State of Alaska
Election Security Project:
*Election Process Review*
Phase 3 Report

April 9, 2013 Final Version

Prepared for State of Alaska Division of Elections
Executive Summary
Alaska Election Security Report, Phase 3
University of Alaska Anchorage

Alaska’s election system remains among the most secure in the country. But the technology and procedures Alaska uses to ensure that all eligible voters can vote, their votes count, and the results can be accurately reported and certified can use additional improvements. The state’s huge size, limited road system, and scattered communities continue to create special challenges for insuring the integrity of the vote.

In this third phase of an ongoing study of Alaska’s election security, we recommend some additional ways of strengthening the system. The lieutenant governor and the Division of Elections asked the University of Alaska Anchorage to conduct this additional evaluation, which began in April of 2011, to assess several items from the 2010 General Election Review (April 2011) that were not included in the scope of the earlier Phase 1 and Phase 2 studies completed in 2008. They also wanted to validate the updates to the tabulation equipment that were previously recommended. The goal of this study was to evaluate and recommend improvements prior to the 2012 elections for ballot security, audit post-election processes and hand count verification procedures, ensure that non-US citizens and felons convicted of moral turpitude are not registered or voting, and explore ways to provide real-time voter history information on Election Day.

Recommendations for Improving Alaska’s Election Security

- Affix additional tamper-evident seals to the touch screen voting system enclosure
- Improve unused and spoiled ballots security at precincts
- Strengthen the details of handling voted ballots in Juneau before hand-count verification
- Continue efforts to strengthen integration of Alaska State Department of Corrections, and U.S. DHS (Immigration)
- Utilize a new comprehensive Election Auditability Checklist
- Implement a consistent and effective procedure to provide public record voter history information to interested parties on Election Day
- Should not undertake implementation of a stand-alone, real-time voter history solution without further evaluation and within the context of a more comprehensive, long-range electronic voting technology plan including a near term statewide voter registration system upgrade
- Develop a mid-to-long range plan for the State of Alaska’s election system

What is the Current System?

Election security continues to be a prominent issue nationwide. In Alaska we must continue to evaluate our systems and procedures and remain vigilant in our efforts to identify and respond quickly to new threats given advances in technology and other security threats. This focus on continuous improvement helps to ensure that the Division of Elections can maintain the public’s trust in Alaska’s election system. Unlike other election security studies, our studies examine not only voting technology but also policies and procedures that add to the security of the system. To provide background for our recommended improvements, here we first briefly summarize the existing system. The figures on this page and the facing page show how the current system is organized.
The Lieutenant Governor heads the election system, and the Division of Elections manages federal and state elections statewide. The state is divided into four election regions, which in turn have 438 precincts. Election regulations, procedures, training, and technology are the same throughout the state.

There are multiple steps in the voting process, from the time Alaskans go to the polls until the director of elections certifies the results (as the figure on the facing page details). The process includes a number of security features that make it among the safest in the country:

- A centralized voting system, with standard procedures and identical hardware and software throughout Alaska. This centralization minimizes opportunities for tampering and allows flaws identified in any part of the system to be corrected statewide.
- Paper back-ups for all votes. Although optical scanners do scan and count ballots in 305 of Alaska’s 438 precincts, almost all voters in Alaska mark paper ballots that serve as back-ups to electronic tallies. There are touch-screen machines in all precincts. Only about 1% of voters use those machines, which also have internal paper reels as back-ups.
- Independent verification and cross-checking of paper ballots and preliminary electronic results.
- Audit of machine-counts of votes by hand-counts in a random sample of precincts.
- Observers invited to watch both voting and vote-counting procedures.

What Makes a System Secure?

Alaska’s system has many strengths, but there is room for improvement. Alaska and other states use electronic systems to count and record votes. That technology has a number of advantages—it makes counting votes much faster, for example. Federal law also requires all polling places to have touch screen devices for voters who cannot mark paper ballots.

But election security studies in other states have shown that the same voting technology used in Alaska could be vulnerable to tampering. Alaska also has security issues most other states don’t face.

It is huge—375 million acres—and the road system covers only about 10% of the land area. More than a hundred small communities can be reached only by water or air. Storms and intense cold frequently disrupt travel and shipments to remote communities.

