Development of a Pilot Election Audit Program

A Project For

The Pew Charitable Trusts – Make Voting Work

Submitted by

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Part 1 – Introduction

A. Overview of the Project

The objective of this project was to research and develop a comprehensive election audit based on professional auditing principles, detailed statistical analysis, and election administration expertise. The election audit that we have developed is a practical and usable audit process that will demonstrate to the public and other stakeholders that an election was conducted accurately, that voting equipment counted votes properly, that only qualified voters cast ballots in the election, that paper ballots were accounted for, and that the election was conducted pursuant to applicable laws and regulations. The audit will also help election officials identify where improvements need to be made.

Recently, comprehensive election audits have been identified by both state and federal lawmakers as a key component to ensuring public confidence in elections. The audits currently being considered by state and federal lawmakers are limited in scope to a simple comparison of hand-tallied paper ballots (or paper audit trails) against the results tabulated by the voting equipment. This approach is of questionable value in determining the accuracy of the voting equipment and it completely fails to test whether votes were cast by qualified voters or whether election laws and procedures were correctly followed. Such shortcomings will undermine the important goal sought by lawmakers in establishing mandatory audit requirements. A broader approach is needed.

B. Overview of the Research Team

To conduct the research and analysis for this project, expertise in the following disciplines was utilized: professional auditing, election administration, political science, and statistical analysis. The professional auditors (both Certified Public Accountants) carefully defined the audit's objectives and the scope and methodology to achieve those objectives. Election officials carefully reviewed and refined the methodology to provide sufficient, competent, and relevant evidence to achieve the objectives of the audit. The political scientists gathered and reviewed the current post-election audit procedures used by different states and local jurisdictions around the country to identify best practices currently used and note shortcomings in current processes. Finally, the statistician analyzed the extent to which evidence identified by election officials must be measured (e.g. sample size).

Biographies of each researcher are listed in *Appendix A*.

C. County Participants

Three counties in Maryland – Caroline, Charles, and Prince George's Counties – were selected to participate in this project. These counties were chosen to represent diversity in size, demographics, and resources.

County	Registered Voters	Precincts	Office Staff	Voting Units	Electronic Pollbooks	Pollworkers
Caroline	17,596	8	3	88	30	100
Charles	87,745	36	5	450	127	522
Prince George's	494,575	218	18	2,706	953	3,940

Data on this table is from the 2008 General Election.

D. Scope of Project

1. Voter Registration

The election audit designed by this study seeks to review all of the critical processes that, if not performed or performed improperly, could jeopardize the integrity of the election. One of the critical processes identified is the creation of the precinct register for use on election day. This is a critical process because it is the means by which eligible voters are included in the precinct register and thereby have the opportunity to vote. The precinct register is created from data from the statewide voter registration system. The audit seeks to verify that the number of voters in each precinct register is consistent with the number of voters in the voter registration system. However, the proposed election audit does not verify that the voters in the voter registration system are eligible to register to vote or are entered correctly. While this is an important audit function that should take place (and does in Maryland), it is not within the scope of this election audit plan. The determination was made that this election audit needed to focus on activities that related directly to election day and not expand to touch every aspect of elections administration.

2. *Recounts and Hand Counts*

A recount is distinct from an audit and is therefore also not within the scope of this project. An audit assesses a process, while a recount represents a reconciliation of the actual votes cast to ascertain if an error occurred in aggregating and counting the votes cast. A recount would not identify exceptions to a comprehensive set of elections processes identified for the audit.

Similarly, a "post election audit" that requires a manual or hand count of paper ballots is not an audit, as defined by this report. It is more akin to a recount and is therefore also not within scope of this project.

E. Project Development and Future Actions

1. Project Development

The professional auditors selected for this project have extensive experience as Certified Public Accountants and have designed and conducted numerous audits of different types and kinds of organizations and industries. At the outset of this project, they were not familiar with elections administration. To facilitate their education on elections administration, numerous site visits were conducted where they had the opportunity to observe different phases of pre-election preparations, election day operations, and post-election procedures. These site visits proved to be a valuable tool to help the auditors understand the scope and complexity of election administration. A full account of the site visits is provided in *Appendix B*.

Next, careful collaboration between the auditors and election officials (including the local election officials) resulted in the identification of what needed to be audited and how it should be audited. This collaboration resulted in an audit plan that incorporates recognized auditing procedures in a meaningful and realistic manner for elections administration

2. Future Actions

One of the questions proposed by the project plan that this report does not answer is the level of effort and cost of conducting the proposed audit plan. However, it has been determined that until some of the audit functions are carried out it is not possible to answer these questions. Accordingly, a future action will be to carry out portions of the audit plan in order to establish an understanding of how long certain functions take and then a cost model can be developed.

Another question that the project plan sought to answer was what effect the audit outcome should have on the state or local jurisdictions. For example, what are the consequences to the state or local jurisdictions for negative audit findings? Since the audit assesses a process and how well that process was executed, it is reasonable to use audit findings as a means to assess the job performance and use those assessments to reward election officials with promotions or advancements or use the assessments to determine where performance needs to be improved and establish consequences for failure to do so. To truly understand how the application of professional auditing principles will work as a feedback tool in an elections administration environment, it was determined that it will be necessary to carry out portions of the audit plan and assess the types of findings that are made.

Part 2 – Survey of Audit Requirements Nationwide

A. Overview

The administration of elections in the United States remains decentralized notwithstanding significant federal and state legislation that has been enacted during the past two decades. Among the nation's fifty states and the thousands of local jurisdictions responsible for the administration of elections, a multitude of processes and practices have evolved to assure compliance with constitutional, statutory and regulatory requirements as well as to assure the correctness of the results in any given election. There does not exist in the United States, and among and in the fifty states, a standard or uniform method to conduct elections. There are no standard or uniform methods to audit the results of an election and the procedures used in the administration of elections. In addition, and significantly, there is a lack of common terminology applicable to the election process among the fifty states and the local election officials responsible for the conduct of elections.

The government entities and individuals responsible for the administration of elections in the United States have worked diligently over the past several decades to improve the quality of their public service through their own initiatives as well as their state and national organizations. Important organizations include the National Association of Secretaries of State (NASS), the National Association of Election Directors (NASED), the National Association of County Recorders, Election Officials and Clerks (NACRC), the International Association of Clerks, Recorders, Election Officials and Treasurers (IACREOT) and the various state associations of elections officials. The elections community regularly shares its "best practices" through regular meetings, sponsored research and formal education programs that have markedly improved the administration of elections over the past several election cycles. The U.S. Election Assistance Commission has also endeavored to promote best practices through the publication of "Election Management Guidelines," "Quick Start Management Guides," and a "Best Practices in Election Administration Tool Kit."

B. Description of Research

In order to accomplish the task of producing a pilot election audit program, the research team conducted a review of all of the constitutional and statutory provisions related to the function of auditing elections contained in the fifty states.

In addition, a literature review was undertaken by the research team to determine the availability of resources for the design of the proposed pilot election audit program. This included a review of other "audit surveys" such as the 2007 National Association of Secretaries of States Election Survey[1] entitled "Post Election Audit Practices by State," the preliminary report entitled "Election Audits in an Electronic Voting with a Paper Trail Environment" released by the Pew/JEHT Foundation Make Voting Initiative in April 2008, and a report entitled "Post-Election Audits: Restoring Trust in Elections," produced in 2007 by the Brennan Center for Justice at New York University School of Law and the Samuelson Law, Technology and Public Policy Clinic at the University of California Berkeley School of Law.

Finally, the research team designed an electronic research survey form that was forwarded to all of the election directors in the fifty states. All state election offices were also called by research team members to verify proper email addresses and appropriate responders to the survey. Follow-up telephone calls were made to state election offices to obtain completion of the survey instrument. The survey instrument (see attachment), sought to determine current audit practices and whether there were existing audit requirements for thirty-five different tasks or functions performed during six distinct phases of the election process.

In the "Pre-Election Process" stage, the research team sought to identify whether the following were the subject of an audit process: (1) the number of ballots ordered; (2) ballot design; (3) voting system allocation; (4) polling place supplies and materials; (5) voting system software; and, (6) voting system hardware.

For "Election Day Processes," the survey sought to determine whether audits were conducted for (1) any parallel testing of voting systems; (2) voting system software; (3) voting system hardware (other than parallel testing); and, (4) polling place evaluations.

With regard to "Verifying the Accuracy of Vote Tabulation," the following matters were queried regarding the performance of audits: (1) verifying the accuracy of the tabulation of votes; (2) audits for absentee and provisional paper ballots; (3) a comparison of voting system results with a hand counted paper record; (4) the existence of automatic post-election recount procedures.

[1] Thirty-one states responded to the 2007 NASS survey. Sixteen states indicated that their state required "any type of post election audit (not recount)" with fifteen states indicating that they were not required. The survey can be accessed on the NASS Web site at www.nass.org.

The fourth section of the survey, entitled "Post-Election Checks of Voting Systems," sought information on the existence of audit requirements for (1) a physical examination of voting system equipment; (2) testing of voting system software; (3) testing of voting system hardware; (4) chain of custody documents for voting units; (5) verification of allocation of voting equipment to precinct polling places; and (6) chain of custody documents for memory cards.

A fifth area of inquiry was "Post-Election Review of Polling Place Operations" that asked whether audits were conducted of (1) compliance with polling place staffing requirements; (2) compliance with requirements for polling place access by voters with disabilities; (3) poll worker attendance and payroll records; (4) examination of voter check-in records; (5) examination of polling place logs, journals or reports; (6) an inventory of materials and supplies; (7) an examination of voter assistance forms; and (8) paper ballot accounting procedures.

The sixth area of inquiry, entitled "Post-Election Central Office Election Practices," asked, if performed, whether the audits were performed on (1) a review of chain of custody of materials and supplies; (2) a comparison of the number of persons checked-in with the number of ballots issued and cast; (3) an examination of voter signatures; (4) an examination of absentee ballot outside envelopes to review compliance with acceptance and rejection criteria; (5) an examination of provisional ballot outside envelopes to review compliance with acceptance and rejection criteria; (6) a check for "multiple voting" by a voter; and (7) a test of central vote tallying servers or equipment.

C. Research Findings

After conducting a review of state constitutions and statutes, contemporary literature on audit procedures and practices in the administration of elections and the survey results, the research team confirmed that the auditing of election processes (as defined in this project) are not common in the administration of elections throughout the country. In fact, the word "audit" is often not contained in the various election laws of the fifty states and, when used, often refers to different specific tasks to be performed and, most often, only to verifying the accuracy of the count produced by a voting device, machine, system or voter-verified paper ballots. There are no states that conduct an audit of the entire election process on a systematic basis after every election.

In the process of recording, compiling, tabulating and certifying of votes cast in an election, there are many processes, procedures and practices that have been developed to assure the accuracy of the vote count. And, there

are a significant number of states that do have detailed requirements to verify the accuracy of the vote count produced by a voting system or machine. Nineteen state statutes require some kind of post-election procedure for verifying the accuracy of a voting system or machine with another five states having regulatory provisions. Different states carry out these post-election procedures at different levels of government. Among the twenty-four states with some "auditing" requirements, the responsibility for the performance of the function resides primarily with the local election jurisdiction that administered the election. Only eleven of the "auditing" states require that a report be issued publishing the results of the audit, test or verification process.

The requirements for conducting a post election "audit" or test of the vote count vary among the fifty state statutes and evidence the lack of uniformity in approach of existing "audit" practices. For example, some state statutes require that there be a sampling of a certain percentage of the "precincts" while other statutes specify a percentage of "votes cast," "voting districts," "voting devices," "voting machines or systems," or "voter-verified paper ballots." The required percentage in the state statutes is variously prescribed as 2%, 3%, 4%, 5% and, even, 10%. The terminology, timing and significance of these vote-verifying procedures are also different among the states. Some state statutes require the vote count "audits" to be performed prior to the completion of canvassing by the local jurisdiction while other states require such a process to be completed after a local canvass but prior to the canvass and certification by a state entity. A summary of a few state statutes illustrate the differences:

- Minnesota labels its process for examining a random percentage of precincts in each county a "post election review of voting systems." (MN Election Law 206.89) Precincts are to be selected by lot for a manual count of ballots used with the state's optical scan voting system to determine if the vote counting device differs from a manual count. If a deviation of greater than 0.5% is found, the State Canvassing Board must be notified two days before its meeting to certify the election results.

