I have tried since obtaining the data to fix this so that an accurate analysis can be provided to the officials and the voters as to what really happened.

CAVEATS:

I cannot stress enough that although I believe my analysis and numbers to be correct enough to be able to be used for most policy discussions, there are and will be slight differences in counts based either on errors in the timestamps of the iVotronic terminals (the "voting machines") or the ambiguity of the messages produced by the terminals.

For the most part, I believe the "slight differences" to be at the level of an error of five or six terminals. That is, if I were to say that there were 515 terminals showing votes collected in the period 8:00am to 8:15am on 11/06/2012, the actual number is almost certainly between 509 and 521 and thus the error is on the order of 1%. The actual number can in fact probably be determined by a detailed analysis terminal by terminal, but for policy purposes, this is probably close enough now.

Examples of problem conditions that would create these small errors include the following.

Timestamp problems: We had four terminals whose date was set to 11/06/2014, one whose date was set to 11/06/2015, and one whose date was set to 11/07/2012. My program that would look at opening and closing times would thus consider these to be totally off. However, it appears that the time of day was correct for these terminals. Also, there is at least one terminal (5140401) that started the day off by an hour but had its clock set to the correct time in the first hour of operation. This causes a slight anomaly in the "first vote" report.

There were perhaps about 50 terminals that were off by an hour, probably because of the known problem with Daylight Savings Time.

Some of these were re-set during the day, but not all were. This will affect the counts of the number of terminals opened and closed at certain times of day, but I think the numbers of these are again small when compared against the whole. In order for changes on the order of 50 terminals to occur to the numbers, it would have had to have happened, for example, that all 50 of the DST terminals went down one hour and then came back the next hour, thus skewing by 50 the counts of number of working terminals. I think it is more reasonable to assume that failure rates for DST terminals were not different from failure rates in general, and thus one small group going down one hour and coming back up the next would be offset by a similar sized group with the opposite behavior.

Further, it is not entirely possible to distinguish a terminal that was not opened until 3pm, say, because of terminal problems, from one that was brought to the precinct at 3pm. If the terminal shows being opened on time, but throws error messages and collects no votes before being adjusted at 3pm, then it is clearly a terminal problem. If the terminal is not actually opened until 3pm, then we cannot tell just from the data—we would need the election board's non-electronic information on new terminals delivered to precincts in order to make that determination.

DATA:

The EL155 “cast vote record” has the individual votes (in random order) together with precinct number and iVotronic terminals serial number. From this data I can associate terminals with precincts. This is also the data that can be used to generate the counts of votes for and against candidates and referendum issues, by ballot style, precinct, and terminal.

The EL152 “event log” file shows the events logged by each iVotronic terminal. Some of these (like “Vote cast by voter”) are actually just “events”. Some of these are more like “error messages” (“Failed to get EB ballot header block”). This file contains PEB serial numbers to go with the terminal serial numbers and the events that are logged. This is the data used to determine PEB serial numbers, opening and closing times of the terminals, time of first vote cast and last vote cast, and similar conditions. Because each vote cast is logged as an event with a timestamp, I can count the number of votes cast in each terminal in even

15-minute interval, and I can count the number of terminals that were collecting votes in each precinct in any 15-minute interval. I could do this for any time interval. I have chosen to use 15 minutes because it is small enough to provide some detailed information but is not so small that the entire election day can't be put on one page and viewed by eye.

Summary: I work from the electronic data, and my analysis can only show what is present in the data. Unless I offer assumptions with specific caveats, the numbers will be presented as "We have data showing that N terminals were collecting votes at 9am". I will not write "I believe there were N terminals collecting votes at 9am".

NUMBERS OF TERMINALS/NUMBERS OF WORKING TERMINALS

The EL152 "event log" file has event logs for 628 terminals used in the precincts. The EL155 "cast vote record" has individual vote data from 627 terminals.

The discrepancy is terminal number 5123595. There is an event log record for this terminal, showing that it was opened at 6:41am on 11/06/2014 (yes, 2014) and closed at 9:13am without ever collecting any votes. Because there are no votes in the EL155 file, I cannot immediately associate this terminal with a precinct. However, this terminal was opened and closed with PEB 157684, which was used in Ward 8, so I believe we may assume that this terminal was at that precinct. This also reconciles the terminal count for Ward 8 with the "red column" numbers. The red column shows the number six. There is vote data from five terminals, and there is one more terminal opened and closed with a Ward 8 PEB but collecting no votes.

Among the questions at the legislative hearing on 11/26/2012 were the number of terminals intended to be allocated, the number of terminals allocated, and the number of terminals in operation. My count of the "red column" is the same as Senator Lourie's—576. My comparison (by hand) of terminals per precinct shows 36 precincts with more terminals than the red number, 7 with fewer terminals, 81 with the same number, and Ward 8 with the same number when 5123595 is accounted for.

I have not gone into the data on the 36 precincts with more terminals than the red column number, but one could look at the data to determine how of many of those precincts started with the red number but then had terminals added during the day.

Of greater concern are the seven precincts

- 324 Friarsgate #1
- 333 Hopkins
- 340 Lincolnshire
- 365 Skyland
- 381 Harbison #2
- 384 Oak Pointe
- 392 Spring Valley West

for which the red column shows a larger number than for which data occurs in the EL152 or EL155 files.

I was a poll watcher at Lincolnshire and took down the serial numbers of the six terminals (same as the red number) at that precinct. The terminal for which no record exists in the files I have was 5133307. This was to be used for curbside voting, but it didn't come up (battery problem was alleged at the time). The problem was called in about 6:45am. The Technician arrived about 9:30am, and the terminal appeared to go on line at about 9:50am. I remember this because I the lines had been long and I made a note to myself to see if the increased number of terminals had an effect on the rate at which votes were cast starting about 9:50am.

Assuming Ms. McBride's statement that the red column was misinterpreted to be the number of terminals to be allocated, we have data in these seven precincts from fewer terminals than were apparently to be sent to the precincts.

- If these terminals were sent, and were so broken that they couldn't be opened at all, there would be no data in either EL152 or EL155, but there should be written technician records that would speak to increased problems.
- If the terminals were sent and were opened, but these terminals were so non-functional that no votes were recorded (as with 5123595 in Ward 8), then there should still be EL152 event data

that would show this and that is a matter of federal and state public record.

- If the terminals were sent and opened, and collected votes, then there are votes not included in the official count, and the EL152 or EL155 files will show this.

Number of Terminals Available

There are two ways to determine how many terminals were available at the beginning of 11/06/2012. I have included both the opening time of the terminals and the time of the first vote collected. We see many terminals opened between 6am and 7am and then collecting the first vote shortly after 7am. This would be the normal behavior. We see some terminals off by an hour, but otherwise normal. This would probably be the Daylight Savings Time anomaly.

Terminals opened on time but not collecting votes until much later were probably not functioning properly.

Terminals opened late were either new terminals provided late to precincts or terminals that had to be repaired and were not repaired until late. To separate these two one would presumably have to look at the repair records.

With all the timestamp caveats, Appendix U-A shows the number of terminals opened in 15-minute intervals during the day. Appendix U-B shows the number of terminals collecting the first vote in the same 15-minute intervals. Appendix U-C shows the number of terminals collecting ANY votes during these intervals. Appendix U-D shows the timing of the last votes collected by terminals.

Open Times: The data summarized in Appendix U-A shows that by 7:15AM there were 501 terminals opened. (In fact, there were 506, because the four 2014 and the 11/07/2012 terminals were also open on time, but my program will not automatically pick up this fact.) An additional 47 terminals were opened with timestamps before 8am. After that the record shows only a few terminals opening in any 15-minute interval. These are probably the terminals that were being serviced by technicians and then brought on line afterwards.

First Vote Times: The data summarized in Appendix U-B shows that by 8am there were 508 terminals that had collected their first vote, and that by 8:15am there were 543 such terminals. This time period would cover any terminals whose timestamp was off by an hour. Again, the five 2014 and 2015 terminals should be added to this.

Working Terminals: Appendix U-C shows 530 terminals working during the period 8:00am to 8:15am. (Again, one ought manually to add five for the terminals with the wrong year.) My definition of “working” is that the terminal recorded some “Vote cast” event in that time interval. This also shows that at no point during the day were there more than 578 (573+5, during 17:00-17:15) terminals collecting votes.

Given the reported prevalence of long lines in many precincts throughout election day, I believe we can take the numbers in Appendix U-C to be close to the number of operational terminals during the day. There will no doubt be some precincts in which the lines disappeared at some point, and thus with terminals that might not have collected votes in some time interval, but I would think that number is fairly small.

Last Vote Times: Appendix U-D shows the time at which the last votes were collected. We can see a handful of terminals (six to be exact) whose last votes were recorded prior to 10am, and 28 prior to 6pm. A look at the detailed records would probably show that these were terminals that became non-functional during the day.