So sending ballots and election equipment to and from communities around the state, as well as storing equipment in small communities with limited facilities, is very expensive and poses many logistical challenges. Also consistent application of processes across all 438 geographically distributed precincts is challenging.

To evaluate how Alaska could improve security, we first thought about the elements that make a system secure, and grouped them into three categories: defense in depth, fortification of systems, and confidence in outcomes.

- Defense in depth: A secure system should have multiple layers of protection, so that if one fails others are still in place. This layered approach can discourage attempts to corrupt election outcomes, because several undetected steps would have to be taken to penetrate the system’s security. Also, layers can provide early warning of attacks in time for election officials to take action. Equipment, people, and procedures together provide defense in depth. These systems and procedures include the equipment and processes used for voter registration, voter eligibility, ballot security, vote tabulation and verification, and procedures used before, during and after elections by officials, poll workers and public participants.
Fortification of systems: This means making electronic systems as secure as possible and using the latest certified updates, which may correct vulnerabilities in earlier systems. Alaska uses optical scanners that tally votes cast on paper ballots; touch-screen machines with internal paper reels that record the votes cast; and servers that integrate and tally the electronic and hand-count results. All of these systems should be equipped with the latest updates to minimize the potential for votes to be miscounted or tampered with, and they should be protected so unauthorized users can’t interfere with their operation before, during, or after elections. The systems must also be certified to federal standards and verified by independent testing centers.

Confidence in outcomes: Systems and results have to be verifiable and shown to be reliable—to increase confidence in the system for both voters and election officials. The methods used to select a sample of results for hand-counting must also provide a high level of confidence. The election process must be open, so anyone can observe what is happening—and those who verify results must be objective and bipartisan.

How Did We Assess Phase 3 Security Issues?

- We re-validated updates made to the equipment based on the 2008 report recommendations to ensure that the changes made addressed the identified security risks and to identify any new threats.
- We studied ballot security from election planning to final certification.
- We assessed the procedures used to verify voter eligibility to ensure that non-US citizens or felons convicted of moral turpitude were not voting.
- We evaluated post-election processes and hand-count verification procedures.

We found that Alaska continues to be well-positioned, compared with many other states. But we also want to emphasize that every state faces different security and procedural challenges. There is no single solution right for every state. There is also no perfect system so there are always opportunities for improvement and fine tuning.

We found that all of the updates to the equipment recommended in the 2008 report were completed.

There were further recommendations for additional tamper-evident seals for the touch screen equipment.

We found that there were opportunities to further secure and segregate un-voted and spoiled ballots from completed ballots and to improve their handling and documentation. We found that the division has procedures in place to validate voter eligibility and works with other federal and state agencies to routinely update the voter registration database with the most currently available information. The processes to collect this information and update the voter registration are not automated. It requires ongoing diligence by division personnel to routinely seek out and update this information coming from other agencies.

The division has post-election and hand-count verification procedures that ensure accuracy and transparency. An election process audit checklist was prepared and proposed for use by the division.

As reported in 2008, two aspects of Alaska’s system continue to help its election security relative to that in other states: centralization and paper ballot back-ups for virtually all votes.
Alaska’s centralized processes and procedures at the state level make it easier to implement consistent security practices. Few states have such centralized systems, with standard practices and voting equipment statewide.

Most states have decentralized systems—that is, systems in which counties, cities, or townships can choose different equipment and set their own election procedures.

Also, Alaska’s system provides a verifiable paper record of all the votes cast. Almost all voters mark paper ballots that are scanned and counted by an optical-scanner. About one percent of voters use touch-screen machines, equipped with an internal paper reel that records votes.

**Real-time Voter History**

In addition to the above security items, we evaluated solutions that could provide publicly available, real-time voter history (RTVH) online on Election Day. We assessed commercially available electronic poll book-based solutions along with some possible custom approaches and provided a cost/benefit analysis of those alternatives. We also provided information about how other states make this information available.

**What Do We Recommend?**

The table on the front page summarizes our main recommendations, some of which the Division of Elections put into effect before the August primary and the November general election. Here we explain more about some of the most important recommendations, which are discussed in detail in the full Phase 3 report.