- Connecticut Public Act 07-194 mandates that the local registrars of voters conduct hand count "audits" in 10% of their voting districts, randomly selected by the Office of Secretary of State, to assess whether the optical scan voting machines correctly counted the paper ballots. These "post election audits" are conducted in accordance with procedures promulgated by the Connecticut Secretary of State and are not considered recounts and are not performed in districts with a contested race or undergoing a recount.

- In 2007, the New Mexico state legislature passed a law providing for random voting system audits (NM §1-14-13-1). The law requires a random selection of 2% of the voting units by county clerks and comparison of the results given by the voting units and a hand count of the ballots on those units. If a variance of more than 1.5% is found to exist, the Secretary of State must conduct a recount. This "random voting system audit" is to be "performed within five days of the county canvass board certification of the county election results to the Secretary of State."[2]

Other than requirements for verifying vote counts, state statutes are largely silent on audits of other aspects of the election process. As with other areas of election administration, there are a wide variety of procedures, processes and practices utilized by state and local administrators of elections to insure compliance with federal and state laws and to monitor the following of rules and procedures by pollworkers. Again, there is no uniformity in approach among jurisdictions with respect to these functions and no process that rises to the level of professional auditing principles.

Polling place evaluations are regularly, but not uniformly and consistently, performed in many jurisdictions including Maryland which has a seven page "Polling Place Evaluation Form" to be used by local boards of elections. During the 2008 presidential general election, the New Hampshire Office of the Attorney General sent polling place inspectors to every polling place in the state with a comprehensive, five page checklist developed to ensure conformity with state laws regarding voter information, accessibility, polling place set-up, check-in processes, wait times.

One state statute is noteworthy in its attempt to distinguish one of the functions of an audit process from verifying a vote count in any given election. In the state of Washington, the election review staff in the secretary of state's office is directed by a state statute to conduct, periodically, a review and "evaluate the policies and procedures established for conducting a primary or election in the county and the practices of those conducting it." (WA 29A.004.570) This review is unrelated to the conduct of any specific election and the statute expressly prohibits such a review from including

[2] A pilot project to develop, implement and analyze a post election ballot audit in anticipation of the New Mexico law was completed by an experienced team of researchers in cooperation with Bernalillo County (the state's largest county). Funding included support pursuant to a grant from the Pew Charitable Trust, Center on the States and the JEHT Foundation. The report, entitled "The New Mexico 2006 Post Election Audit Report, dated September 22, 2008, may be accessed at www.pewcenteronthestates.org/report_detail.aspx?id=44786

"any evaluation, finding or recommendation regarding the validity of the outcome of a primary or election or the validity of any canvass of returns." Although limited by personnel resources and time in its current implementation, the Washington state law does provide a reasonable and simple approach to empowering the chief state election official to employ sound administrative practices which could provide the basis for applying professional auditing principles.

D. Recommendation

A systematic review of the election process would enhance the administration of elections. While there are "best practices" being employed among the fifty states and by local election officials for every stage of the election process, there are no states which require an audit, using professional auditing principles, of the election process. The administration of elections in Maryland could be improved and public confidence in the state's election process could be strengthened by the development and implementation of professional auditing.

Part 3 – Professional Auditing in General

A. Overview

Professional auditing is a method of verifying, through evidence gathered by inquiry, observation and testing, the activities and results of a process. It is the method by which third parties and stakeholders – both internal and external to the process – can be assured that the process was performed in accordance with the established procedures and will increase acceptance of the process outcomes because of the independent validation of the established procedures. Professional auditing is performed in various industries, and this project evaluates whether professional auditing can be performed in an elections environment and if so, the appropriate methodology to perform this type of an audit.

Using the above definition of an audit, an "election audit" would be a method of verifying key election processes by gathering and reviewing evidence, observing key election processes being conducted, and testing specified factors to determine their accuracy. It is important to note that the focus of this audit is on the process of conducting the election – not the results of the election. Ideally, the audit will give stakeholders greater confidence in the results, because if the election processes are carried out as designed, the results are highly reliable.

As discussed in Part 2, some audit activities are being conducted by election officials around the country. These audits, however, are not formalized and do not follow recognized professional auditing standards. Nonetheless, the lack of formalized auditing does not indicate a failure of the election process. This is because elections are generally conducted in an open and transparent manner and have bi-partisan oversight which provides assurance in the accuracy and integrity of the process. Conversely, the application of professional auditing principles does not guarantee the success of the election process. A comprehensive election audit using professional auditing principles can provide stakeholders with additional confidence that an election was fairly and accurately conducted and serve as a way to reduce any controversy surrounding election results. Even with an audit, election officials are ultimately responsible for conducting and certifying the election pursuant to state laws and procedures and in a manner that ensures integrity and accuracy.

B. Use of Auditing

There is value in applying professional auditing standards to elections. Examples of the value to the election process include:

1. Enhanced credibility for elections administration and its processes;
2. Opportunity to demonstrate that key processes are accurately performed;
3. Increase public confidence in the election process;
4. Establish standards for all jurisdictions to work towards;
5. Provide state elections administrators a tool to find out how well processes are being carried out at the local jurisdiction level; and
6. Provide strong incentives for local elections administrators to work to meet the standards that will be audited.

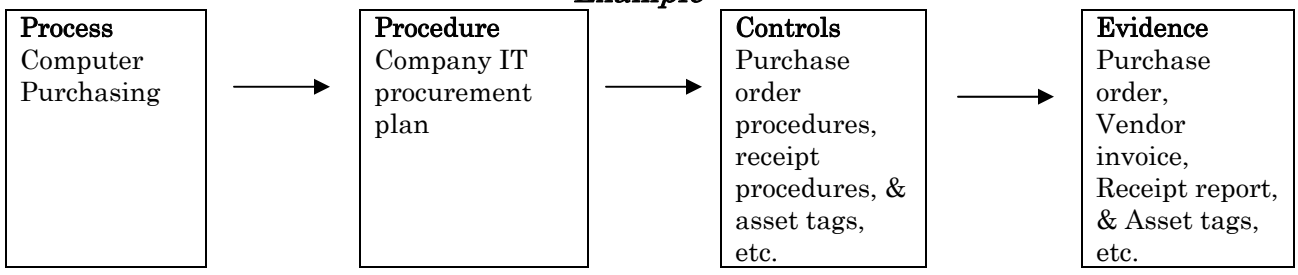
Given that there is value in conducting a comprehensive professional audit, the next question is whether an audit methodology can be developed for an election. In determining whether an audit methodology can be developed, the following questions need to be asked:

1. Can the processes be specified and flow-charted?
2. Are there written procedures for all processes?
3. Have controls or checkpoints been designed and developed to determine whether the written procedures have been followed?
4. Is there evidence documenting that the controls or checkpoints functioned as intended?

If the answers to these questions are affirmative, the process is appropriate for the development of an audit methodology.

The flowchart below demonstrates a process for which an audit methodology can be developed. For example, a business may hire an auditor to review how it purchases computer equipment. The business has procedures for procuring computer equipment, periodically accounts for its inventory, and documents the results of the inventory review. The answer to each of the above questions is yes, and therefore, the audit methodology can be developed.

Example



As an election is a formal process with well defined laws, regulations, and procedures, it is, therefore, a process which is amendable to audit methodology. This audit methodology would include testing compliance with

the associated laws, regulations, procedures, and controls established by state and local election officials and would be based on a variety of objective and judgmental factors, including:

- Effective controls established, documented, and tested by election officials. These controls enable the auditors to identify specific attributes of control for testing.
- Tests and observations by auditors of the operations of key performance indicators included in those systems of internal controls.
- Recognition that evidence gathered in the audit process will have qualitative and quantitative characteristics and that the nature and amount of evidence gathered in the audit process will be responsive to these variables.

C. Professional Auditing Standards

Currently, there are neither professional auditing standards for elections nor an organization or entity with the authority and responsibility to establish auditing standards/procedures for election audits. To the extent that existing election laws and regulations address audits of elections, such laws and regulations have not established auditing standards. As a result, it is appropriate to look to existing professional auditing standards as models on which an election audit might be based. These models are useful as they have evolved during the last 150 years and have, over time, added credibility to processes independent from the individuals who are charged with managing the activities and performing the process.

Examples where stakeholder acceptance of information increased as a result of objective verification of information are found in television, radio and magazine publishing industries. Advertising rates were and continue to be based on numbers of viewers, listeners and readers of these programs, stations and publications. Advertisers purchasing television, radio or print advertisements wanted to verify the accuracy of the company supplied data. In each media, industry developed auditing standards were used to confirm that the information supplied by the broadcasters or publishers was accurate. Professional auditing standards were then used to test for compliance with the industry standards resulting in greater confidence among those purchasing the advertisements.

There is an extensive body of auditing literature that has been created over time by organizations that have authority to establish auditing standards in their respective environments that can be used as guidance in developing audit procedures for an election environment. These audit standards include:

- American Institute of Certified Public Accountants (AICPA)
  The AICPA has codified U.S. Auditing Standards that are used for financial statement audits. These standards also were adopted and modified or expanded upon by the Public Company Accounting Oversight Board. These standards include, among other things, auditing standards for risk assessment, internal control evaluation and testing for public reporting on internal control, evidential matter, analytical procedures, audit sampling, inventory observation, related parties, agreed-upon procedures audits, *etc.* While these standards cannot explicitly be used in election audits, they can be used as a framework for the development of auditing procedures for an election process.

- Government Accounting Standards (The Yellow Book)
  Government Auditing Standards issued by the Comptroller General of the United States outline standards for performance audits. Of the eight chapters in the Government Auditing Standards, five of them apply to performance audits. These standards require written reports, a clearly outlined scope and methodology to be used in performing the performance audit, the need to report significant findings and auditors' conclusions, and auditors' recommended actions to be taken by management in response to the findings, where appropriate. These responses by management may not be feasible in the short duration of election audits.

- The Institute of Internal Auditors (IIA)
  The IIA has issued its "International Standards for the Professional Practice of Internal Audit." These standards are used for corporate operational and financial auditing purposes. They address, among other things, risk management, effective internal controls, and reporting to the board and senior management.

Each of the above organizations has established norms and priorities for gathering audit evidence. In developing the comprehensive election audit described in this report, elements of these different auditing standards have been employed, resulting in sufficient evidence upon which to base audit conclusions. As each organization uses different procedures, it is ultimately the auditor's judgment as to the nature, timing, and extent of the evidence gathered.

By using the best auditing procedures from among the existing auditing standards and recognizing that election audits will develop over

time, there is likely to be increased confidence that an election was conducted fairly and accurately.

D. Election Audit Standards

1. Level of Independence

a. Overview

Virtually all auditing standards require a measure of independence (*i.e.* that the audit is performed by an individual who is independent from the individual performing the activities or preparing the documents covered by an audit). The level of independence can vary from an individual who is employed by the same entity but reports to an individual in another division to an individual who is employed by another entity that is hired to conduct the audit.

For example, a company or government entity may have an internal auditor who is responsible for auditing transactions performed and documents created by a division of the company. The internal auditor, however, reports directly to the board of directors, the company's chief executive officer, or the designated government entity. This internal auditor is generally considered to be independent as he is not an employee of the division that is the subject of the audit and is reporting to a chain of command outside the division. The company or government entity could also decide to hire an auditing firm to conduct an audit. This external auditing firm would also be considered independent as its relationship is limited to payment for conducting the audit. Generally, payment for services rendered during an audit does not reduce the independence of the auditing firm.

Before applying the generally accepted principles of independence to an election audit, it is important to recognize that independence cannot be achieved in the traditional sense as every registered voter has some level of interest in an election. The traditional notions of independence would disqualify any registered voter from conducting an audit and would leave only individuals from other countries or individuals who are not registered to vote to conduct election audits. In light of this limitation, the practical level of independence is achieved if the auditor was not a registered voter in the local jurisdiction being audited.