MACHINE PROBLEMS

I have been concentrating recently on the timing of events, resulting in the Appendices of this update. One could also look more closely at the event logs that indicate error conditions, but I have not yet done so.

There were, for example, 120 screen recalibration events during the day, on 89 different terminals, with 23 terminals showing more than one screen recalibration.

Part of my reason for not having looked at this is that the event logs that indicate error conditions can possibly be ambiguous, and I have not had confirmation from the election commission or from the vendor that one can specifically link an event message to a condition.

Appendix U-A

Number of terminals opened in each time interval

Interval	Number	Cumulative
07:00 - 07:15	0	501
07:15 - 07:30	1	501
07:30 - 07:45	2	503
07:45 - 08:00	3	505
08:00 - 08:15	4	509
08:15 - 08:30	5	514
08:30 - 08:45	6	520
08:45 - 09:00	7	527
09:00 - 09:15	8	535
09:15 - 09:30	9	544
09:30 - 09:45	10	554
09:45 - 10:00	11	565
10:00 - 10:15	12	577
10:15 - 10:30	13	590
10:30 - 10:45	14	604
10:45 - 11:00	15	619
11:00 - 11:15	16	635
11:15 - 11:30	17	652
11:30 - 11:45	18	670
11:45 - 12:00	19	689
12:00 - 12:15	20	709
12:15 - 12:30	21	730
12:30 - 12:45	22	752
12:45 - 13:00	23	775
13:00 - 13:15	24	799
13:15 - 13:30	25	824
13:30 - 13:45	26	850
13:45 - 14:00	27	877
14:00 - 14:15	28	905
14:15 - 14:30	29	934
14:30 - 14:45	30	964
14:45 - 15:00	31	995
15:00 - 15:15	32	1027
15:15 - 15:30	33	1060
15:30 - 15:45	34	1094
15:45 - 16:00	35	1129
16:00 - 16:15	36	1165
16:15 - 16:30	37	1202
16:30 - 16:45	38	1240
16:45 - 17:00	39	1279
17:00 - 17:15	40	1319
17:15 - 17:30	41	1360
17:30 - 17:45	42	1402
17:45 - 18:00	43	1445
18:00 - 18:15	44	1489
18:15 - 18:30	45	1534
18:30 - 18:45	46	1580
18:45 - 19:00	47	1627
19:00 - 19:15	48	1675
19:15 - 19:30	49	1724
19:30 - 19:45	50	1774

19:45 - 20:00	51	5 :	620
20:00 - 20:15	52	0 :	620
20:15 - 20:30	53	0 :	620
20:30 - 20:45	54	0 :	620
20:45 - 21:00	55	0 :	620
21:00 - 21:15	56	0 :	620
21:15 - 21:30	57	0 :	620
21:30 - 21:45	58	0 :	620
21:45 - 22:00	59	0 :	620
22:00 - 22:15	60	0 :	620
22:15 - 22:30	61	0 :	620
22:30 - 22:45	62	0 :	620
22:45 - 23:00	63	0 :	620
23:00 - 23:15	64	0 :	620
23:15 - 23:30	65	0 :	620
23:30 - 23:45	66	0 :	620
23:45 - 24:00	67	0 :	620
24:00 - 24:15	68	0 :	620
24:15 - 24:30	69	0 :	620
24:30 - 24:45	70	0 :	620
24:45 - 25:00	71	0 :	620
25:00 - 25:15	72	0 :	620
25:15 - 25:30	73	0 :	620
25:30 - 25:45	74	0 :	620
25:45 - 26:00	75	0 :	620
26:00 - 26:15	76	0 :	620
26:15 - 26:30	77	0 :	620
26:30 - 26:45	78	0 :	620
26:45 - 27:00	79	0 :	620
27:00 - 27:15	80	0 :	620
27:15 - 27:30	81	0 :	620
27:30 - 27:45	82	0 :	620
27:45 - 28:00	83	0 :	620
28:00 - 28:15	84	0 :	620
28:15 - 28:30	85	0 :	620
28:30 - 28:45	86	0 :	620
28:45 - 29:00	87	0 :	620
29:00 - 29:15	88	0 :	620
29:15 - 29:30	89	0 :	620
29:30 - 29:45	90	0 :	620
29:45 - 30:00	91	0 :	620
30:00 - 30:15	92	0 :	620
30:15 - 30:30	93	0 :	620
30:30 - 30:45	94	0 :	620
30:45 - 31:00	95	0 :	620
31:00 - 31:15	96	0 :	620
31:15 - 31:30	97	0 :	620
31:30 - 31:45	98	0 :	620
31:45 - 32:00	99	7 :	627

Appendix U-B

Number of terminals collecting the first vote in each time interval

Interval	Number	Cumulative
07:00 - 07:15	0	447 :
07:15 - 07:30	1	37 :
07:30 - 07:45	2	14 :
07:45 - 08:00	3	10 :
08:00 - 08:15	4	35 :
08:15 - 08:30	5	2 :
08:30 - 08:45	6	3 :
08:45 - 09:00	7	3 :
09:00 - 09:15	8	1 :
09:15 - 09:30	9	2 :
09:30 - 09:45	10	3 :
09:45 - 10:00	11	1 :
10:00 - 10:15	12	6 :
10:15 - 10:30	13	1 :
10:30 - 10:45	14	4 :
10:45 - 11:00	15	2 :
11:00 - 11:15	16	0 :
11:15 - 11:30	17	2 :
11:30 - 11:45	18	3 :
11:45 - 12:00	19	0 :
12:00 - 12:15	20	0 :
12:15 - 12:30	21	4 :
12:30 - 12:45	22	0 :
12:45 - 13:00	23	2 :
13:00 - 13:15	24	2 :
13:15 - 13:30	25	2 :
13:30 - 13:45	26	1 :
13:45 - 14:00	27	1 :
14:00 - 14:15	28	0 :
14:15 - 14:30	29	4 :
14:30 - 14:45	30	1 :
14:45 - 15:00	31	1 :
15:00 - 15:15	32	0 :
15:15 - 15:30	33	0 :
15:30 - 15:45	34	4 :
15:45 - 16:00	35	1 :
16:00 - 16:15	36	2 :
16:15 - 16:30	37	0 :
16:30 - 16:45	38	1 :
16:45 - 17:00	39	2 :
17:00 - 17:15	40	1 :
17:15 - 17:30	41	1 :
17:30 - 17:45	42	1 :
17:45 - 18:00	43	1 :
18:00 - 18:15	44	1 :
18:15 - 18:30	45	2 :
18:30 - 18:45	46	0 :
18:45 - 19:00	47	0 :
19:00 - 19:15	48	2 :
19:15 - 19:30	49	1 :
19:30 - 19:45	50	1 :

19:45 - 20:00	51	6 :	621
20:00 - 20:15	52	0 :	621
20:15 - 20:30	53	0 :	621
20:30 - 20:45	54	0 :	621
20:45 - 21:00	55	0 :	621
21:00 - 21:15	56	0 :	621
21:15 - 21:30	57	0 :	621
21:30 - 21:45	58	0 :	621
21:45 - 22:00	59	0 :	621
22:00 - 22:15	60	0 :	621
22:15 - 22:30	61	0 :	621
22:30 - 22:45	62	0 :	621
22:45 - 23:00	63	0 :	621
23:00 - 23:15	64	0 :	621
23:15 - 23:30	65	0 :	621
23:30 - 23:45	66	0 :	621
23:45 - 24:00	67	0 :	621
24:00 - 24:15	68	0 :	621
24:15 - 24:30	69	0 :	621
24:30 - 24:45	70	0 :	621
24:45 - 25:00	71	0 :	621
25:00 - 25:15	72	0 :	621
25:15 - 25:30	73	0 :	621
25:30 - 25:45	74	0 :	621
25:45 - 26:00	75	0 :	621
26:00 - 26:15	76	0 :	621
26:15 - 26:30	77	0 :	621
26:30 - 26:45	78	0 :	621
26:45 - 27:00	79	0 :	621
27:00 - 27:15	80	0 :	621
27:15 - 27:30	81	0 :	621
27:30 - 27:45	82	0 :	621
27:45 - 28:00	83	0 :	621
28:00 - 28:15	84	0 :	621
28:15 - 28:30	85	0 :	621
28:30 - 28:45	86	0 :	621
28:45 - 29:00	87	0 :	621
29:00 - 29:15	88	0 :	621
29:15 - 29:30	89	0 :	621
29:30 - 29:45	90	0 :	621
29:45 - 30:00	91	0 :	621
30:00 - 30:15	92	0 :	621
30:15 - 30:30	93	0 :	621
30:30 - 30:45	94	0 :	621
30:45 - 31:00	95	0 :	621
31:00 - 31:15	96	0 :	621
31:15 - 31:30	97	0 :	621
31:30 - 31:45	98	0 :	621
31:45 - 32:00	99	6 :	627