- **Affix additional tamper evident seals** to the AV-TSX (Touch Screen) voting system enclosure.
- **Improve unused and spoiled ballot security** at the precincts.
- **Strengthen handling of voted ballots after receipt in Juneau** and prior to hand-count verification.
- **Continue efforts to strengthen integration of Alaska State Department of Corrections, U.S. Department of Homeland Security (Immigration), and other databases with the Voter Registration database.**
- **Utilize a comprehensive Election Auditability Checklist** before, during and after each election.
- **Ensure implementation of consistent and effective procedures to provide public record voter history information** to interested parties on Election Day.
- **Should not undertake implementation of a stand-alone, Real-time Voter History (RTVH)** solution without further evaluation and within the context of a more comprehensive, long-range electronic voting technology plan including a near term statewide voter registration system upgrade.
- **Develop a mid-to-long range strategic plan for Alaska’s Election System** (given expectations that some equipment used in Alaska will soon become obsolete), that includes the evaluation, adoption, and implementation of new technologies (including tabulation systems, databases, real-time voter history solutions, voter registration systems, electronic poll books, etc.) to support the changing needs of voters and election officials in Alaska and that address the associated and necessary evolution of procedures and workforce training to ensure a continuation of secure and participative elections.

**Conclusions**

We have made a number of recommendations for improving the security of Alaska’s election system, but we want to keep those recommendations in context: Alaska’s election system is in good shape. Other states have adopted measures we’ve had in place for years. Personnel of the Division of Elections understand the system and have a good idea of what kinds of measures could help make it more secure.

But there’s always room for improvement. Aside from the specific recommendations we’ve listed, Alaska needs to build a foundation for the future—to make sure Alaska’s election system stays among the best in the country. The current election technology is aging, and the state will face new choices when it has to upgrade that technology. It needs to start systematically assessing its future needs and new technologies now.

This publication summarizes Phase 3 of the *Alaska Election Security Report*, prepared for Lieutenant Governor Mead Treadwell and the Alaska Division of Elections. Contributors are UAA faculty, staff and researchers: LuAnn Piccard, Mark Ayers, David B. Hoffman, Roger Hull, Michelle Webb, Stephanie Martin, Mary Killorin and Patricia Deroche.
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Acknowledgements

The study team gratefully acknowledges help from many people in the preparation of this report.

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Project Overview
In April 2011, the State of Alaska Office of Lieutenant Governor Mead Treadwell produced a 2010 General Election Review (Appendix B: 2010 General Election Review, April 1, 2011). This report recommended a number of statutory and election procedure changes. In addition, several areas were recommended for third party review:

- Review of division’s audit procedures and hand-count verification of election results.
- Audit to ensure non-U.S. citizens are not voting.
- Audit to ensure felons are not voting.
- Explore systems or methods that can provide for real-time voter history.

The above items were incremental to the scope of work conducted in the State of Alaska Election Security Project (Phase 1 and 2, September 2007-May 2008) (See Appendix C), conducted by the University of Alaska Anchorage. Additionally, the division asked for revalidation of two items that were included in that original project report:

- Revalidate election equipment security given recent certified, technology upgrades.
- Reassess end-to-end ballot security.

The Alaska Division of Elections requested that the University of Alaska Anchorage undertake the third party review to assess the above items. This study was completed during the period of June 2011-July 2012. This report builds upon the original State of Alaska Election Security Project (Phases 1 and 2). That study evaluated the overall security of Alaska’s Election System including the integrity of the electronic voting systems, the procedures, processes and personnel of the election system overall, and the public’s confidence in the outcomes of the election process. The report recommended a number of improvements to further strengthen the system. All of the recommendations made were accepted and implemented by the Division of Elections.

The goal of this third party review was to address a specific set of items identified in the 2010 General Election Review (See Appendix D: Division of Elections Election Process Review Scope of Work) including a review of tabulation equipment (new items implemented after 2008 study), ballot security (pre-, during and post-election), and an audit of the post-election processes and procedures used by the Division of Elections in anticipation of the 2012 elections. This follow on study was undertaken to identify those areas where improvements could be made to ensure the division’s tabulation equipment, voter history, ballot security and review, and election audit procedures are secure, effective, and maintain the public’s trust in Alaska’s election system. In addition, the division’s processes to ensure non-U.S. citizens and felons convicted of moral turpitude are not registered and/or voting was also reviewed. The team was also asked to evaluate potential solutions to provide real-time voter history on Election Day.