Using the generally accepted principles of independence and recognizing the practical limitation stated above, there are potentially two types of individuals that could conduct an election audit and satisfy the standard for independence.

b. Internal Audit

An internal audit comprised of state election officials who are not registered voters in the jurisdiction being audited or election officials from other jurisdictions could be used to conduct an election audit and report their findings to the state's chief election official. Similar to the level of independence attributed to an internal auditor in a company, an election official from either the state or another jurisdiction is not an employee of the local board of elections being audited and would be reporting to a chain of command outside of the local board of elections.

There are admittedly practical challenges to election officials auditing other election officials as an election audit needs to be performed before, during, and after an election when these officials have their own election-related duties to perform at their respective offices. Further, the degree of independence of state election officials may be questioned since the state officials are often the entity that establishes the procedures being audited. In addition, if the public perceives the state officials as part of a single elections administration entity, this will undermine one of the benefits of the audit.

To overcome the concerns of independence, it is recommended that, if an internal auditor performs an election audit, the auditor should report directly to the highest election authority that is not charged with the day-to-day administration and direct oversight of the conduct of election. For example, the auditor could report to the Secretary of State instead of the State Director of the Division of Elections or to the State Board of Elections, instead of the State Administrator or Director of Elections.

c. External Audit

If a jurisdiction opts to use an external audit to conduct an election audit, the jurisdiction should look for one or more objective individuals who are capable of understanding complex processes and evaluating documentation quality as well as being experienced or familiar with various auditing environments. There are different types of firms that could be considered for an external audit, and they include:

1. Accounting firms specializing in performance audits and internal controls engagements;
2. Law firms and other organizations specializing in special projects of "due diligence" type engagements;
3. Forensic investigation firms;
4. Firms that specialize in documenting and reviewing internal controls for publicly held companies; and

5. Institutions of higher education with faculty having expertise in auditing, government, and management.

The advantages of this method are that it creates more independence and it allows auditing work to be conducted in a timely manner by non-election officials who are not engaged in the day-to-day tasks of conducting an election. The drawback of this approach is that the cost will potentially be higher than an internal auditor.

2. Methodology

a. Audit Model

There are two models of audit methodology that could be used when developing an audit methodology for an election audit. The first model is an integrated model in which the audit is conducted contemporaneously with the process that is being audited. The second model is a substantive model in which the audit occurs after the completion of the process.

After observing and reviewing election preparation, election day, and post-election activities and documents, we believe that the integrated model is most appropriate for an election audit.[3] Applying the integrated model to an election audit can provide assurances that pre-election, election day, and post-election procedures were documented and followed and can increase public confidence in the entire election process, not just one component of it. Another advantage of the integrated audit model is that an exception noted prior to election day has the potential for remediation and therefore, will not have an adverse impact on the election process.

b. Factors Impacting Audit Complexity

The complexity of the audit methodology will be significantly impacted by a number of factors. We identify three factors below that may impact the complexity of the audit methodology for an election, but there may be other factors unique to different election processes that can potentially increase the complexity of the election audit methodology and the related costs of the audit.

First, whether election administration is centralized (state entity establishes the process) or decentralized (each local entity establishes a process) will affect the complexity of the audit methodology. In situations where local election officials have greater autonomy and customize the

[3]By concluding that the integrated model is most appropriate for an election audit, the phrase "post-election audit" is no longer the correct term. As observation and review of established procedures will occur throughout the entire election process from pre-election activities through post-election activities, a more appropriate term is "election audit."

critical procedures and controls or pollworkers can override or apply unique judgments to the established controls, the auditor will need to consider the effects of such modifications to documented statewide controls.

Second, the extent and completeness of the written procedures for the process and design of controls will determine the complexity of the methodology and ultimately, whether the election process is auditable. For example, if an election office has a thorough process for canvassing ballots but it is based on institutional knowledge and not on written procedures, it will add complexity to the review and analysis of this process. Ultimately, the auditor may find that this process cannot be audited as there are no written procedures against which he or she can test for compliance with the process.

Third, the degree of effective oversight of the governing election authority will impact an election audit. A process that has weak oversight (even if it is highly centralized) will result in the same challenges and complexity as a decentralized elections administration. This is because there will be less standardization in how processes are conducted. Additionally, an entity with weak oversight may face challenges requiring the local election officials to address exceptions identified in the election audit.

3. Other Standards

a. Documented Procedures

An election audit should be documented in such a way that another auditor or similar person can confirm the results of the audit. The ability to confirm the audit findings enhances the value and acceptance of the audit.

b. Report on Audit Findings

The election audit findings should be presented in a report to state election officials. The report should note exceptions, recommend any necessary corrective actions, and be made public in accordance with state open records laws.

c. Sampling

As with any audit, a sample size and confidence and precision levels must be established after an initial election audit is conducted. Preliminary sample sizes and confidence levels have been identified and are described in detail in Part 4 of this report. The precision rate will be established after the initial audit. These decisions by election officials, as they have the responsibility for compliance with relevant election laws, will drive the sample size and extent of testing for each key performance indicator

identified and ultimately the total scope of the audit and the resources necessary to support the audit methodology.

E. Audit Limitations

An audit generally includes testing transactions and following the documents associated with those transactions through the entire process. For example, the purchase of computer equipment might be audited, and this audit would include reviewing the procedures for purchasing and receiving equipment and the purchase order, the shipping documents, the invoice for the equipment, and the payment of the invoice. Applying this audit methodology to an election audit, an auditor would track randomly selected individuals through the voting process by reviewing the individual's voter registration application, its entry into the voter registration system, the inclusion of the voter's information on the precinct register, the checking-in of the voter on election day, and following the voter's ballot into the final voting tally.

While there are limitations in every audit process, an election audit has a unique limitation – the requirement for a secret ballot. Because of this requirement, the traditional methodology of tracking or testing a transaction from beginning to end cannot be used, *i.e.* following the voter's vote into the final tally. As a result, audit methodology for an election audit must be centered on verifying the accuracy of the election process, not the tracking individual voters through the process.

F. Factors Impacting Audit Outcome

The election process includes factors unique to elections that will affect the outcome of the audit. One factor is the substantial human element in the election process, which includes many people that have limited training or experience performing critical election day tasks. At its most basic level, election day is conducted by pollworkers who are generally trained one week to three months before an election and generally only perform their assigned duties infrequently (in Maryland only two days every two years). The risk of unintentional errors by pollworkers in carrying out their responsibilities on election day and the corresponding number of exceptions in an election audit may increase as the amount of time between the date of training and the date of the election increases.

A second factor is the authority given to pollworkers to manage the polling place to which they are assigned. While these dedicated individuals generally try to observe the established procedures for conducting an election day at a polling place, there are deviations from established procedures. Pollworkers may have appropriately deviated from established procedures to respond to a situation at a polling place or deviated due to lack of

understanding. Regardless of the reason for the deviations, these variances – whether intentional or unintentional – increase the likelihood of errors in the administration of the voting process. Because of this risk, the election process should provide for the documentation of these variances in order for election officials to review and evaluate their impact on the election results and overall election process.

G. What to Audit

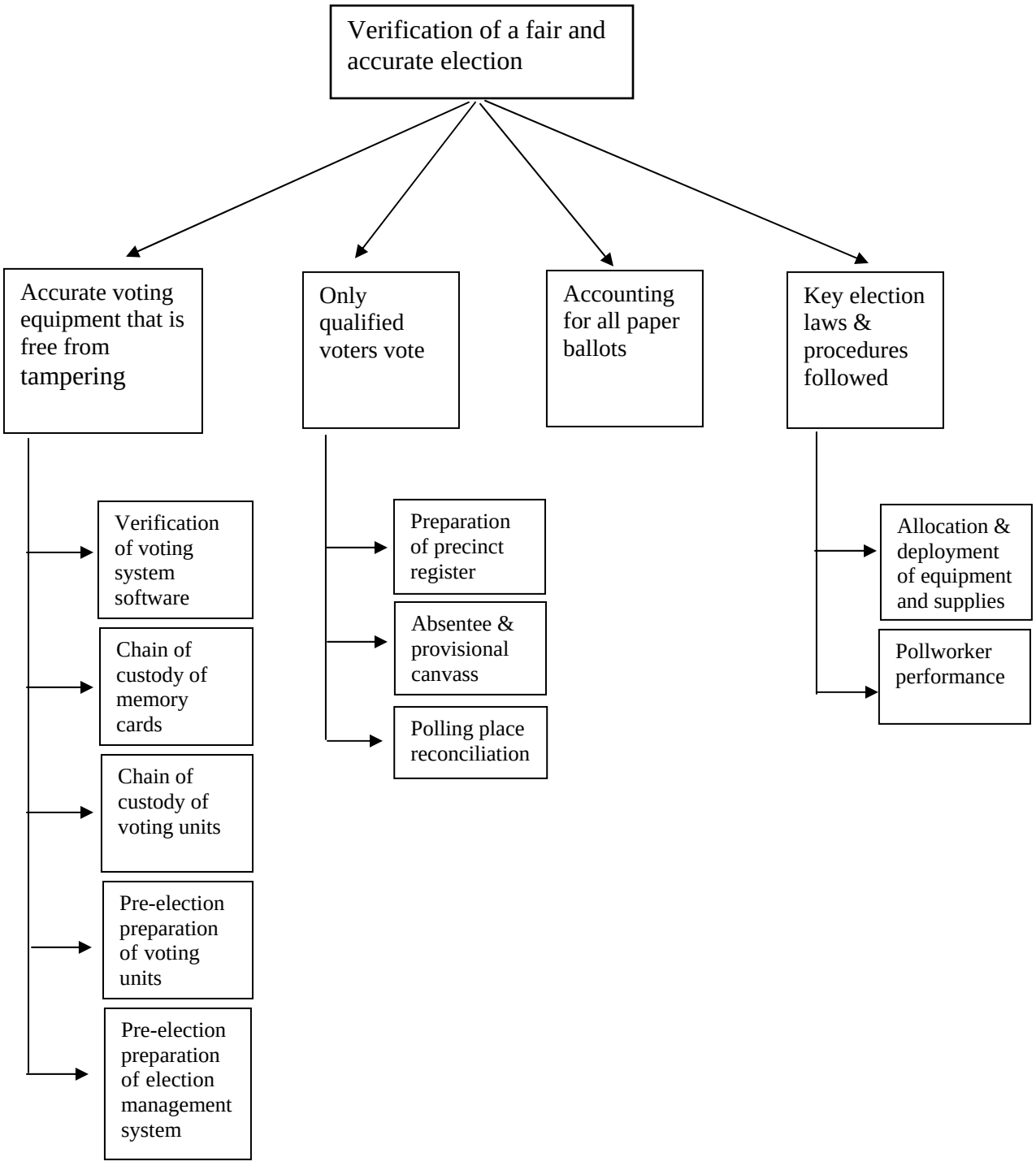
Elections are a multi-faceted and complex set of processes. In developing an election audit, the first step is to identify the critical components of the process. The critical components are those processes that, if not performed or if performed improperly, could jeopardize the integrity of the election. While ultimately these processes will vary among states and jurisdictions, there are some common election processes that all states will need to consider. These include processes that:

1. Ensure the accuracy of voting equipment and software;
2. Ensure paper ballots are properly accounted for;
3. Confirm that only qualified voters were permitted to vote; and
4. Confirm that absentee and provisional ballots are properly accepted or rejected.

The procedures necessary for conducting the above processes will then serve as the key performance indicators to be audited. Key performance indicators are those documented activities that provide the most assurance of the successful performance of election rules. For each indicator, the activities and documentation will be assessed and verified by observation, examination of evidence, and testing.

The key performance indicators selected for the Maryland Pilot Election Audit Program include:

1. Verification of the voting system software;
2. Chain of custody of the voting system's memory cards;
3. Chain of custody of the touchscreen and optical scan voting units;
4. Pre-election preparation of touchscreen and optical scan voting units;
5. Pre-election preparation of the election management system;
6. Preparation of the precinct register;
7. Accurate absentee and provisional ballot canvasses;
8. Proper accounting for paper ballots;
9. Polling place reconciliation;
10. Allocation and deployment of election day equipment and supplies; and
11. Pollworker performance.