Appendix U-C

Number of working terminals (collecting votes) in each time interval

Interval		Number
07:00 - 07:15	0	447
07:15 - 07:30	1	477
07:30 - 07:45	2	490
07:45 - 08:00	3	492
08:00 - 08:15	4	530
08:15 - 08:30	5	528
08:30 - 08:45	6	526
08:45 - 09:00	7	526
09:00 - 09:15	8	524
09:15 - 09:30	9	529
09:30 - 09:45	10	532
09:45 - 10:00	11	533
10:00 - 10:15	12	544
10:15 - 10:30	13	543
10:30 - 10:45	14	547
10:45 - 11:00	15	546
11:00 - 11:15	16	545
11:15 - 11:30	17	545
11:30 - 11:45	18	551
11:45 - 12:00	19	540
12:00 - 12:15	20	541
12:15 - 12:30	21	543
12:30 - 12:45	22	540
12:45 - 13:00	23	543
13:00 - 13:15	24	543
13:15 - 13:30	25	544
13:30 - 13:45	26	550
13:45 - 14:00	27	550
14:00 - 14:15	28	555
14:15 - 14:30	29	557
14:30 - 14:45	30	557
14:45 - 15:00	31	558
15:00 - 15:15	32	552
15:15 - 15:30	33	561
15:30 - 15:45	34	561
15:45 - 16:00	35	562
16:00 - 16:15	36	567
16:15 - 16:30	37	567
16:30 - 16:45	38	564
16:45 - 17:00	39	566
17:00 - 17:15	40	573
17:15 - 17:30	41	570
17:30 - 17:45	42	568
17:45 - 18:00	43	569
18:00 - 18:15	44	569
18:15 - 18:30	45	556
18:30 - 18:45	46	548
18:45 - 19:00	47	511
19:00 - 19:15	48	434
19:15 - 19:30	49	386
19:30 - 19:45	50	362

19:45 - 20:00	51	348
20:00 - 20:15	52	319
20:15 - 20:30	53	282
20:30 - 20:45	54	249
20:45 - 21:00	55	215
21:00 - 21:15	56	185
21:15 - 21:30	57	162
21:30 - 21:45	58	139
21:45 - 22:00	59	126
22:00 - 22:15	60	99
22:15 - 22:30	61	85
22:30 - 22:45	62	65
22:45 - 23:00	63	52
23:00 - 23:15	64	28
23:15 - 23:30	65	17
23:30 - 23:45	66	13
23:45 - 24:00	67	10
24:00 - 24:15	68	6
24:15 - 24:30	69	4
24:30 - 24:45	70	0
24:45 - 25:00	71	0
25:00 - 25:15	72	0
25:15 - 25:30	73	0
25:30 - 25:45	74	0
25:45 - 26:00	75	0
26:00 - 26:15	76	0
26:15 - 26:30	77	0
26:30 - 26:45	78	0
26:45 - 27:00	79	0
27:00 - 27:15	80	0
27:15 - 27:30	81	0
27:30 - 27:45	82	0
27:45 - 28:00	83	0
28:00 - 28:15	84	0
28:15 - 28:30	85	0
28:30 - 28:45	86	0
28:45 - 29:00	87	0
29:00 - 29:15	88	0
29:15 - 29:30	89	0
29:30 - 29:45	90	0
29:45 - 30:00	91	0
30:00 - 30:15	92	0
30:15 - 30:30	93	0
30:30 - 30:45	94	0
30:45 - 31:00	95	0
31:00 - 31:15	96	0
31:15 - 31:30	97	0
31:30 - 31:45	98	0
31:45 - 32:00	99	6

Appendix U-D

Number of terminals collecting their last vote in each time interval

Interval	Number	Cumulative
07:00 - 07:15	0	0
07:15 - 07:30	1	0
07:30 - 07:45	2	2
07:45 - 08:00	3	3
08:00 - 08:15	4	3
08:15 - 08:30	5	6
08:30 - 08:45	6	6
08:45 - 09:00	7	6
09:00 - 09:15	8	6
09:15 - 09:30	9	6
09:30 - 09:45	10	6
09:45 - 10:00	11	6
10:00 - 10:15	12	6
10:15 - 10:30	13	6
10:30 - 10:45	14	8
10:45 - 11:00	15	8
11:00 - 11:15	16	10
11:15 - 11:30	17	10
11:30 - 11:45	18	10
11:45 - 12:00	19	10
12:00 - 12:15	20	11
12:15 - 12:30	21	12
12:30 - 12:45	22	12
12:45 - 13:00	23	12
13:00 - 13:15	24	12
13:15 - 13:30	25	13
13:30 - 13:45	26	13
13:45 - 14:00	27	15
14:00 - 14:15	28	15
14:15 - 14:30	29	15
14:30 - 14:45	30	15
14:45 - 15:00	31	15
15:00 - 15:15	32	15
15:15 - 15:30	33	16
15:30 - 15:45	34	16
15:45 - 16:00	35	16
16:00 - 16:15	36	16
16:15 - 16:30	37	18
16:30 - 16:45	38	19
16:45 - 17:00	39	19
17:00 - 17:15	40	20
17:15 - 17:30	41	22
17:30 - 17:45	42	23
17:45 - 18:00	43	28
18:00 - 18:15	44	32
18:15 - 18:30	45	45
18:30 - 18:45	46	91
18:45 - 19:00	47	175
19:00 - 19:15	48	225
19:15 - 19:30	49	248
19:30 - 19:45	50	268

19:45 - 20:00	51	30 :	298
20:00 - 20:15	52	37 :	335
20:15 - 20:30	53	33 :	368
20:30 - 20:45	54	36 :	404
20:45 - 21:00	55	30 :	434
21:00 - 21:15	56	23 :	457
21:15 - 21:30	57	23 :	480
21:30 - 21:45	58	13 :	493
21:45 - 22:00	59	29 :	522
22:00 - 22:15	60	14 :	536
22:15 - 22:30	61	20 :	556
22:30 - 22:45	62	13 :	569
22:45 - 23:00	63	24 :	593
23:00 - 23:15	64	11 :	604
23:15 - 23:30	65	4 :	608
23:30 - 23:45	66	3 :	611
23:45 - 24:00	67	4 :	615
24:00 - 24:15	68	2 :	617
24:15 - 24:30	69	4 :	621
24:30 - 24:45	70	0 :	621
24:45 - 25:00	71	0 :	621
25:00 - 25:15	72	0 :	621
25:15 - 25:30	73	0 :	621
25:30 - 25:45	74	0 :	621
25:45 - 26:00	75	0 :	621
26:00 - 26:15	76	0 :	621
26:15 - 26:30	77	0 :	621
26:30 - 26:45	78	0 :	621
26:45 - 27:00	79	0 :	621
27:00 - 27:15	80	0 :	621
27:15 - 27:30	81	0 :	621
27:30 - 27:45	82	0 :	621
27:45 - 28:00	83	0 :	621
28:00 - 28:15	84	0 :	621
28:15 - 28:30	85	0 :	621
28:30 - 28:45	86	0 :	621
28:45 - 29:00	87	0 :	621
29:00 - 29:15	88	0 :	621
29:15 - 29:30	89	0 :	621
29:30 - 29:45	90	0 :	621
29:45 - 30:00	91	0 :	621
30:00 - 30:15	92	0 :	621
30:15 - 30:30	93	0 :	621
30:30 - 30:45	94	0 :	621
30:45 - 31:00	95	0 :	621
31:00 - 31:15	96	0 :	621
31:15 - 31:30	97	0 :	621
31:30 - 31:45	98	0 :	621
31:45 - 32:00	99	6 :	627

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**An Analysis of the 11/06/2012 Richland County General Election
For the Board of Elections and Voter Registration**

And

Legislative Delegation of Richland County

Duncan Buell

League of Women Voters of South Carolina

and

University of South Carolina

12/18/2012

1 Executive Summary/Main Findings

About 90 of the 124 non-absentee precincts had fewer terminals for 2012 than for 2010. A total of 813 terminals appear in the data for 2010, but only 630 terminals appear in the data for 2012.

In 2010 there were 132 of 813 non-absentee terminals that closed after 7:30pm, but only nine of these were closed after 8:30pm and the latest was 9:26pm.

In 2012 there were 402 of 629 non-absentee terminals closed after 7:30pm, with 291 of these closing after 8:30pm and 62 closing after 11pm. The last of these was closed at 1:30am the morning of November 7. (An additional 20 terminals were not closed until midday November 7 or even later.)

In all, the data show 14844 of the 121335 non-absentee votes, more than 12% of the total, cast after 7pm. The detailed breakdown of votes by hour after 7pm is shown in Exhibit F, with comparisons to 2010.

The election could only have been conducted in 12 hours under an absolutely perfect distribution of voter arrivals and terminal allocations.

Finally, we note that the average "last vote time" for a terminal still being used at 7:30pm was 9:45pm. The average voter in line at 7:30pm would still have had an additional wait of an hour and eight minutes before voting.

2 Resource Allocation Estimates

We will provide two back-of-the-envelope estimates on resource allocation to provide a context for looking at the data.

2.1 Resource allocation based on voter counts and vote counts:

First, the South Carolina State Election Commission (SCSEC) reports the following on its website (scvotes.org) for Richland County:

- 2008 general election: 218,127 registered voters, 166,106 votes cast

- 2010 general election: 221,743 registered voters, 119,127 votes cast
- 2012 general election: 244,721 registered voters, 160,111 votes cast

Based on these numbers, the state requirement of one iVotronic terminal for every 250 registered voters would have required

- 873 terminals in 2008
- 887 terminals in 2010
- 979 terminals in 2012

The county's supply of 958 (or 970?) terminals was apparently adequate in 2008 and 2010, but is now no longer adequate.

One can, however, compare against the 2010 data, that show 813 terminals (in precincts) collecting 104,904 votes in precincts. This would provide ballpark estimates.

If one were to project roughly 40% more voters for 2012 than for 2010 (using $166106/119127 = 1.39$ and rounding up to 1.40 to begin to account for the increased number of registered voters), one would estimate that $1.4 * 813 = 1138$ terminals would be needed to provide the same level of service in 2012 as in 2010. Using the number of registered voters for the estimate, one has $244,721/221,743 = 1.10$ and would estimate $1.1 * 813 = 898$ terminals needed.

Between these two is the following: if one were to have allocated one more terminal per precinct in 2012 than in 2010, for a total of 937 terminals across the county (in precincts), that would have accommodated about 15% more voters for 2012 than in 2010. This allocation, together with the terminals at county headquarters, would essentially have exhausted the supply of terminals available to the county, but this represents a very simple ballpark estimate of terminal allocation and expected increased turnout.

2.2 Resource allocation based on voting time needed:

It is not possible to determine exactly the length of time required for each vote to be cast. However, based on the post-closing vote times as analyzed below, we believe it reasonable to estimate that the average vote in Richland County took about 214 seconds, or just over 3-1/2 minutes. This includes the time for a voter to walk up to a terminal, the time for the terminal to be opened for the voter, and the time taken for the vote itself; it is the mean time between "vote cast" events for the votes cast after closing time. And we would expect that there would be no idle time after closing time; the polling places would have been busy until the voter line was completely gone.

From this average vote time we can compute a rough estimate of the terminal resources needed as follows. An estimated 120,000 votes cast on Election Day would have required, at 214 seconds per vote, a total of 428,000 vote-minutes. There are 720 minutes in a 12-hour Election Day (7am to 7pm). For the entire

election to have completed in 12 hours would thus have required $428,000/720 = 594$ iVotronic terminals working full time nonstop through the day. That is, even with perfect distribution of the arrivals of voters, and assuming no slack time at any point, an election projecting 120,000 votes cast could not be completed in 12 hours with fewer than 594 terminals working full time.

3 Data Sources

Our primary sources of data are the EL30A, EL45A, EL68, EL68A, EL152, and EL155 files obtained from the SCSEC on Wednesday, 21 November 2012. Electronic files copied on Wednesday 5 December 2012 at the Richland County office of election administration (to be referred to as “the Richland County office”) have augmented these files. The new data obtained on 5 December are the 152 and 155 files for one iVotronic terminal in each of Lincolnshire and Spring Valley West precincts.

The accounting for terminals comes from comparing the electronic data from the SCSEC against the paper and other disparate records while at the Richland County office on 5 December and subsequent emails from those election officials regarding re-examination of specific terminals.

The standard output files from the ES&S election system are as follows.

- EL30A – this is a “results” file that we use to get precinct names, number of registered voters, and number of ballots cast. Although we could extend the processing to compare my own vote counts in detail against the 30A results, we don’t do this.
- EL68A – this is the “system” log. This file shows the time and serial numbers of the PEBs whose data is uploaded to the county master files, as well as the time and serial numbers of the memory cards when their data is uploaded. This file provides much of the verification that the hardware used during the election has all been accounted for after the election is over.
- EL155 – this is the actual cast vote record. Each vote cast in an iVotronic is recorded in detail (in a somewhat randomized order). This is the file we use to count votes.
- EL152 – this is the “event log” for each of the iVotronic terminals. This records the existence of votes cast, the opening and closing of the terminal, collection of the totals, calibrations and re-calibrations, errors, and other events. Each event comes with a timestamp.

4 Caveats about Numbers

Almost none of these numbers will be perfectly correct. The reason for this is that the timestamp inside a terminal is not synchronized to “real time” and does not affect the terminal’s ability to collect votes. We have throughout our analysis and in this report indicated what we believe to be lower and upper bounds based on

timestamps and have pointed out where timestamp issues might make the data less than 100% accurate. Correcting the data so that the numbers were perfect could be done, but it would be very time-consuming and tedious. And since the error bounds are relatively small compared to the overall data, we do not believe this would change any basic understanding of what happened on Election Day.

Examples of timestamp problems are these:

The terminals are sometimes an hour off (due to anomalies with Daylight Savings Time?). Some of these terminals started the day an hour off but had the time and date reset (by a technician, probably) during the day. Some were not reset. However, it is impossible from the electronic data to determine, for example, if a terminal opened at 7:15am (instead of 6:15am) and closed at 8:20pm was opened late due to problems or simply ran all day long an hour off. Thus, a count of number of terminals at opening of the polls will not be exact. It even happens that we have a terminal whose first vote was collected at an earlier time than it shows it was opened, because the time inside the terminal was reset before the polls opened.

We will mention throughout the effect of timestamp ambiguity on the data presented, but we believe the inexactness is minor in all cases where this is an issue.

Our software specifically excludes the 750+ and 850+ precincts (absentee, failsafe, provisional, etc.), which we will refer to as “the absentee precincts”. All our analysis is done on the election process “in the precincts” and not at county election offices. This is because the absentee terminals are opened and closed all the time during absentee voting, and their collection of votes is not an Election Day event. We could have looked at the provisional/failsafe terminals, given that long lines were reported at county headquarters on Election Day, but did not do that.

5 Votes Not Included in the Certified Count

Our analysis of the 2010 general election showed that 1127 votes in Richland County had not been included in the certified count. There were two reasons for this failure to include votes. In Bluff Precinct, six of the eight terminals were not closed on Election Day. In spite of closing tape messages to the effect that terminals were not closed, and in spite of a huge difference between the number of voter signatures (1026) and the number of certified votes (254), this error was not caught until a week later.

More common is the mistake made in Ward 21 in 2010. In this precinct, two PEBs were used to open and close terminals, but the votes of the second (presumably red-stripe) PEB were not included in the totals. This led to 355 votes not included in the certified count.

This particular failure seems to be one of the common reasons that votes are not included in the count. This was the reason in 2010 in Ward 21 in Richland, in one precinct in Dorchester County, and in two precincts in Horry County.

In Lincolnshire and in Spring Valley West, this error was compounded by the fact that the terminals that were opened with the second PEB were opened late. In Lincolnshire (where the author was a pollwatcher and saw this first hand), terminal 5133307 was down until a technician arrived at about 9:30am. The terminal was opened with a second PEB, functioned for about two hours, and was then deemed unusable due to battery problems and collected no votes after 2:15pm.

In Spring Valley West, the terminal whose votes were not collected was not opened until 3:31pm, when it was opened with a second PEB. Its last vote was 10:43pm.

The problem in these cases seems to be that the messages produced by the system are either wrong or at best misleading. A paper closing tape specifically says that the Lincolnshire terminal was not opened. We believe this to be a misleading statement by the software, and that that tape should say that the terminal was not opened by the PEB being used at that time to produce the closing tape. What this means is that poll workers don't get the correct information, and they clearly have not been trained to know that they will be getting incorrect information from the system.

The two terminals in Lincolnshire and Spring Valley West had 27 and 102 votes on them, for a total of 129 votes not counted.

6 Numbers of Terminals, Opening Times, and Vote Collection

The data provided by SCSEC for 628 terminals, plus the EL152 and EL155 data for one more terminal in each of Lincolnshire and Spring Valley West precincts, amounts to a total of 630 terminals in use in the precincts on Election Day for which we have either 152 or 155 data or both. Of these, one (serial number 5123595, in Ward 8) was opened but never collected votes. Two of these, 5133307 in Lincolnshire and 5133948 in Spring Valley West, were the terminals whose votes were not counted. The remaining 627 were the terminals in the original SCSEC data on which votes were collected on Election Day.

We spent most of Wednesday, 5 December 2012, at the county election office. Much of that time was spent in reconciling the counts of terminals per precinct based on the data in the electronic files against the counts of terminals per precinct based on other records at the county election office. In perhaps 20 precincts, an "extra machine" listed by count by the county election office but for which no data existed appears to be a terminal that was checked by a technician on Election Day and deemed inoperable. It would be better if the technicians' reports all listed serial numbers, but they do not. We must assume, in these cases, that if the county says that nine terminals were deployed, and we have data for eight plus a report that one

terminal was inoperable, that this accounts for the nine terminals deployed by the county.