Verification of a fair and accurate election
Accurate voting equipment that is free from tampering
Only qualified voters vote
Accounting for all paper ballots
Key election laws & procedures followed
Verification of voting system software
Chain of custody of memory cards
Chain of custody of voting units
Pre-election preparation of voting units
Pre-election preparation of election management system
Preparation of precinct register
Absentee & provisional canvass
Polling place reconciliation
Allocation & deployment of equipment and supplies
Pollworker performance

H. Interpreting Audit Outcomes/Results

The results of the audit will be a report in the form of exceptions to the established procedures and/or controls. The determination of the significance of the exception and the intentions of the people involved in the exception is beyond the scope of the audit. That would be the responsibility of the governing election officials, and it could result in additional audit testing or other actions to determine and reach a conclusion. Accordingly, election officials will need to consider the course of action that should be taken when exceptions are found and how to interpret exceptions for stakeholders in a way that will not undermine public confidence in elections.

While each of the key performance indicators is important, a negative finding in some is clearly of greater concern. For example, if the audit finds an exception in the voting system software chain of custody (*see* Part 4B-Key Performance Indicator 1a), this would indicate a serious issue that would impact the integrity of the election. However, other audit exceptions that indicate that a process was not performed correctly or completely, while serious, would not impact the integrity of the election unless the audit findings indicate a significant number of exceptions. For example, it is anticipated that the verification of pollworker performance (*see* Part 4B – Key Performance Indicator 4b) will contain exceptions. This is a process that is dependent on the conduct of pollworkers and voters and is therefore subject to errors and anomalies. Accordingly, it is up to election officials to establish a reasonable margin of error and explain why that margin of error is acceptable.

Part 4 – Specific Audit for Maryland Counties

This section of the report establishes the appropriate level of confidence for conducting an election audit in Maryland and identifies and describes the key performance indicators that will be used to conduct a future election audit in Maryland. For each key performance indicator, the appropriate sample size is identified. For each key performance indicator relating to voting equipment and polling place performance, the sample size is based on equipment deployed and the number of polling places for the 2008 General Election; for key performance indicators relating to absentee and provisional ballots, the sample size is based on absentee and provisional voting in the 2006 General Election.

A. Level of Confidence to be Used

The proposed sampling plan attempts, given the anticipated resources available, to maximize the precision with which we can estimate each key performance indicator (*i.e.*, margin of error) and the confidence that we have a relatively representative sample with which to make those estimations.

Sample size and margin of error and confidence levels are interdependent factors; that is, a change to one of the factors will result in a change to at least one of the other factors. For example, with a constant sample size, an increase in the allowable margin of error means that the confidence that the results are satisfactory can be increased. Likewise, if the confidence level required is lowered, the margin of error can be decreased for the same sampling plan. Changing the sample size but holding the confidence level constant will impact the margin of error.

The interaction of the sample size, margin of error, and confidence level can be demonstrated using an example of a survey assessing the preferences of voters. A newspaper conducts a survey of 1,000 potential voters and asks the potential voters whether they prefer Candidate A or Candidate B (in a two candidate contest). The survey results show that Candidate A is preferred by 54% of the respondents.

Confidence level means how confident a researcher or auditor can be that the range of estimates produced using a sample of a given size actually includes the "real" parameter – the result that would be obtained if the entire population had been measured or audited. Newspapers generally use a 95% confidence level when they conduct these surveys. That is, they assume that, using the survey methods they employed, the sample size they used will not adequately represent the entire population only 5% of the time.

With sample size of 1,000 potential voters and a 95% confidence level, the margin of error in this survey would be "plus or minus 3 percent," and the newspaper would report that Candidate A's 54% score is "greater than the margin of error." In this example, if we simply estimate that 54% of the voting population prefers Candidate A, our estimate would almost certainly be wrong because our sample is very likely to be slightly different than the entire population in their preferences. By acknowledging a margin of error, we increase the likelihood that the survey results reflect the preference of the entire population because our sample, while very likely to be slightly different than the entire population, is very unlikely to be very different from the entire population.

In the candidate example, 54% is the best point predictor but "best" is not sufficient because all point predictors taken from the sample are very likely to be inadequate guesses about the entire population. Using 54% with a "plus or minus 3 percent" margin of error (range is now 51% to 57%), however, greatly increases the likelihood that we have an adequate estimate of the preferences of the entire population. In this survey with 1,000 respondents, the newspaper can report with confidence that Candidate A will receive a majority of the votes in the upcoming election knowing that statistical theory says they will be right more than 95% of the time. That is what it means to use a 95% confidence level.

To demonstrate the interdependence of these factors, if the newspaper uses a 99% confidence level, the margin of error would increase to a little more than plus or minus 4% and, so, the newspaper could not say with 99% confidence that Candidate A is supported by a majority of the entire voting population. If the sample size was changed but the confidence level of 95% held constant, the margin of error would change. For example, instead of surveying 1,000 voters, the newspaper surveyed 500 voters. With a confidence level of 95%, the margin of error would be "plus or minus 4.3%." The 54% with a 4.3% margin of error now means that the newspaper is not likely to report that Candidate A will receive a majority of votes because the range is now 49.7% to 58.3%.

For the initial election audit, a 99% confidence level will be used. This choice of a 99% confidence level is, necessarily, somewhat arbitrary. In other contexts (*e.g.*, the candidate preference survey described above), a difference confidence level is used and is sufficient. For this environment, however, a constant and more rigorous confidence level should be used. Since this initial audit will be an important tool to communicate the potential benefits and costs of potential future audits, choosing a constant and rigorous confidence level facilitates comparisons of the margin of error achieved for each measure.

The initial audit will establish baseline results for each key performance indicator. With this baseline data, election officials will use their experience to determine the appropriate margin of error that should be applied to each key performance indicator. For example, election officials may determine that the margin of error for key performance indicators relating to verifying the version of the voting system software should be very small (*e.g.*, less than one half of one percent margin of error), but the margin of error may be increased (*i.e.,* three percent margin of error) for pollworker performance in recognition that this is a purely human process performed by individuals who work two days every two years. Depending on the preciseness of the data, the sample size may need to be altered for future audit.

For the reasons described above, there may be changes to the sample sizes described in part 4.2 of this report and confidence and margin of error after the initial audit. Once, however, the sample size and confidence and margins of error have been established, they will **not** vary based on the closeness of a particular contest. An election audit is a method of verifying key election processes – not the results of the election. As a result, the closeness of a particular contest will not affect the sample size or the confidence and precision levels established for the election audit.

B. Description of and Auditing Key Performance Indicators

To be confident in an election, the voting equipment used in the election must count votes accurately and be free from tampering, only qualified voters must be allowed to vote, all paper ballots must be accounted for, and election officials must follow key election laws and procedures. When reviewing election processes to identify key performance indicators to include in an election audit, the processes were selected because the integrity of the entire voting process could be jeopardized if they are either not performed or performed incorrectly. For each key performance indicator, there is a recommended sample size that provides a sufficient level of confidence in the resulting findings and specific audit tasks.

1. End-to-End Verification of the Voting System

a. Voting System Software

The integrity of voting system software is critical to the overall integrity of and confidence in an election. Verification of voting system software throughout the election process should be a component in any election audit as this software records and accumulates votes and generates election results. By verifying the integrity of the voting system software, there is an assurance that the software used in an election is the same software accepted by the State and has not been altered in any way.

Maryland receives software directly from the independent testing authority (ITA) that certified the software pursuant to the appropriate governing entity (currently the U.S. Election Assistance Commission). The ITA creates and maintains a file signature[4] of the certified software and provides election officials with access to the file signature[5]. After the certified software is tested and accepted by the State, agents of the State load the certified software onto the voting equipment in a controlled environment. Individuals perform independent validation and verification (IV&V) to confirm that the correct software was loaded onto the voting units.

Confirmation that only certified software is used throughout the election process can be done by checking the file signature of the software during pre-election preparations and post-election analysis. In Maryland, file signatures will be checked for the three kinds of voting equipment software: (1) touchscreen voting units for non-provisional ballots cast at a precinct on election day; (2) optical scan voting systems used for absentee and provisional voting; and (3) election management systems that tabulate results at the county level.

During the pre-election voting system activities (often referred to as "Logic & Accuracy" or "L&A"), representatives of the local boards of election will confirm the file signature on every voting unit and record its verification on the Voting System Integrity Report. (An explanation of the Logic & Accuracy process is provided below in 1d of this part.) A similar verification will be performed on the optical scan voting system and election management system before each election. Likewise, after an election, the local boards of election will verify the file signature on the touchscreen voting units, optical scan voting units, and election management system.

Because using certified software is critical to the overall integrity of the election process, even one non-matching file signature would be significant. Thus, a very high level of precision is required in this performance area. The tolerable error rate for this attribute is zero, and the expected error rate is also zero. The recommended sample size would be 20% of the touchscreen voting units, all optical scan voting units, and each election management system.

[4] A file signature, sometimes called a hash value, is essentially a "digital fingerprint" of a data file. The purpose of it is to uniquely identify that data, and any changes made to the data, however small, will result in a different signature. The signature takes the form of a fixed length binary string and is typically displayed as a 32 digit Hexadecimal number.

[5] The ITA provides a file signature of the installation file. This signature is verified on all media used to install the software on the voting units.

The specific touchscreen voting units being audited would not be randomly chosen, but the choice would be probabilistic. By using this model to select voting units to be audited, as well as the selected precincts that will be described later, each voting unit (and each precinct) has some chance of being audited.

To select the touchscreen voting units in the sample, the vote totals for each voting unit would be collected and sorted from highest number of votes cast on a unit to the lowest, and the voting units in the top five percent would be selected for file signature verification. Fifteen percent of the remaining voting units (those not in the top 5%) would be audited with a probability proportionate to the number of voters recorded as casting votes on the voting units. Accordingly, in total, 20% of voting units from each county would be audited (5% of units representing those with the highest number of votes and 15% of all other units).

The greater the population of voting units, the lower the percentage of voting units that must be sampled to attain the same precision. Thus, it is likely that the required precision for the smallest county in the most sensitive performance area will require such a large percentage of voting units that it might become burdensome. It is unlikely that such a high percentage would be required to attain acceptable precision for the counties with a much greater number of voting units. Estimating the relative burden for the small and large counties will be an important task of the initial audit. For the participating counties, this would mean 18 voting units in Caroline County, 90 voting units in Charles County, and 542 voting units in Prince George's County[6] would be audited. But, by using the same plan in each of the three pilot counties, the precision rates attained can be compared with each other and be evaluated in terms of the effort involved in auditing each voting unit.

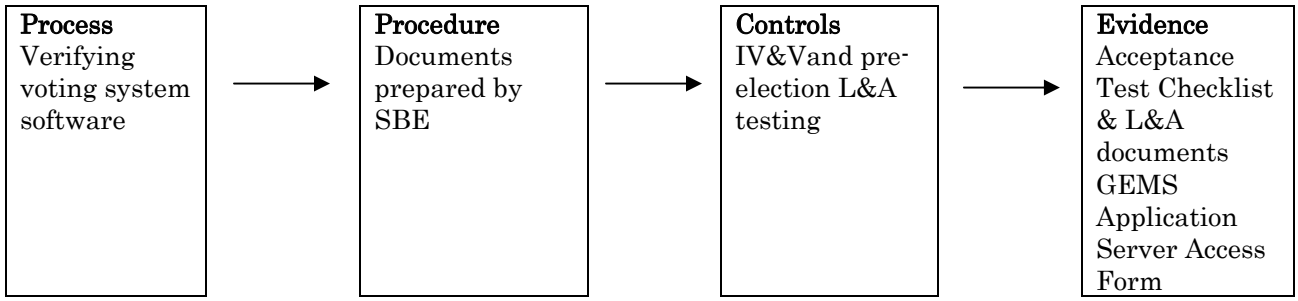
This probabilistic model reflects the fact that a failure of a voting unit with more votes on it represents a more severe failure. The choice of auditing all voting units with the highest number of votes reflects the fact that, to affect the outcome of an election, more voting units with fewer votes cast would have to fail or be tampered with, while the failure of one voting unit with many votes is more likely to affect an election. If more voting units would have to fail, the probabilistic model outside the top 5% will more likely find such failures. The decision rule for this key performance indicator is that any failure (*i.e.*, any finding that the file signature for a voting unit does not match the expected file signature) would trigger an in-depth review of the

[6] If, during the initial audit, it is determined that auditing 542 voting units in Prince George's County is too burdensome, the sample size can be reduced, and the precision levels will still be more precise than the levels from the other counties.

history of that voting unit and would result in an expanded audit of every voting unit in the county.