It appears to be the case at this point that all the terminals that were used on Election Day have been accounted for. The two terminals whose votes are known not to have been counted, from Lincolnshire and from Spring Valley West, appear to be the only terminals for which votes were not included in the certified count.

6.1 Timestamp Issues

The data show that 487 terminals were opened prior to 7:00am on Election Day. This includes the five terminals showing 2014 as the year. We believe the time is correct for these terminals, and only the year is in error.

The data show that 38 terminals were opened between 7:00am and 8:00am, but then had their time and date reset by an hour. We are assuming that these terminals were in fact opened by 7:00am and should be added to the 486 that were opened by 7:00am and had correct time.

The data show 14 terminals opened between 7:00am and 8:00am whose time and date were not reset and that did not collect the first vote until after 8:00am. In each case, these terminals were closed with a timestamp about one hour later than the rest of the terminals in the precinct. This suggests that these were in fact off by one hour all day long and should be counted as opened by 7:00am.

It thus appears that there were $487+38+14 = 539$ terminals opened prior to 7:00am on Election Day.

The data then show 17 terminals opened after 7:00am that did not have time and date reset and that collected the first vote prior to 8:00am. We assume that these timestamps were in fact correct and that the terminals were in fact opened late.

The data show that 74 terminals were opened after 8:00am on Election Day. This includes the terminal showing 2015 as the year. Even accounting for a one-hour error in the timestamp, these terminals were clearly opened late.

These last 14 terminals that appear to have run all day with the timestamp off by one hour had a total of 572 votes cast after closing time. These votes will therefore skew the "last vote" times slightly. We have not attempted to correct for this.

The total of $539+17+74 = 630$, the total of terminals for which we have data.

6.2 Terminal Opening Times

In this section and in what follows, we present data in 15-minute time intervals. We could have done any interval, not just 15 minutes. However, this seemed to be small enough as a unit size to allow for compressing the data in a meaningful way, but large enough so that the results when displayed would fit neatly on one page.

Exhibit A shows the number of terminals opened at the beginning of Election Day. With the adjustments for timestamp issues, there appear to be 523 terminals opened prior to 7:00am, 14 in the next 15 minutes, 11 in the following 15 minutes, and so on, for a total by the end of the day of 630 terminals for which we have electronic data.

Exhibit B, for comparison against other tables, shows a histogram of the number of terminals opened at the end of each 15-minute interval, without adjustment for timestamp issues.

6.3 "First Vote" Times

Exhibit C shows the time, in 15-minute intervals, in which terminals collected the first vote of the day. AS WITH EXHIBIT B, THIS EXHIBIT HAS NOT BEEN ADJUSTED FOR THE ONE-HOUR TIME ANOMALY. This table can be compared against Exhibit B to show that most terminals, once opened, were working at the beginning of the day, although eight terminals did not collect the first vote until 90 minutes or more after the opening time. Presumably this was due to terminal malfunction. (This count of 8 was done by hand examination of the data.)

A comparison of the opening time counts against the first vote time counts shows that these are reasonably consistent with each other. There were a few terminals that failed, but for the most part, the terminals that were opened were able to collect votes, at least first thing on the morning of Election Day. The data show 555 terminals opened by 8:00am (which would take the DST adjustment into account) and 543 terminals whose first vote was collected by 8:15am.

6.4 Number of Working Terminals

Of particular interest is the number of terminals that were working or not during Election Day. We have tracked this by looking at the number of terminals that were collecting votes in each of the 15-minute intervals throughout the day. This count is displayed as Exhibit D. We acknowledge that this might be slightly lower than was actually true given that there may have been slack times in some precincts (perhaps during the early afternoon after a lunchtime rush).

The high water mark for terminals collecting votes was 578, in the period 5:00pm to 5:15pm.

6.5 "Last Vote" Times and Late Votes

We display in Exhibit E the number of terminals whose last vote was collected in each time interval, and in Exhibit F the number of votes in each hourly period after close of polls at 7:00pm. We note that there were 572 late votes in the 14 terminals that ran all day long an hour off in timestamp. Correcting for this will shift the numbers down slightly, so that the 255 votes listed as cast between 11:00pm and midnight may well be more like 200. Nonetheless, the bottom line conclusion is that more than 14,000 votes were likely cast after closing, more than 12% of the total

votes cast on Election Day. None of these 14 terminals were in precinct 0336, Keels, where the 29 votes were cast after midnight.

The lengthy spreadsheet of Exhibit G shows the number of votes cast in each precinct, the number of votes after 7:00pm, and the percentage of the vote for that precinct that was cast after 7:00pm. We have put in bold face all percentages of late votes larger than 10% and have put those larger than 30% in red.

7 Terminal Failures

It has been repeatedly stated that there were hardware failures on Election Day in excess of what would be considered “normal”. We have examined the event logs to extract five kinds of terminal hardware or software problems:

- 0000117 Set Time and Date
- 0000169 Calibrate Screen
- 0001634 Terminal shutdown - DIE exit
- 0001635 Terminal shutdown - IPS exit
- 00025xx several kinds of Compact Flash memory card or file read/write errors

We present in Exhibit H a summary of the number of terminals in which these messages occur prior to 11/06/2012, the number of terminals on 11/06/2012, and the number of terminals showing these event log messages both before and on 11/06/2012. We include also the similar chart for Richland County for the 2010 general election. We note that the 117 and 169 messages would likely occur in all terminals as part of preparation for the election, so we should not be surprised to see these messages in nearly all terminals. The 777 terminals whose time and date were set on Election Day in 2010 were because that week was not daylight time, and yet the terminals expected the first week of November to be daylight time.

The 1634 and 1635 messages are harder to use as diagnostics. One would expect a “DIE” message to mean something catastrophic. However, we note that three terminals issued that message twice on Election Day. Two issued the message twice, about a minute apart, between 6:00am and 7:00am in the morning. One issued the message twice about a minute apart at 7:14 in the evening.

It is thus hard to take the “DIE” message to mean “die”, especially given that it is issued twice in succession by a terminal that then goes on to look as if it were functioning normally. (We have two such in Richland County on 11/06/2012.)

We do not know how to interpret the “IPS exit” message. It is stated that this expands to “internal power supply”, which could indicate a hardware problem that is not actually battery-related but is related to the power supply that transforms ordinary electrical current into 5V current for computers.

It is not clear how to interpret Exhibit G, especially the comparison from 2010 to 2012. At first glance, the number of "failures" in 2012 does not seem significantly different from those in 2010. On the other hand, the number of "failures" before Election Day and the number both before and on Election Day might suggest hardware problems. We feel these numbers warrant further scrutiny and comparison to other counties, but they do not shriek "hardware failure" for 2012 that is different from 2010.

On the other hand, we suspect that an examination of paper records plus the electronic data might suggest a high rate of terminal failure on Election Day. We cannot tell from the electronic data which of the 75 terminals opened after 8:00am were newly supplied to the precincts and which were present at poll opening but didn't open properly. We know from our precinct-by-precinct comparison of electronic data against paper records that in each of about 20 precincts that indicated one more terminal than we had data for, the unaccounted-for terminal was deemed inoperable by the technician. There are an additional 20 terminals whose last vote was collected before 5:00pm. We may assume that these terminals were not used because they were not functioning properly. This represents at least 40 or so terminals, perhaps 8% of the total, even before we go further into a detailed analysis of the event logs.

8 Duration of Voting Events

We are given to understand that one of the harder things to predict is the length of time needed for each voter. We do not have event log messages for the time when a terminal is opened for voting by an individual, so we cannot separate a voter's duration in the actual voting process from possible slack time with no one in line.

After closing, however, we ought to be able to assume that voting is a steady state activity, and thus the times between "vote cast" events on the terminals is a good measure of the actual time spent for a voter to be voting, including the time spent by the poll manager opening the terminal, etc.

Exhibit I is a histogram of the time between "vote cast" events after closing time in Richland County, with times rounded to the nearest five second intervals. The 14,000 plus voters who cast votes after 7pm spent an average of just over three minutes and thirty seconds in walking to the voting booth, having the terminal opened for them, and casting their ballots. If we extrapolate from the late voter durations, we would have needed just over 600 terminals in steady state to have enough "vote minutes" in a 12-hour period of Election Day. When one discounts from the 630 total in the data for terminals with only a very small number of votes collected, the 600 terminal count is about right.

What this means in round numbers is that the allocation of terminals to the election could have been completed in the 12 hours of election day if voters had arrived at

precincts exactly five voters per precinct every 3-1/2 minutes nonstop throughout the day. Any bursty arrivals (the morning, noon, and evening rush, for example) would necessarily have caused lines to form. Any underallocation of terminals to precincts would have caused lines to form. **The election could only have been conducted in 12 hours under an absolutely perfect distribution of voter arrivals and terminal allocations.**

Finally, we note that the average “last vote time” for a terminal still being used at 7:30pm was 9:45pm. The average voter in line at 7:30pm would still have had an additional wait of an hour and eight minutes before voting.