This plan assumes that sampling voting units from different precincts would not burden the local boards of elections much more than sampling all the voting units from a selected group of precincts. If the burden of verifying file signatures from numerous precincts is too great, the analysis of this key performance indicator should be changed to audit all the voting units in probabilistically selected precincts.

Key Performance Indicator 1a



Audit Tasks

1. Pre-Election – Observe the pre-election loading and testing of election-specific data on voting system.
2. Post-Election – Evidentiary Review
   - Touchscreen Voting Units – Review the voting unit history file on selected voting units and confirm that the acceptance test included verification of the file signature and an appropriate sign off by the IV&V trusted agent. Review that the file signature was confirmed again during L&A testing as indicated on the L&A checklist.
   - Optical Scan Voting Units – Review the voting unit history file on all units and confirm that the acceptance test included verification of the file signature, the memory chip compartment seal number, and the appropriate sign off by the IV&V trusted agent. Review that the seal number was confirmed during L&A testing as indicated on the L&A checklist[7].
3. Post-Election – Evidentiary Review
   - Touchscreen Voting Units – Verification of file signature on X touch screen units.
   - Optical Scan Voting Units – Verification of the memory chip compartment seal number.

[7] Due to hardware limitations, it is very burdensome and technically difficult to confirm the file signature on the current optical scan voting system. As a result, an alternate process was developed to verify the file signature upon accepting the unit, seal the compartment where the memory chip resides, and record the seal number. The seal number, instead of the file signature, is then confirmed throughout the various stages of the process. Since the optical scan units are used centrally under very strict controls, this alternate process is reasonable.

b. Memory Card Chain of Custody

Memory cards store the votes cast and the appropriate ballot styles for the precinct to which the voting unit is assigned. On the touchscreen units, memory cards are also used for uploading software changes to the voting unit. Proper chain of custody of the memory cards ensures that the correct software and ballot were on the voting units and the same memory cards are used throughout the process. It also ensures the integrity of the results which are maintained and transported on the memory card.

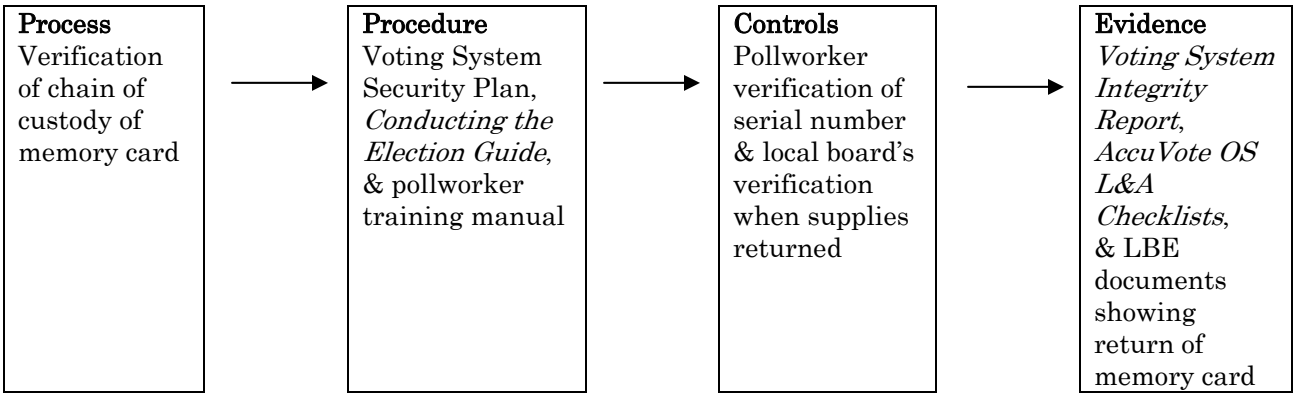
During the pre-election loading of the touchscreen memory cards, the local boards of election record on the *Voting System Integrity Report* each memory card serial number (see attachment). After the polls close, the pollworkers record the serial number on the report as part of their closing procedures[8]. Representatives of the local boards of elections will verify the serial numbers of the memory cards when the pollworkers return the memory cards after the polls close. For optical scan units, the memory card serial number is recorded on the *AccuVote OS Logic and Accuracy Checklists*[9] (see attachments). When the ballots have been scanned and the election officials are ready to upload the results to the election management system, they check the label and serial number of the memory card against the L&A checklists to confirm that it is the correct memory card.

Although documentation of serial number verification exists, the accuracy of the forms is dependent on a person manually entering a multiple digit number onto the form and doing so accurately. This is especially problematic as it relates to the touchscreen memory card chain of custody documentation, which relies on pollworkers to provide needed input. As a result, the expected error rate for this attribute would certainly be above 5%. The tolerable error rate for this attribute will be set after the initial audit. The exact levels of these rates need not be established before the initial audit because, in the interest of comparing rates, the audit plan for this and other unit-related attributes is the same as the plan articulated above for voting system software for the touchscreen voting units.

[8] At one time, the procedures required the pollworkers to remove the memory card from the voting unit at the start of election day to verify that the serial number matched the number recorded on the Voting System Integrity Report. While this is arguably a better practice, it was determined that there was too much risk in the memory card not being reinserted properly. Accordingly, serial number verification is performed at the end of election day. However, with a different voting system, verifying the serial number before the polls open may be preferable.

[9] There is no corresponding *Voting System Integrity Report* since the optical scan voting units do not leave the control and custody of election officials.

Key Performance Indicator 1b



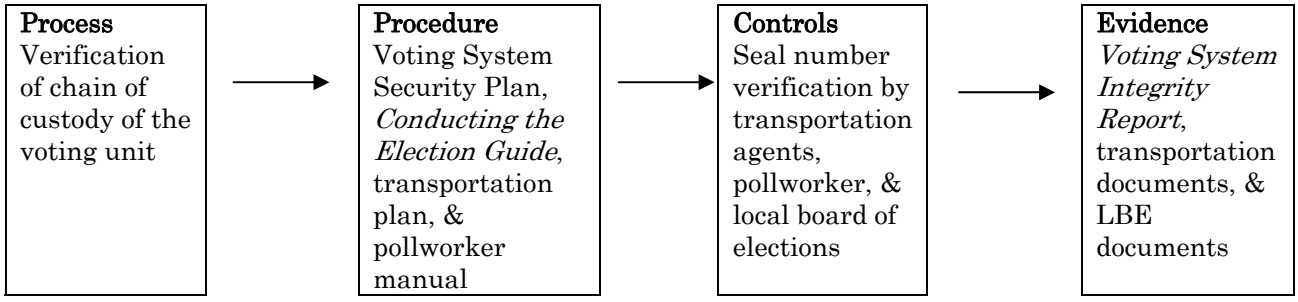
Audit Tasks

1. Pre-Election – Observe the pre-election procedures to record the memory card serial numbers on the *Voting System Integrity Report* and *AccuVote OS L&A Checklists*.
2. Post-Election – Evidentiary Review
    - Touchscreen Voting Units – Review the *Voting System Integrity Report* for the same touchscreen voting units as selected under 1(a).
    - Optical Scan Voting Units – Review the *AccuVote OS L&A Checklists* for all optical scan voting units.

c. Voting Unit Chain of Custody

Maintaining a strict chain of custody for the voting units ensures that the voting units that were accepted and tested by election officials are the voting units used throughout the election and that there is no evidence of tampering. Voting unit chain of custody is established by recording serial numbers and using seals throughout the election process. The voting unit serial number is recorded during acceptance testing and after any required maintenance. For touchscreen voting units, the outer cases are sealed after the pre-election testing has been completed and a strict chain of custody is maintained when the voting units are transported from the warehouse to the polling places. Before a polling place opens, pollworkers use information on the *Voting System Integrity Report* to verify the seal number on the voting unit's case and voting unit's serial number. Optical scan voting units are also sealed after the pre-election testing has been completed (since the units do not leave the custody and control of election officials, the other procedures are not applicable).

Key Performance Indicator 1c



Audit Tasks for Key Performance Indicator 1c

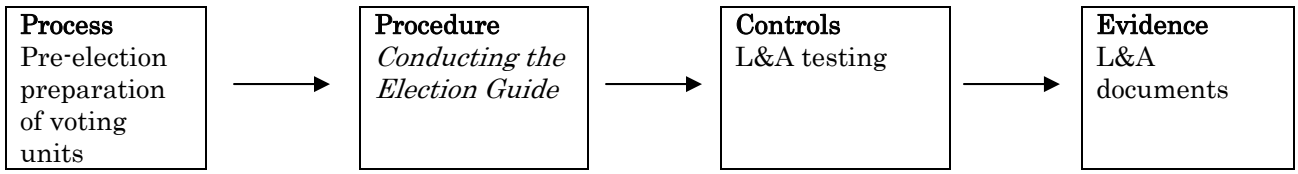
1. Pre-Election – Observe the pre-election procedures to record the voting unit serial numbers on the *Voting System Integrity Report* and the *AccuVote OS L&A Checklists*.
2. Post-Election – Evidentiary Review
   - Touchscreen Voting Units – Review the *Voting System Integrity Report* for the same touchscreen units as selected under 1(a).
   - Touchscreen Voting Units – Review the chain of custody documentation completed by the shipping company in the process of delivering and returning the voting units selected under 1(a).
   - Optical Scan Voting Units – Review the *AccuVote OS L&A Checklist* for all optical scan units.

d. Pre-election Preparation of Voting Units

Before each election, the local boards of elections load the ballot styles on to the voting units and then perform Logic and Accuracy testing on every voting unit. For touchscreen voting units, the L&A test verifies that the

correct ballot is loaded on each unit, the ballot displays correctly, and that each voting unit accurately records and tabulates votes cast for the contests on the ballot. For optical scan voting units, the L&A test runs a set of pre-voted ballots with expected results through the scanner to determine that it accurately records and tabulates votes cast for the contests on the ballot. The local boards of elections use state-issued forms to document the loading and testing process. In addition, the accuracy of the state's existing touchscreen voting system can be confirmed through pre-election and election day parallel testing, and optical scan voting systems can also be confirmed through a post-election hand tally.

Key Performance Indicator 1d



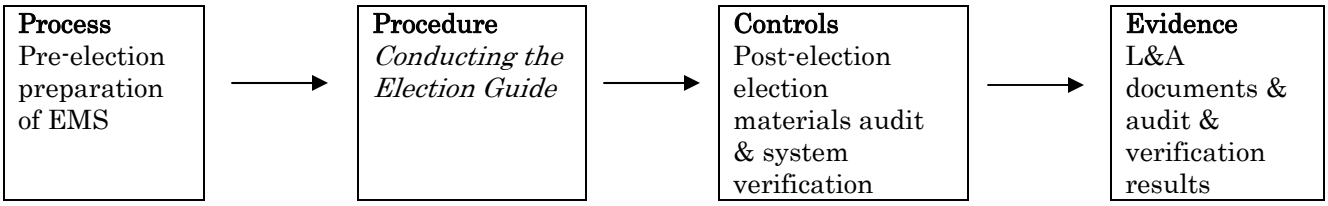
Audit Tasks for Key Performance 1d

1. Pre-Election – Observation of Logic and Accuracy testing procedures and parallel testing on the touchscreen voting system.
2. Post-Election – Evidentiary Review
    - Touchscreen Voting Units – Review Logic and Accuracy Checklists and voting unit totals reports for the same voting units selected for 1(a) and review pre-election parallel test documents.
    - Optical Scan Voting Units – Review all Logic and Accuracy Checklists.

e. Pre-Election Preparation of the Election Management System

Once the state creates the main database for an election, the local boards of elections load the database into the election management system (EMS) maintained at the local board of elections. To verify that the election management system properly compiles election result totals, a Logic and Accuracy test will be conducted by uploading the results of the voting unit Logic and Accuracy test into the election management system for the county. A post-election confirmation will be conducted by manually tabulating the precinct results of randomly selected precincts and verifying the manually tabulated results with the results reported by the election management system.[10]

Key Performance Indicator 1e



Audit Tasks

1. Pre-Election – Observe the pre-election loading and testing of the election management system.
2. Post-Election – Observe the local board's audit of election materials and system verification.
3. Post-Election – Review all documents associated with the pre-election loading and testing of the election management systems and post-election review of election materials and system verification.