9 Votes per Terminal

Finally, we present as Exhibit J the data of votes per terminal for 2010 for the counties for which electronic data is available. There are two counties with votes per terminal in the high 150 range. Richland was somewhat above average with 129 votes per terminal in 2010. But in Richland in the 2012 election just conducted, the average number of votes per terminal was 193, about 50% more votes per terminal than in 2010 and 25% larger than the high water marks anywhere in the state in 2010.

10 Personal

I am a computer science professor at the University of South Carolina, and I have lectured and published on the analysis of election data as part of my professional work. I have since 2004 been a member of the League of Women Voters of South Carolina and serving the League as a consultant regarding election technology. I have often assigned parts of this data processing as student assignments in my classes.

EXHIBIT A - Counts of terminals by adjusted opening time

Opening Time	Number Opened	Cumulative Opened
Before-07:00am	523	523
7:00am-7:15am	14	537
7:15am-7:30am	11	548
7:30am-7:45am	7	555
7:45am-8:00am	1	556
8:00am-Closing	74	630

EXHIBIT B – Opening times

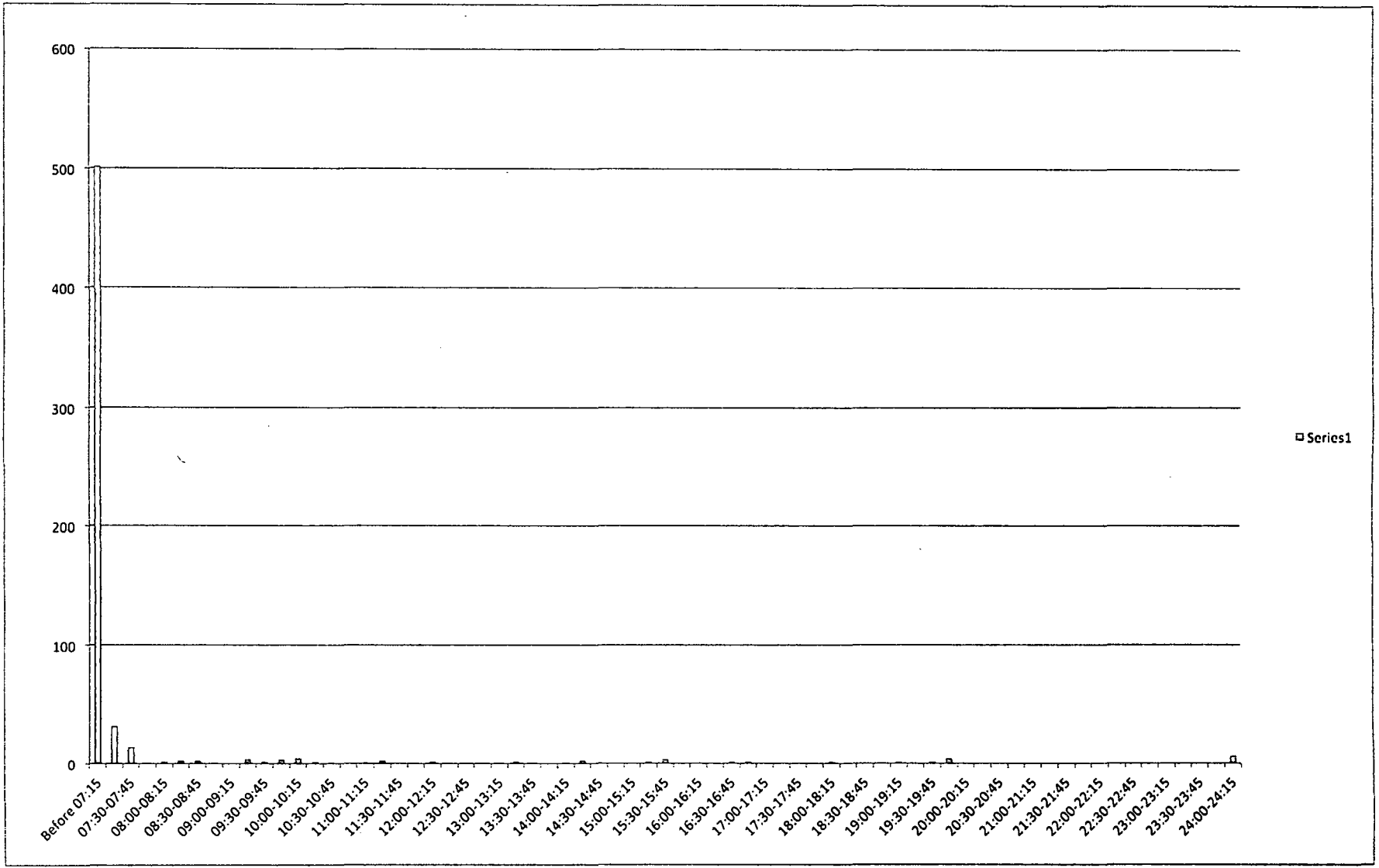


EXHIBIT C – Time of First Vote Collected

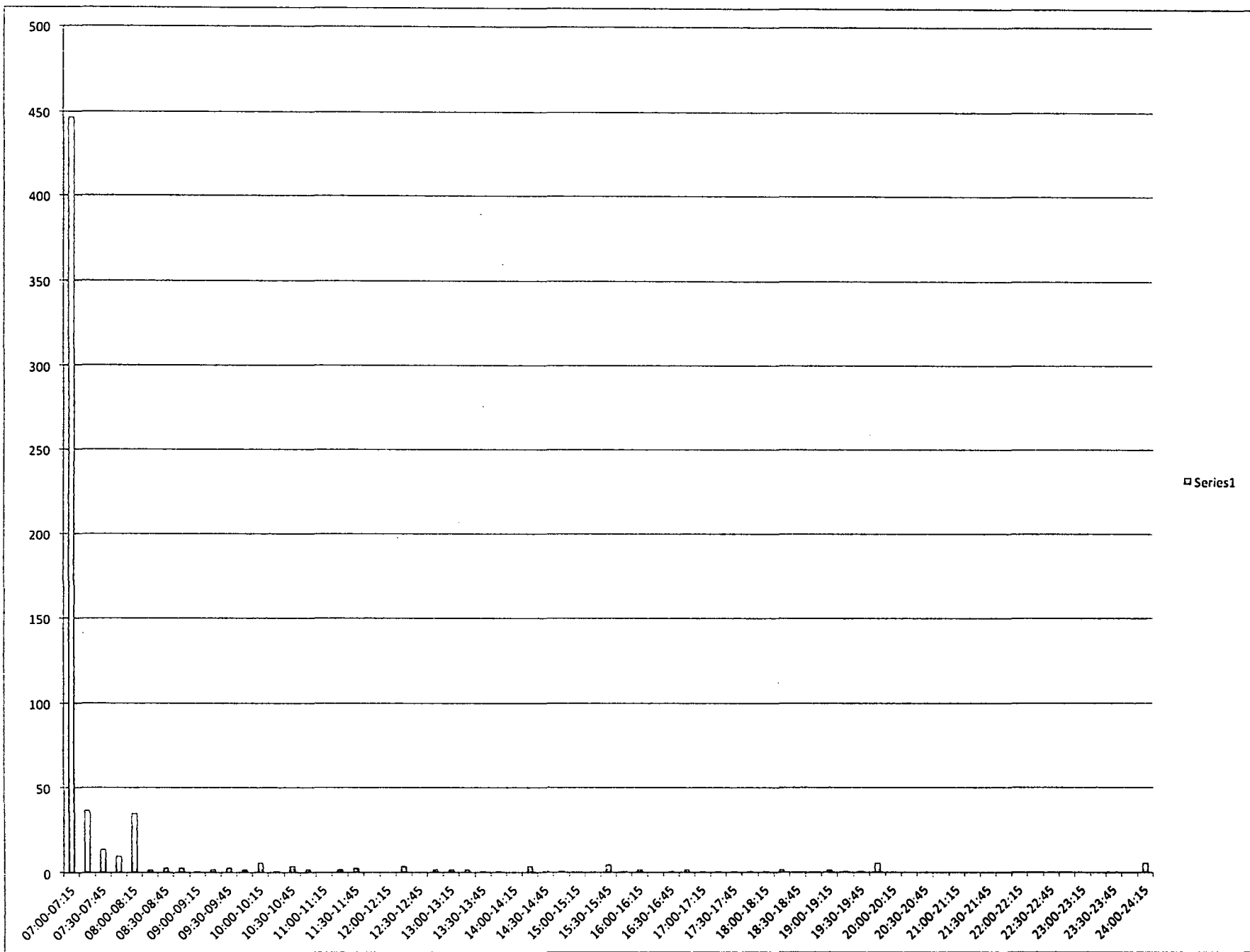


EXHIBIT D – Number of Working Terminals Collecting Votes

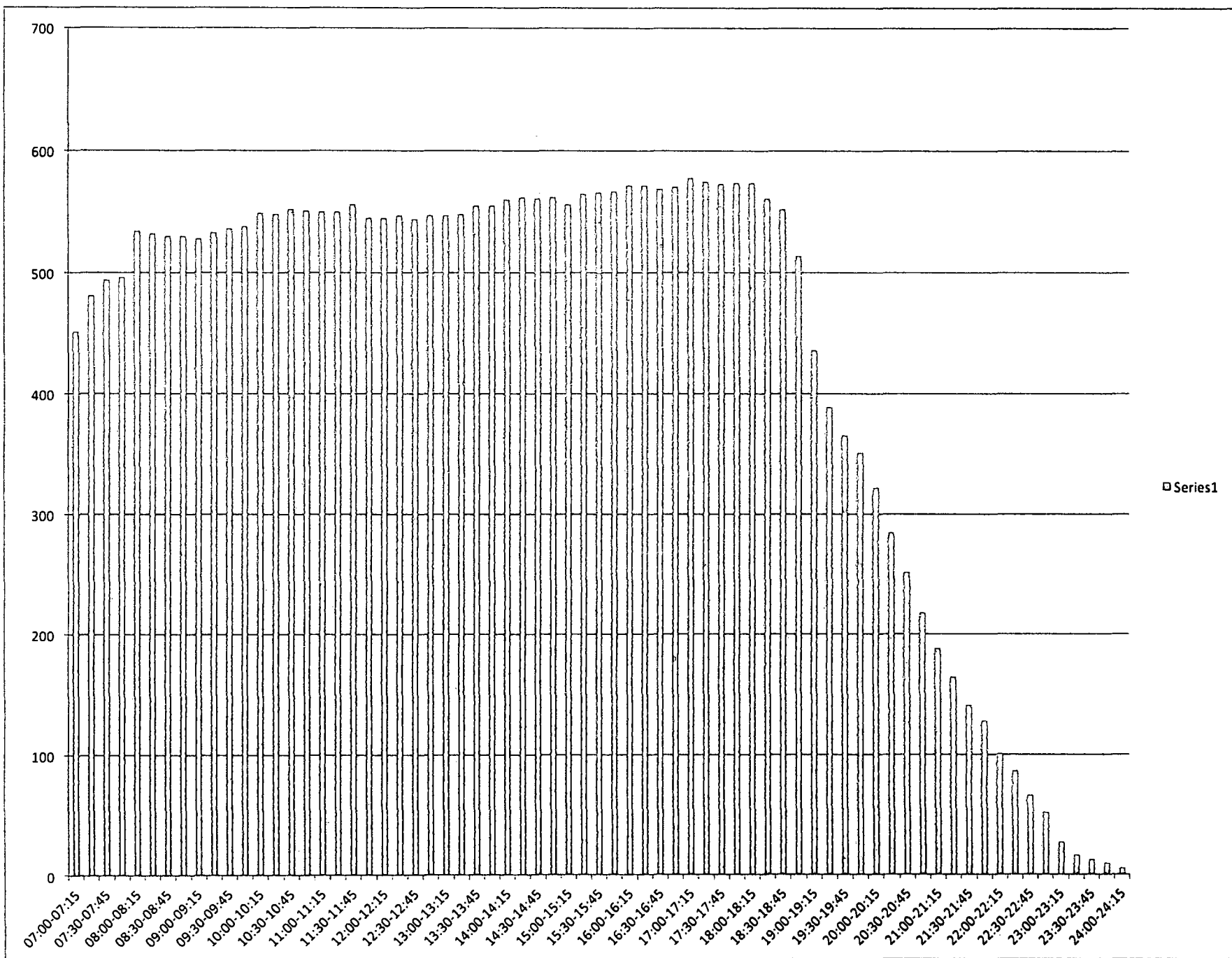


EXHIBIT E – Terminal Counts of Time of Last Votes

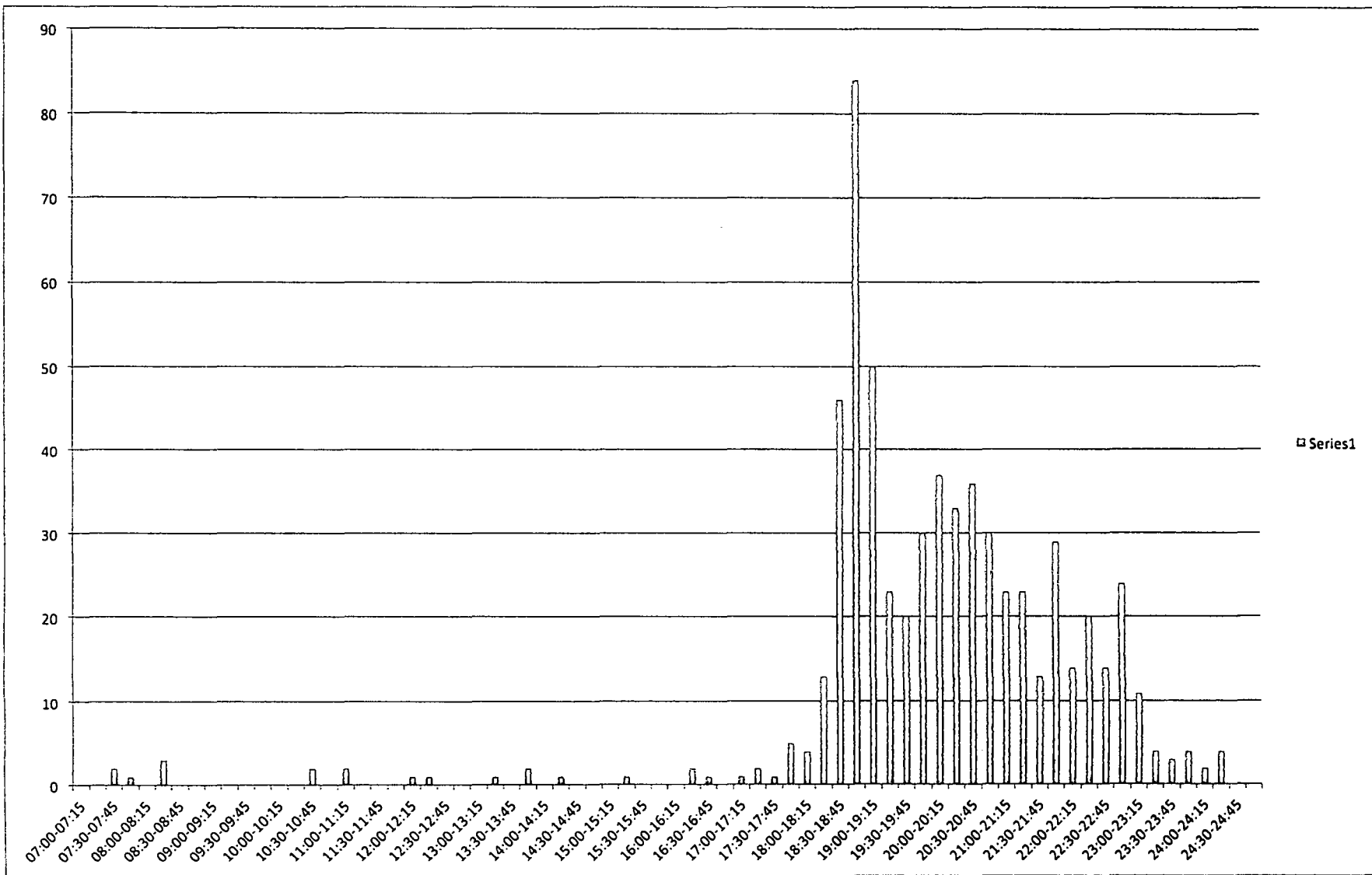


Exhibit F

Late Votes by Hour after 7pm

	2010	2012
7pm - 8pm	1888	6309
8pm - 9pm	43	4561
9pm - 10pm		2535
10pm - 11pm		1155
11pm - 12M		255
12M - 1am		29
Total	1931	14844