2. Verification that Only Qualified Voters are Able to Vote

a. Preparation of Precinct Register

The precinct register is created by taking data from the statewide voter registration system and importing the data into the electronic pollbook's central server.[11] Once the data has been imported, election

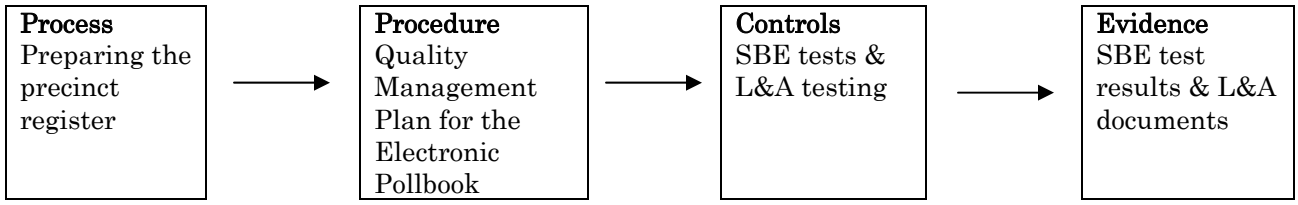
[10] After each election, Regulation 33.08.01.10 of the Code of Maryland Regulations (COMAR) requires that each election director audit the election materials to confirm the accuracy of the pollworkers' information. This includes reviewing voter authority cards, precinct registers, ballots voted, *etc.* A local board is also required under Regulation 33.10.02.38 to perform a system verification of the voting system. This includes either manually verifying the vote totals from the reports printed from each voting unit and comparing these results with the reports from the election management system and the audit required by Regulation 33.08.01.10.

[11] An electronic pollbook is a tablet-like device that contains identifying information for all voters eligible to vote in an election. A pollworker uses the electronic pollbook to check in a voter who has presented himself or herself for voting and print the voter authority card required by State law. The electronic pollbook guides the pollworker through the check-in process.

officials will initially verify the number of voters in each precinct register against the number of voters in the voter registration system assigned to the precinct. This confirms that all eligible voters are included in the precinct register and thereby have the opportunity to vote. Additional verifications confirming other sub-values, such as the number of voters that received an absentee ballot, the number of voters required to show identification, and the number of inactive voters, will be performed. In Maryland, because of the use of the electronic pollbooks, testing the accuracy of precinct register data will be conducted through comparing values from database reports.

Verification of the data imported into the electronic pollbook will be conducted at the precinct level. The precincts will be chosen with a probability proportional to the size of the active voters in that precinct. This will mean that the precincts with more voters will have a proportionately greater chance of being in the selected precincts. In each county, 25% of precincts will be chosen. In the smallest county, this will mean that only two precincts will be chosen, which may not provide enough precision. The precision in the more populous counties provided by this plan, however, will be more than adequate, and the plan will allow for comparisons of these precision levels. In Caroline County, 25% of the precincts is two precincts, in Charles County, it is nine precincts, and in Prince George's County, it is 55 precincts.

Key Performance Indicator 2a



Audit Tasks

1. Pre-Election – Review documentation at State Board of Elections that compares and reconciles the number of voters in the voter registration system and the electronic pollbook database.
2. Pre-Election – Observe electronic pollbook L&A testing.
3. Post-Election – Review electronic pollbook L&A test documentation for 25% of the precincts.

b. Absentee and Provisional Canvass

Canvassing of absentee and provisional ballots[12] requires the staff at the local boards of elections to analyze and decide whether the voter's ballot

[12] An absentee ballot is a ballot that is not used in a polling place. A provisional ballot is a ballot that is cast by an individual but not counted until the individual's qualifications to vote have been confirmed by the local board of elections. Maryland does not currently have early voting, that is voting in designated

should be accepted or rejected (and in the case of provisional voting, accepted in part). With absentee and provisional ballots accounting for approximately eight percent of the votes cast in an election, it is important to ensure that the decision of the local board of canvassers[13] to accept or reject the ballot was made pursuant to state laws and regulations.

For each county, there will be two different samples needed to audit absentee ballots. One sample will be absentee envelopes from voters whose absentee ballots were accepted to ascertain if these ballots were properly accepted. The other population will be absentee envelopes from voters whose absentee ballots were rejected to ascertain if they have been properly rejected. These two populations will be randomly sampled. (If the absentee envelopes are organized without systemization, a random number will be generated and an interval calculated to create a systematic random sample).

To determine the number of absentee envelopes in each sample, it is assumed prior to the preliminary audit that 99% of the ballots were either properly accepted or properly rejected and that it is desirable to have a precision level that provides an assurance with 99% confidence that no more than 5% of the ballots were improperly accepted or improperly rejected.

To accomplish this level of precision in each county, a sample size of 161[14] will be needed for both samples. This number will certainly exceed the actual number of rejected ballots in some counties, and in that case, a number slightly smaller than the whole number of such ballots would actually suffice, but it is recommended that, if a county has less than 161 rejected absentee ballots, all ballots will be reviewed.

A provisional ballot can be accepted in full, accepted in part, or rejected. These will be treated as three separate populations for auditing purposes. In each county, these three populations will be randomly sampled. (If the paper records are organized without systemization, a random number

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locations before election day. When early voting is implemented (most likely in 2010), procedures and controls unique to early voting will need to be developed and audited.

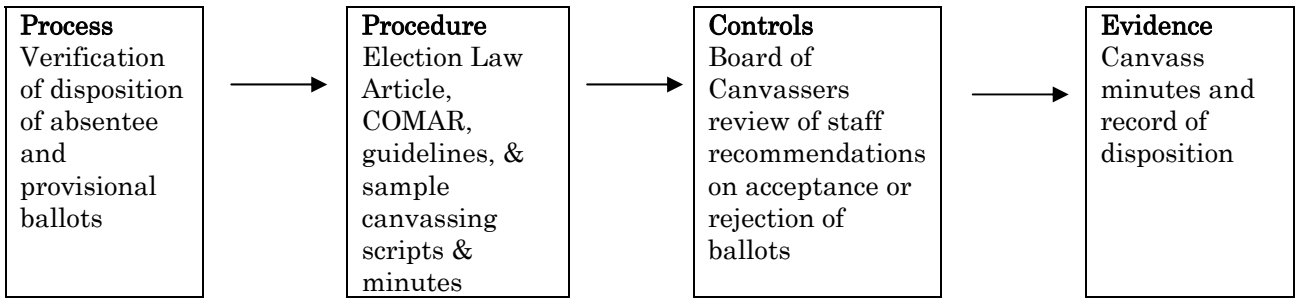
[13] On or before election day, the members of the local board of elections are sworn in as the local board of canvassers. In this capacity, the local board of canvassers reviews absentee and provisional ballots and determines, in accordance with state law, regulations, and guidelines, whether to accept or reject these ballots.

[14] This calculation is complicated to demonstrate and is often done using a computer program. In this case, the calculation was done using the calculator found at http://www.dssresearch.com/toolkit/sscalc/size_p1.asp.
The calculation used 95% as the "test value" (that is the value we want to make sure we are above), 99% as the "sample percentage" (the expected percentage of properly disposed of absentee ballots), 1% as the "alpha level" (the risk we are willing to take of having a sample that does not support are inferences, that is 1 minus our 99% confidence level), and the simplifying assumption of 50% as the beta error level.

will be generated and an interval calculated to create a systematic random sample).

To determine the number of provisional ballots in each sample, the same assumptions used to calculate the sample size for absentee ballots above are applied. With these assumptions, 161 provisional ballots of each type in each county will be reviewed. Data from past elections indicate that the population of "accepted in part" ballots will rarely reach this number in certain election cycles. As with the case of absentee ballots, simplicity of implementation argues for a plan that reviews all such ballots when there are fewer than 161 provisional ballots.

Key Performance Indicator 2b



Audit Tasks

1. Post-Election – Observe absentee and provisional canvasses[15].
2. Post-Election – Review canvass documentation and sampled absentee and provisional ballots to determine if they were accepted or rejected pursuant to State law, guidelines, and procedures.

c. Polling Place Reconciliation

Reconciling polling place information is necessary to ensure that only qualified voters cast ballots and that those ballots were properly recorded. To conduct the reconciliation, an election official will compare the number of voter authority cards or electronic pollbook check-ins in a precinct to the number of votes cast on the voting units in the precinct. If the numbers are equal, it provides a strong indication that only qualified voters cast votes in the polling place on election day.

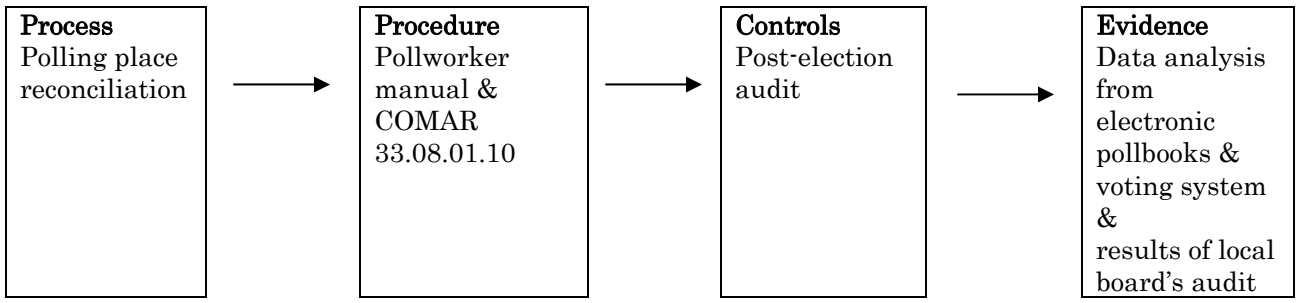
Although the number of voter authority card and electronic pollbook check-ins should equal, it is expected that an error of approximately one percent would be found in many precincts. This can occur for a number of reasons. For example, a voter may inadvertently take his or her voter

[15] The absentee canvasses start on the first Thursday and second Friday after the election, and the provisional canvass starts on the 1st Monday after the election.

authority card with him or her. This will mean that there is one less voter authority card than votes cast on the voting units. A voter may leave the polling place before casting his or her ballot. In this case, there will be one more voter authority card than votes cast on the voting units.

Since comparing these numbers will be accomplished by electronic compilation and analysis, it can be done almost as easily for every precinct as for a sample of precincts. As a result, data from every precinct should be examined, and those precincts with a larger than expected discrepancy (for example above 2%) should be subject to additional analysis to reconcile the difference.

Key Performance Indicator 1c



Audit Tasks

1. Election Day – Observe polling place activity to confirm that pollworkers are issuing voter authority cards, placing the voter authority cards in the envelope attached to the touchscreen voting unit on which the voter votes, and conducting periodic reconciliation of voter authority cards to the touchscreen voting unit's public counter.
2. Post-Election – Review data comparison, local board's post-election audit documents, and polling place evidence (including voter authority cards and reconciliation forms) from the polling places selected under 2(a).

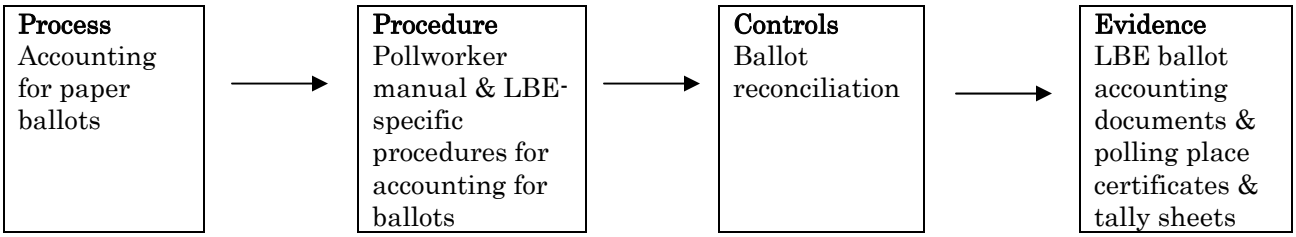
3. Accounting for Paper Ballots

Accounting for every paper ballot, including unused and spoiled ballots,[16] is necessary to confirm that ballots have not been misplaced or misused. When the ballot printer ships the pre-defined quantity to the local boards of elections, the local officials will verify that the shipped quantity equals the quantity ordered and account for how the ballots are distributed (*i.e.*, deployed to polling places for provisional voting or mailed as absentee ballots to requesting voters). The forms used by the local boards of election to account for paper ballots will be used during the audit.

[16] A spoiled ballot is a ballot on which a voter makes an error or otherwise spoils the ballot. The voter may return a spoiled ballot and be issued up to two more ballots.

For absentee ballots, the local boards of elections will need to verify that the number of voted absentee ballots returned by voters[17] is equal to the sum of the number of absentee ballots accepted and the number of absentee ballots rejected and less than the number of absentee ballots requested. For provisional ballots, the local boards of elections will verify that the ballots sent to polling places for election day provisional voting are accounted for by pollworkers using the *Provisional Ballot Certificate Parts A & B* and *Provisional Ballot Tally Sheet* (see attachments).

Key Performance Indicator 3



Audit Tasks

Post-Election – Review the ballot accounting forms completed by the local boards of elections and the ballot accounting forms completed by pollworkers in same the polling places selected for 2(a).

4. Election Official Performance

a. Allocation and Deployment of Election Day Equipment and Supplies

To ensure that voters are properly served on election day, it is critical that the proper amount of equipment and supplies are deployed to the polling places. For example, if an insufficient number of voting units or electronic pollbooks are deployed, voters will be subject to long lines. If the correct equipment is not supplied, the consequences range from an inconvenience to a complete shutdown of a polling place.

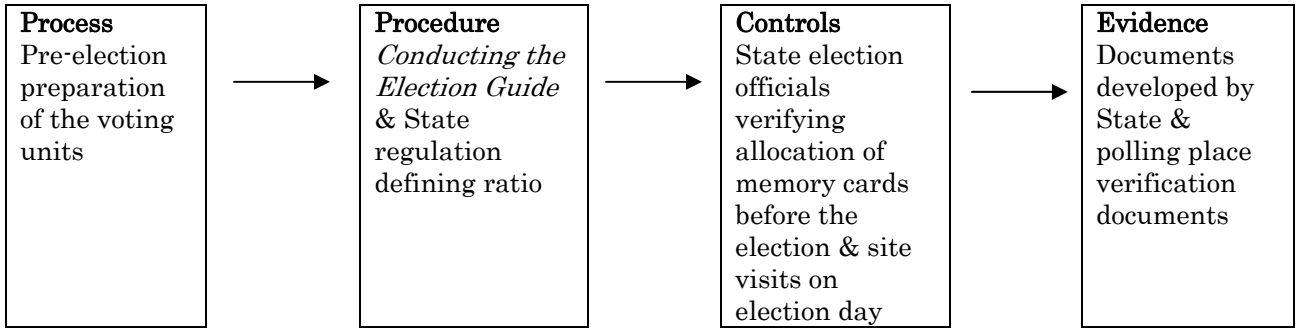
Some of the analysis will occur prior to the election by reviewing the voting system database and inspecting supplies that are packed for election day. When the local board of elections is preparing the voting units for election day, they use the State-mandated ratio of one voting unit for every 200 voters when creating memory cards for the voting units. (Estimated and then actual voter registration data is provided immediately before the start of the pre-election loading of the memory cards.) The number of memory cards

[17] This verification would exclude the number of absentee ballots returned to the local board of elections because the United State Postal Service could not deliver the absentee ballot to the address provided by the voter.

(and therefore, voting units) allocated to a precinct is stored in the pre-election database in the election management system. A copy of this database is provided to State election officials who will verify that the correct number of memory cards have been created and allocated to each precinct. This analysis enables there to be adjustments before election day if there are any precincts with less than the required number of voting units. Another verification will occur on election day by inspecting polling places and verifying that the proper number of voting units have been deployed to the polling places and set up by the election judges for voters to use. The final verification will be conducted after election day to determine whether the units were actually deployed (i.e. units assigned have results).

As this data is easily available for each precinct, voting unit allocation will be analyzed for all precincts. Auditors will review these efforts for adequacy. No sampling plan is needed for this performance area since data from all precincts will be reviewed.

Key Performance Indicator 4a (part 1)



Auditing Tasks

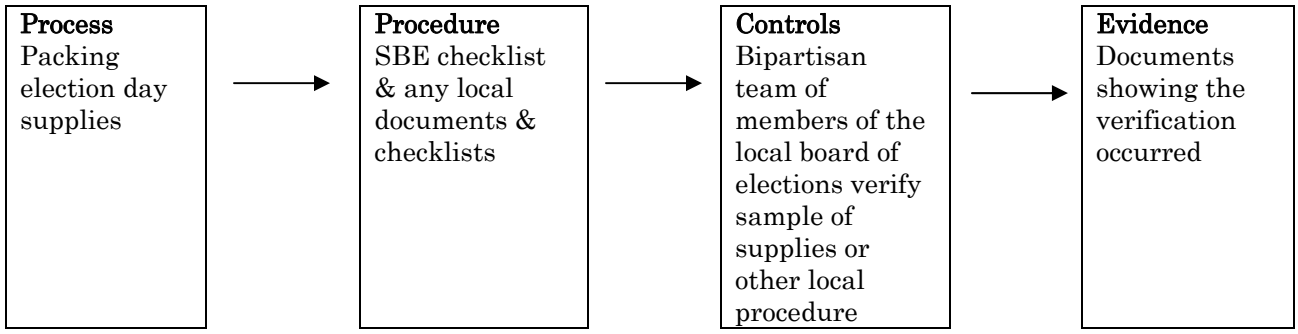
1. Pre-Election – Review the State Board's pre-election allocation analysis for each county to confirm that the proper allocation is used.
2. Election Day – Observe polling places designated under 4(b) below, to determine that the correct number of voting units were deployed and were set up and available for use by voters.
3. Post-Election – Review the State Board's post-election allocation analysis for each county to confirm that the proper allocation was used.

In addition to the voting units and electronic pollbooks, there are other critical election day supplies. These include State-required signs, voter access cards,[18] ancillary equipment to make the voting units accessible for voters with disabilities, provisional ballot applications and ballots, and supplies for contingency back-up plans. While the local boards of elections likely have their own checklists for packing supplies, the State Board of

[18] Voter access cards are required to use the voting units. It is a smart-card with the ballot style assigned to the voter. The voter inserts the voter access card into the voting unit to load the voter's ballot.

Elections issues a critical polling place supply checklist. Each local board of elections is required to have written documentation explaining how the contents of the supplies are verified and documentation showing that the supply verification occurred. The State Board of Elections will require each local board of elections to certify that the critical supplies have been packed, that the process of verifying the supplies has been followed, and that there is documentation available to show that verification was performed.

Key Performance Indicator 4a (part 2)



Auditing Tasks

1. Pre-Election – Review completed critical supply checklists submitted to SBE by the local boards of elections.
2. Election Day – Observe polling places designated under 4(b) below to confirm supplies have been deployed and are properly utilized (*e.g.*, signs are displayed).

b. Pollworker Performance

Given the important role that pollworkers play in administering the election to the voter, it is important to determine how effective they were in carrying out their responsibilities. Indicators include whether or not they returned the correct supplies, whether forms were properly completed, whether or not provisional ballot applications were signed, whether the polling place is set up correctly, and whether signs were properly displayed, *etc.*

There are two ways to assess pollworker performance. For factors such as polling place layout and posting of signs, an election day site visit will be required. Completion of forms and return of supplies, for example, will be evaluated post-election. To the extent that information about these factors is available to the State Board of Elections (*e.g.*, signed provisional ballot applications), the state will provide the local boards of elections with feedback on the pollworkers' performance.

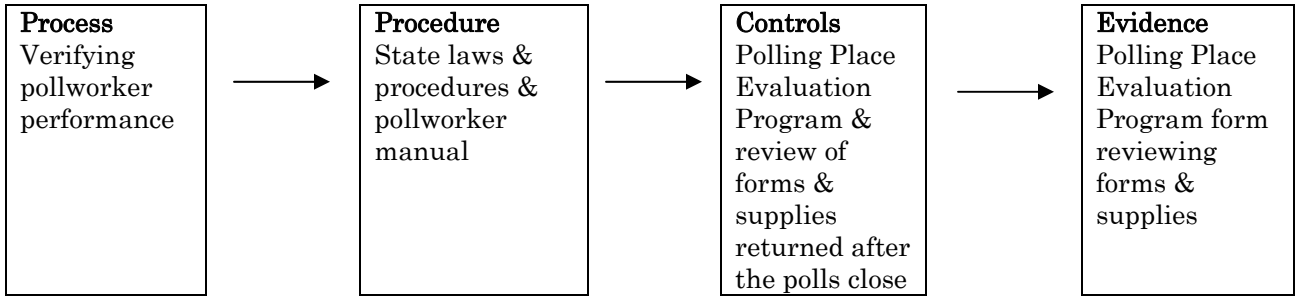
Dimensions of the precinct performance that are affected by pollworker performance are many and varied. For those performance criteria that can be generated from data compiled at the state level, data aggregated at the county level will be provided to the local boards of elections. For each of these criteria, the local boards will generate precinct level reports to identify the precincts where pollworker performance on these criteria could be improved.

For those dimensions of pollworker performance that can only be audited by visiting polling places on election day, it is recommended that, for the preliminary audit, the same 25% of precincts chosen through probabilistic sampling could be used. That is, for Caroline County, the activities in two precincts would be observed, in Charles County, nine precincts, and in Prince George's County, 55 precincts. Alternatively, in this preliminary audit, three precincts could be chosen from each of three counties. Visits could be made and the attributes desired could be reviewed. Although this will not generate enough data to allow an analyst to say anything with statistical confidence about most attributes for the larger counties, it will generate the data that will allow future estimates to be made about the commitment of resources needed to generate statements with certain degrees of confidence.[19]

It may be determined that visiting this number of precincts on election day is too labor intensive in counties with many precincts, and the sample size may need to be reduced. In that case, the most important factor in deciding the number of polling places to visit is the number of resources available on election day to visit polling places. The initial audit will assess whether additional resources need to be allocated for this observation or whether the sample size needs to be decreased.

[19] Under Regulation 33.07.03.04 of COMAR, each local board is required to have a Polling Place Evaluation Program. This program requires unannounced election day visits to polling places to assess polling worker performance. The State Board of Elections issues the form to be completed by the individual visiting the polling place. Many local boards of elections use board members to complete the form, while several local boards of elections use representatives of the League of Women Voters.

Key Performance Indicator 4b



Audit Tasks

1. Pre-Election – Observe pollworker training and review pollworker manual.
2. Election Day – Observe selected polling places to determine whether signs are displayed and the equipment is set-up correctly and pursuant to the site plan.
3. Post-Election – Review SBE analysis on pollworker performance.

Part 5 – Conclusion

As discussed in great detail throughout this report, professional auditing is a method of verifying, through evidence gathered by inquiry, observation and testing, the activities and results of a process. The report demonstrates that professional auditing principles can be applied to elections administration and will provide greater confidence in the election by demonstrating that the election was conducted pursuant to federal and state laws and procedures. Further, by testing the entire election process, election officials will have a much needed tool for assessing and ultimately improving performance.

Proposals to conduct post election audits by comparing hand tallied paper ballots against the results generated by the voting equipment, at best only test the accuracy of the tabulating function of the voting equipment. Focusing only on that one aspect completely ignores other critical components of the election process. The concern is that hand-tally audit requirements will cause state and local governments to focus all of their resources on the hand-tally audit to the detriment of conducting a more meaningful and complete audit such as what is being proposed by this report. The audit being proposed by this report will still provide a high level of confidence in the accuracy of the tabulation function of the voting equipment while also providing a complete assessment of other critical components of the election process.

Appendix A – Research Team

Maryland State Board of Elections

Linda H. Lamone, Administrator, Maryland State Board of Elections

Linda H. Lamone was appointed by the Governor to be the State Administrator of Elections on July 1, 1997, and subsequently reappointed to that position by the State Board of Elections. Ms. Lamone began her legal career and her work in elections by serving in the office of Counsel to the Maryland General Assembly where, among other duties, she also served as Counsel to the State Administrative Board of Election Laws from 1983 to 1987. As Maryland's Elections Administrator, Ms. Lamone is the Chief Election Official for the State and by statute is charged with maximizing the use of technology in election administration. Since her appointment, Ms. Lamone has overseen the development and implementation of a statewide voter registration system and a mandate for a uniform statewide voting system. Additionally, Ms. Lamone has administered the development of a sophisticated candidate and campaign finance management program and an election management system that creates and certifies each ballot layout for the State of Maryland. Ms. Lamone is a Past President of the National Association of State Election Directors and serves on the Advisory Board and the Technical Guidelines Development Committee of the federal U.S. Election Assistance Commission. Ms. Lamone is a graduate of the University of Maryland College of Business and University of Maryland School of Law.