EXHIBIT G -- Late Votes by Precinct, with Comparison to 2010

	2010 Votes	2010 Late	2012 Votes	2012/2010	2012 Late
WARD_#1 0101	546	0.366	659	1.21	0.152
WARD_#2 0102	227	1.322	342	1.51	0.000
WARD_#3 0103	612	2.124	841	1.37	0.595
WARD_#4 0104	652	0.153	704	1.08	2.841
WARD_#5 0105	325	0.923	582	1.79	2.921
WARD_#6 0106	655	1.221	718	1.10	0.000
WARD_#7 0107	472	1.483	611	1.29	13.748
WARD_#8 0108	432	0.694	1143	2.65	20.385
WARD_#9 0109	440	0.682	660	1.50	0.303
WARD_#10 0110	731	0.410	781	1.07	1.536
WARD_#11 0111	530	0.755	690	1.30	11.739
WARD_#12 0112	715	0.140	808	1.13	0.371
WARD_#13 0113	937	0.854	1068	1.14	8.333
WARD_#14 0114	855	0.702	873	1.02	3.322
WARD_#15 0115	587	0.852	595	1.01	0.000
WARD_#16 0116	769	0.260	763	0.99	0.131
WARD_#17 0117	830	0.361	894	1.08	6.935
WARD_#18 0118	500	0.400	663	1.33	15.385
WARD_#19 0119	492	0.203	674	1.37	0.000
WARD_#20 0120	740	0.946	864	1.17	0.000
WARD_#21 0121	694	0.576	826	1.19	20.702
WARD_#22 0122	638	0.470	832	1.30	11.058
WARD_#23 0123	478	0.418	569	1.19	0.000
WARD_#24 0124	539	0.186	583	1.08	0.172
WARD_#25 0125	905	0.331	875	0.97	17.600
WARD_#26 0126	360	1.111	607	1.69	0.000
WARD_#29 0129	588	0.000	719	1.22	13.491
WARD_#30 0130	287	0.697	386	1.34	0.259
WARD_#31 0131	392	1.276	545	1.39	0.000
WARD_#32 0132	410	0.244	442	1.08	0.000
WARD_#33 0133	424	1.179	516	1.22	0.000
WARD_#34 0134	555	0.000	577	1.04	8.319
ARCADIA 0301	774	0.000	853	1.10	0.000
ARDINCAPLE 0302	195	0.000	247	1.27	0.000
BALLENTINE 0303	1436	1.671	1806	1.26	0.055
BEATTY ROAD 0304	293	2.048	509	1.74	0.000
BLUFF 0305	1026	0.000	1154	1.12	0.000
BLYTHEWOOD_#1 0306	545	0.734	678	1.24	0.590
BLYTHEWOOD_#2 0307	819	6.227	1060	1.29	0.000
BRANDON 0308	1235	3.077	1577	1.28	9.258
BRIARWOOD 0309	1083	4.247	1306	1.21	0.000
CAUGHMAN ROAD 0310	852	11.854	937	1.10	0.000
COLLEGE PLACE 0311	713	1.543	891	1.25	3.928
COOPER 0312	673	0.149	697	1.04	1.291
DENNYSIDE 0313	390	0.256	479	1.23	0.000
DENTSVILLE 0314	1079	3.892	1080	1.00	19.444
DUTCH_FORK_#1 0315	1111	0.270	1395	1.26	9.677
EASTOVER 0316	1172	0.597	1421	1.21	14.638
EDGEWOOD 0317	761	3.285	967	1.27	20.786
ESTATES 0318	1928	4.149	2229	1.16	21.714
FAIRLAWN 0319	1284	2.960	1402	1.09	17.475
FAIRWOLD 0320	462	1.948	484	1.05	0.207
E_FOREST_ACRES 0321	622	0.161	680	1.09	0.000
N_FOREST_ACRES 0322	646	0.619	737	1.14	3.392
S_FOREST_ACRES 0323	770	2.727	836	1.09	0.000

FRIARSGATE_#1 0324	927	6.472	944	1.02	32.733
FRIARSGATE_#2 0325	753	1.594	918	1.22	7.190
OLD_FRIARSGATE 0326	654	0.917	661	1.01	21.180
GADSDEN 0327	1049	1.144	1113	1.06	31.806
GARNERS 0328	447	2.013	518	1.16	1.351
GREENVIEW 0329	970	0.309	978	1.01	0.102
GREGG_PARK 0330	739	0.135	900	1.22	2.778
HAMPTON 0331	710	0.282	858	1.21	9.907
HARBISON_#1 0332	878	0.683	1126	1.28	6.661
HOPKINS 0333	1332	0.976	1224	0.92	23.284
HORRELL_HILL 0334	1007	0.497	1215	1.21	1.070
HUNTING_CREEK 0335	283	0.353	298	1.05	0.336
KEELS 0336	1144	4.108	1213	1.06	35.779
KEENAN 0337	848	0.825	842	0.99	20.546
KILLIAN 0338	604	0.662	752	1.25	10.771
KINGSWOOD 0339	1221	1.884	1424	1.17	18.961
LINCOLNSHIRE 0340	997	2.307	1222	1.20	11.548
LONGCREEK 0341	1683	2.258	1864	1.11	14.539
LYKESLAND 0342	1189	2.523	1274	1.07	17.661
MCENTIRE 0343	403	0.248	485	1.20	0.000
MEADOWFIELD 0344	957	0.418	940	0.98	13.617
MEADOWLAKE 0345	1098	1.730	1147	1.04	8.806
MIDWAY 0346	1113	2.965	1283	1.15	17.927
MILL_CREEK 0347	739	0.000	978	1.32	17.996
MONTICELLO 0348	995	2.412	1142	1.15	19.352
NORTH_SPRINGS_#1 0349	1523	5.384	1554	1.02	14.221
NORTH_SPRINGS_#2 0350	1340	0.000	1377	1.03	14.379
OAKWOOD 0351	506	0.000	591	1.17	0.000
OLYMPIA 0352	654	0.000	997	1.52	7.121
PARKWAY_#1 0353	2395	5.219	2408	1.01	29.651
PENNINGTON 0354	1254	8.373	1250	1.00	18.800
PINE_LAKES 0355	1124	2.936	1228	1.09	26.059
PINEWOOD 0356	708	3.672	855	1.21	26.082
POLO_ROAD 0357	1817	1.211	2254	1.24	11.934
PONTIAC 0358	1186	0.759	1304	1.10	31.825
RICE_CREEK 0359	1828	3.665	1928	1.05	28.164
RIDGEWOOD 0360	331	0.906	403	1.22	0.248
RIVER_SPRINGS 0361	1770	1.582	1951	1.10	12.096
RIVERSIDE 0362	405	0.247	562	1.39	0.178
RIVERWALK 0363	1373	2.185	1358	0.99	27.614
SATCHELFORD 0364	724	0.276	816	1.13	0.000
SKYLAND 0365	367	0.000	554	1.51	10.469
SOUTH_BELTLINE 0366	554	0.361	720	1.30	15.139
SPRING_VALLEY 0367	1154	0.173	1229	1.06	7.079
SPRINGVILLE 0368	1791	1.117	2186	1.22	0.046
ST_ANDREWS 0369	489	0.204	639	1.31	1.408
TRENHOLM_ROAD 0370	521	0.000	586	1.12	0.000
VALHALLA 0371	1089	0.643	1249	1.15	1.121
VALLEY_STATE_PARK 0372	861	5.923	1155	1.34	5.714
WALDEN 0373	335	1.493	455	1.36	9.011
WESTMINSTER 0374	647	1.855	835	1.29	7.665
WHITEWELL 0375	547	0.914	835	1.53	6.707
WILDEWOOD 0376	1297	0.000	1237	0.95	25.061
WOODFIELD 0377	1063	0.847	1370	1.29	5.036
WOODLANDS 0378	1289	0.155	1288	1.00	14.053
BLYTHEWOOD_#3 0379	639	0.782	873	1.37	1.604
DUTCH_FORK_#2 0380	1466	3.411	1446	0.99	31.743
HARBISON_#2 0381	584	0.514	638	1.09	9.091
KELLY_MILL 0382	416	0.962	618	1.49	4.854

LAKE_CAROLINA 0383	1059	0.755	1288	1.22	17.624
OAK_POINTE 0384	1447	1.866	1612	1.11	17.308
PARKRIDGE 0385	291	1.718	467	1.60	0.214
PARKWAY_#2 0386	1222	3.764	1351	1.11	25.167
PINE_GROVE 0387	737	3.121	814	1.10	27.027
RIDGE_VIEW 0388	1843	3.690	1932	1.05	29.037
ROUND_TOP 0389	320	0.313	392	1.23	0.255
SANDLAPPER 0390	1166	0.000	1578	1.35	32.953
SPRING_HILL 0391	669	3.587	813	1.22	0.000
SPRING_VALLEY_WEST 0392	1177	1.274	1185	0.92	30.009
	104904		121335	1.16	

Exhibit H: Terminal "failures" 2012, Richland County

	Before 11/6/12	Range	On 11/6/12	Range	Both
117	549	1 - 3	114	1 - 3	59
169	511	1 - 19	103	1 - 6	76
1634	5	1	12	1 - 2	0
1635	154	1 - 51	463	1 - 44	97
25xx	20	1 - 16	17	1 - 56	4

Exhibit H: Terminal "failures" 2010, Richland County

	Before 11/2/10	Range	On 11/2/10	Range	Both
117	11	1 - 2	777	1 - 4	6
169	3	1	87	1 - 9	1
1634	0	0	27	1 - 2	0
1635	19	1 - 14	501	1 - 44	7
25xx	1	8 - 8	5	2 - 34	0

EXHIBIT I – Vote Duration Times