Ross Goldstein, Deputy Administrator, Maryland State Board of Elections

Mr. Goldstein has worked in the field of elections for over 12 years in both a policy and administrative capacity. Mr. Goldstein began his career in elections when he became staff attorney to the Florida House Committee on Ethics and Elections. Next, he served as a staff attorney for the Maryland General Assembly where he was assigned to draft election laws and serve as counsel to the Task Force to Revise the Election Code. The task force led to a position with the Maryland State Board of Elections. As deputy administrator for the State Board, Mr. Goldstein works closely with local election officials to develop guidelines, policies, and procedures that ensure efficient administration of election laws. Mr. Goldstein is a graduate of the University of Florida and Temple University College of Law

Nikki Baines Trella, Election Reform Director, Maryland State Board of Elections

Since joining the Maryland State Board of Elections in 2003, Ms. Trella has been involved with implementing the requirements of the federal Help America Vote Act of 2002. As the Election Reform Director, she is involved in projects ranging from the implementation of a HAVA-compliant voting

system and voter registration system to election official and public education to improving accessibility of the electoral process for individuals with disabilities. Prior to joining the State Board of Elections, Ms. Trella worked in various positions in the Maryland Office of the Secretary of State. Ms. Trella is a graduate of Loyola College and the University of Baltimore School of Law.

Professional Auditing

B. Gary Dando

Retiring in June 2001, Mr. Dando worked for Ernst & Young LLP for 37 years, the last 25 of which he served as a partner. While at Ernst & Young LLP, Mr. Dando serviced a broad array of clients, including those in high technology, biosciences, government contracting, manufacturing and banking. Mr. Dando also held positions of national and regional operational responsibility within Ernst & Young LLP in areas of practice management and operations, and co-authored various internal training publications, including those relating to audit procedures and government contracting. Mr. Dando serves as a Director of MICROS Systems, Inc. and is chairman of its Audit Committee. Mr. Dando previously served on the board of directors and as chairman of the audit committee of PEC Solutions, Inc., a publicly held professional services firm, until it was acquired by Nortel in June 2005. Additionally, Mr. Dando is currently a member of the Board of Trustees, University System of Maryland Foundation, Inc., where he is also a member of the Finance Committee and Chairman of the Spending Policy Committee. Mr. Dando is a 1964 graduate of the University of Maryland, with a Bachelor of Science degree in Accounting.

Espey T. Browning, Jr., Partner, Johnson Lambert & Co. LLP

Mr. Browning has been licensed and practicing Certified Public Accountant since 1974. Mr. Browning began his career with Ernst & Young in the Washington, D.C. office where he became a partner in the firm's audit department. In 1996, he joined Johnson Lambert & Co. LLP continuing as an audit partner. Mr. Browning is active in various professional societies and committees, including the American Institute of Certified Public Accountants' Business Performance Measurement Task Force and the Maryland Association of Certified Public Accountants' Professional Ethics Committee. Mr. Browning also serves as an adjunct faculty member at Montgomery College, Rockville, MD. Mr. Browning is a graduate of the University of Maryland.

Statistical Analysis

Dennis McGrath, Ph.D. – Research Associate

Dr. McGrath received his Ph. D. from the University of Maryland in 1983. He was trained in research methods and advanced statistics at the

University of Maryland and the University of Michigan. He has gone on to teach these subjects to graduate students and to apply his knowledge in solving a wide variety of research problems faced by state and local government officials. Since joining the Schaefer Center staff in 1993, Dr. McGrath has specialized in statistical analysis, performance measurement, and program evaluation. For the past six years, he has helped the Quality Control Division of the Family Investment Administration of Maryland's Department of Human Resources address sampling and statistical analysis issues. He has helped create and implement a program that trains Maryland state officials in techniques of performance measurement. He has helped develop performance measures for the Family Investment Administration of the Department of Human Resources and other agencies.

Political Science

John T. Willis, Schaefer Center for Public Policy, University of Baltimore

John T. Willis, senior research associate at the center, is a graduate of Bucknell University and Harvard Law School. He has conducted extensive research on Maryland political history, elections and demographics and has authored several publications and significant reports. He is the author of *Presidential Elections in Maryland*, a contributing author to *Western Maryland: A Profile* and the co-author of an upcoming book, *Maryland Government and Politics*. From 1995 to 2003, he served as the Secretary of State for Maryland and was deeply involved at the state and national levels in election reform issues as a member of numerous commissions and committees, as a presenter before federal and state legislative and executive bodies, and as a contributor to broadcast and print media. Since 1999, he has taught courses at the University of Baltimore.

Student Research Assistants

Mark Brown and Kon Woo Kim, University of Baltimore

The student research assistants on this project are enrolled at the University of Baltimore. Mark Brown is in the Government and Public Policy Program in the School of Public Affairs. Kon Kim is currently attending the Law School at the University of Baltimore.

In addition to their academic work, they both have served as classroom assistants in the pollworker training program conducted by the Schaefer Center for Public Policy at the University of Baltimore. This program has provided training for over 15,000 pollworkers since 2006.

Appendix B – Research – Site Visits

a. *Overview*

Mr. Browning and Mr. Dando conducted a series of site visits between December 2007 and March 2008. Each site visit was arranged to give a sense of a different phase of the process of election administration. Prior to the election, Mr. Browning and Mr. Dando observed the processing of voter registration information, as well as pre-election loading and test of election-specific software on the voting units. On the date of Maryland's presidential primary, each was assigned to observe a number of different precincts as well as the process of parallel testing conducted at the State Board of Elections. Following the election, they were present to observe the final canvassing and reconciliation of the results of the election at selected locations. The purpose of the visits was to determine if the current environment of election administration is one for which an audit methodology could be introduced.

b. *Pre-Election Site Visits*

The first site visit took place at the Prince George's County Board of Elections in late December 2007. Mr. Browning and Mr. Dando spent several hours each at this site, observing the local board of elections' employees carrying out their day-to-day jobs and a demonstration of the functionality of the electronic pollbooks. Additionally, they observed the processing of voter registration applications: how those materials arrived, were batched and then entered into the statewide voter registration system. A brief tour was conducted of the warehouse where the voting units are stored when not in use.

A second site visit took place on January 30, 2008, at the Charles County Board of Elections. The primary purpose of this visit was for Mr. Browning and Mr. Dando to observe the process of the pre-election loading and testing of election-specific software onto the touchscreen voting units. In Charles County, this is a process takes a day and a half to perform, and Mr. Browning and Mr. Dando were present to observe the second day. In the course of this observation, they were also able to see procedures in place to verify that the appropriate chain of custody was followed and that the voting units remained secure. Mr. Dando noted this appeared to be a "well-controlled process in terms of people knowing what they were doing"; however, he did not test any documentation used throughout this part of the process. In the course of this visit, they were given copies of the pollworkers' training manual in Charles County, and both commented that as outsiders they were impressed that it "appears to be very comprehensive."

c. *Primary Election Day Site Visits*

For Maryland's primary election on February 12, 2008, Mr. Browning and Mr. Dando visited and observed a variety of precincts across the state. These were arranged so that precincts in counties with small, medium and large populations could all be observed.

Mr. Dando first visited his home precinct of River Falls in Montgomery County on the evening prior to the election. Early in the evening, he observed the truck from the county unloading the voting units. Returning later, he found that everyone who was to be a pollworker the next day was meeting at the precinct. The chief pollworkers took roll and discussed the tasks for the following day. The electronic pollbooks were set up, and voting units were staged and positioned with the remainder of the opening tasks left for the following morning. On the morning of the election, he returned at about 6:00 a.m. to observe the opening of the voting units. There was already a line of voters outside of the door at 7:00 a.m. There were about 14 voting units in the precinct, though not all of them were up and running as the voting began.

Throughout the day, he observed several precincts in Caroline County – Federalsburg High School, Denton Elementary School and Ridgely Elementary School. He was impressed with the knowledge base among the pollworkers at all of these precincts. They obviously had been doing this for a long time. Federalsburg was a small precinct in a hallway, whereas Denton and Ridgely appeared to be in cafeterias with the tables removed. He noted the difference in square footage across the precincts and could see how a more cramped precinct may have an impact on efficiency.

Mr. Browning also began his morning at his own home precinct in Montgomery County, Cedarbrook Church in Clarksburg, MD. He observed the set-up on the evening prior to the election, and then on the morning of the election, he arrived at the precinct at about 6:00 a.m., prior to the opening of voting hours to check out the signage and the final set-up of voting units and running of zero reports. He noted there were about 14 voting units in this precinct and that the floor plan had to be adjusted as the voting units did not fit according to the map provided. He remained in this precinct until around 9:00 a.m., observing the pollworkers checking in voters, noting that the pollworkers seemed "appropriately familiar" with everything they were doing.

In mid-morning that day, Mr. Browning and Mr. Dando made separate visits to the offices of the State Board of Elections in Annapolis to observe parallel testing of the voting units. Parallel testing is a method of testing an electronic voting unit by producing an independent set of results that can be

compared against the results produced by the voting unit. If an error in the software exists that would cause votes to be changed or dropped, this process would identify a concern that would need to be addressed. Volunteers from the League of Women Voters and other groups participated. This appears to be a good test of software controls.

Mr. Browning went on to observe two precincts in Anne Arundel County during the middle of the day. One was small with only six voting units in the precinct, and he noted that there was "virtually no crowd" in that time of the day. There were no issues in either precinct while he was there that required the involvement of a chief pollworker. He spent the remainder of the voting hours at a precinct in Frederick County, including the time that extended voting hours had been ordered. He noted that this precinct did not receive the call about extended hours until nearly the time of the scheduled election closing hour, but once the call was received, they "followed the rules." About a dozen people took advantage of the extended hours to vote in this precinct. Once extended voting hours had ended, he observed the close-out procedures performed by the pollworkers and followed the chief pollworkers to the warehouse in Frederick County where the local board of elections conducted the tally of votes. He described "a triage process of collecting the materials," making sure the memory cards were in good order, and observed as they were entered into the election management system's database. As a result of the ice storm that night, there was one person who had become stuck in transit in a hilly area and had to get police to help them out. The operation in Frederick County was orderly and went according to the established procedures.

Mr. Dando concluded his precinct visits at Twinbrook Library in Montgomery County to observe how this precinct closed down at the end of the night. The pollworkers in the precinct were unaware of the extended hours until one pollworker called the local board of elections with a question about closing procedures. The pollworkers used their precinct binder to proceed with the extended hours and worked together with a high degree of cooperation. Mr. Dando then went to the Montgomery County local board of elections to observe the precinct check in procedures. Based on his observations, the process was appeared well organized, orderly and well controlled for the log in of all precinct materials as they were returned and readied for processing of the vote count.

d. *Post-Election Day Site Visits*

Following the primary election, Mr. Browning and Mr. Dando visited the Montgomery County Board of Elections to observe the process of reconciling the number of voters who check-in to vote and the number of votes cast on the voting units. In cases where there were discrepancies,

employees of the local board of elections tracked down the problem in order to resolve it. This process appeared to be documented as to the results of the process.

Another part of this site visit involved the tabulation of absentee and provisional ballots. Mr. Dando asked the local board's employees whether written procedures and control points exist for this process. He was told that the local board was in the process of creating such documentation, but it was not yet completed as the local board was still in the process of developing what was thought to be best practices.

e. *Summary*

For the site visit phase of the process, Mr. Browning and Mr. Dando were not conducting any audits themselves. Instead, they were observing the environment of election administration to determine if these are processes that can be audited. Mr. Browning noted that the whole system was well-planned out with "processes that are generally in good order throughout." Mr. Dando observed there are areas where written documentation is not presently available; however, so long as written procedures for that documentation standard are developed, then there is "an environment where you should be able to build an audit methodology."