Scope of Work for Project
The specific items included in the scope of work for this project are described in detail in Appendix D: Division of Elections: Election Process Review Statement of Work, and include:
• Revalidate tabulation equipment security (items implemented based on 2008 report recommendations)
• Review ballot security (pre-, during, and post-election)
• Review post-election audit procedures and hand-count verification procedures
• Review methods used by division relating to felons and non-U.S. citizens
• Review systems that can improve real-time access to and more efficient processing of voter history (See Appendix E: Real-time Voter History Solution Evaluation).

In particular, the following items were evaluated:

**Tabulation Equipment Security** - Revalidate tabulation equipment security, building on a foundation of the original study completed in 2008.

**Ballot Security** - The processes used to secure ballots (pre-, during, and post-election) during transit between various polling locations and the Division of Elections, as well as the security of the ballots once they are received by the division were reviewed to ensure ballots are secure and accounted for before, during, and after transport and to identify any necessary improvements. In addition, the processes and procedures relating to accountability and destruction of unvoted ballots after an election were reviewed to ensure unvoted ballots cannot be later falsified and added to the election results. The study will identify improvements needed to ensure ballot accountability.

**Post-election Audit Procedures** – The methods and audit procedures used by the division’s absentee and questioned ballot review boards and the State Ballot Counting Review Board (SRB), including the hand-count verification, to certify the election results should be reviewed to determine if the audit processes currently used would identify potential discrepancies in reported results and to recommend changes that would improve audit procedures. In addition, a review of the post-election processes would increase the public’s confidence in the election results and identify any information that might be necessary to answer questions in the event of an election challenge.

**Voter History** – When entering a polling place, voters sign a precinct register before being given a ballot. The precinct boards return all registers to the Division of Elections office in their region. Division staff then updates voter history on the official voter registration record. This history is entered manually by division staff and must be completed before the division opens and counts absentee and questioned ballots. In addition, in order for political parties and/or candidates to determine which voters have voted in an election, they currently need to station poll watchers at precincts to record voter names or wait until the division has performed the voter history. A review of the procedures used by the division to provide for voter history, researching the feasibility of implementing systems that might provide “real-time” access to and more efficient processing of voter history was done to determine possible alternatives, including a cost/benefit analysis, timelines for, and risk assessment of such alternatives aligned with the 2012 election. (This review is included as Appendix E: Real-time Voter History Solution Evaluation.)
**Felons and Non-U.S. Citizens** – The processes and procedures used by the division to ensure felons convicted of moral turpitude and non-U.S. Citizens are not registered and/or voting should be reviewed to determine if the division has access to, and receives information from, the necessary resources and data to identify such voters.

**Out of Scope Items**

Several items in the 2010 General Election Report (Appendix B) were handled through different forums and were not included in the scope of work for this report. In particular, poll worker training and mechanisms for Division of Elections to respond to and address public comment are not included. Please see Appendix B for further details.

This study also did not evaluate the implementation of electronic poll books (EPB) as an alternative to or replacement for paper registers in polling places and the resulting costs/benefits of such implementations. Research was restricted to the evaluation of EPB based Real-time Voter History (RTVH) solutions to determine the potential feasibility of implementing standalone RTVH capabilities within the context of the current polling place environment in Alaska. (See Appendix E: Real-time Voter History Solution Evaluation.)

**Significant Findings and Recommendations**

The University of Alaska Anchorage research team has determined that the Alaska Election System remains secure. However, there are opportunities to fine tune the equipment and processes for even greater benefit. Some of these items were revealed as a result of the atypical senatorial write-in campaign during the 2010 general election. Another was identified based on a recent analysis of the Accu-Vote Touch Screen (AV-TSX) voting system conducted by Argonne National Laboratory Vulnerability Assessment Team and our independent validation of the issue. Others are more general recommendations given technology and workforce changes that will impact the longer term approach for the state’s election system. This report recommends several additional election security measures and other general findings. The Division of Elections should:

- Add additional tamper evident seals on the AV-TSX (Touch Screen) voting system enclosure.
- Improve unused and spoiled ballot security at the precincts.
- Strengthen handling of voted ballots after receipt in Juneau and prior to hand-count verification.
- Continue efforts to strengthen integration of Alaska State Department of Corrections, U.S. Department of Homeland Security (Immigration), and other databases with the Voter Registration and Election Management System database (VREMS).
- Utilize a comprehensive Election Auditability Checklist before, during and after each election (See Appendix F: Election Auditability Checklist).
- Implement a consistent and effective procedure to provide public record voter history information to interested parties on Election Day.
- Should not undertake implementation of a stand-alone, Real-time Voter History (RTVH) solution without further evaluation and within the context of a more comprehensive, long-range electronic voting technology plan including a near term statewide voter registration system upgrade. (See as Appendix E: Real-time Voter History Solution Evaluation).
• Develop a mid-to-long range strategic plan for Alaska’s Election System that includes the evaluation, adoption, and implementation of new technologies (including tabulation systems, databases, real-time voter history solutions, voter registration systems, electronic poll books, etc.) to support the changing needs of voters and election officials in Alaska and that address the associated and necessary evolution of procedures and workforce training to ensure a continuation of secure and participative elections.

Introduction

Alaska’s Election System

Our findings indicate that Alaska’s election system is among the most secure in the country and it has a number of safeguards other states are now adopting. Given the state’s huge size, limited road system, and scattered communities, Alaska has some unique challenges not faced by other states to ensure the integrity of the vote.

Some of the key characteristics of Alaska’s election system for state and national offices are:

- Centralized voting system with standard procedures and identical hardware and software throughout Alaska. This centralization minimizes opportunities for tampering and allows flaws identified in any part of the system to be corrected statewide.
- Paper back-ups for all votes. Although optical scanners do scan and count ballots in 305 of Alaska’s 438 precincts, almost all voters mark paper ballots that serve as back-ups to electronic tallies. There are touch-screen machines in all precincts. However, only 1% of voters use those machines and they also have internal print paper reels as back-ups. In Alaska, the paper ballot is considered the official vote.
- Independent verification and cross-checking of paper ballots, electronic tallies, and voter registration books.
- Audit of machine counts by votes using hand counts in a random sample of precincts in all 40 election districts in the state.
- Observers invited to watch both voting and vote-counting procedures.

Alaska measures its election security along the following dimensions:

**Defense in Depth:** A secure system should have multiple layers of protection so that if one fails, others are still in place. This layered approach can discourage intrusion because intruders would have to take several undetected steps to penetrate the system’s security. Also, layers can provide early warning of attacks in time for election officials to take action. Equipment, people, and procedures together provide defense in depth.

**Fortification of Systems:** This means making electronic systems as secure as possible and using the latest certified updates, which may correct vulnerabilities identified in earlier systems. Alaska uses optical scanners that tally votes cast on paper ballots; touch-screen machines with internal paper reels that record the votes cast; and computer servers that integrate and tally the electronic and hand-count
results. All of these systems should be equipped with the latest updates to minimize the potential for votes to be miscounted or tampered with. These systems are protected so unauthorized users can’t interfere with their operation before, during, or after elections. The systems must also be certified to federal standards and verified by independent testing centers.

**Confidence in Outcomes:** System and results must be verifiable and shown to be reliable in order to maintain both voters’ and election officials’ confidence in the system. The methods used to select a sample of results for hand-counting must also provide a high level of confidence. The election process must be open, so anyone can observe what is happening and verify that the election officials are objective and that partisan interests are balanced.

In Alaska, the lieutenant governor oversees the Division of Elections, and the Division of Elections manages federal and state elections statewide.

Alaska is divided into four election regions that include a total of 40 House Districts and 20 Senate Districts. Two House Districts combined make up a single Senate District. Each House District is further divided into precincts. There are 438 precincts in Alaska. There is one polling place for each precinct. In order to conduct an election, the Division of Elections must make sure that each precinct has a polling location, election workers to run the polling place, and that each location has the ballots, supplies, and equipment needed for the election.
For administrative purposes, the Division of Elections has four regional offices:

- Region I in Juneau includes Districts 28-35
- Region II in Anchorage includes Districts 7-27
- Region III in Fairbanks includes Districts 1-6 and 38-39
- Region IV in Nome includes Districts 36-37 and 40

**How Alaska Voters Cast Their Ballots**

Alaska has many small, rural communities as well as several larger urban areas. Some of the smaller communities are not on the road system. Many of the communities are separated by large geographic distances. These characteristics influence how voters in Alaska cast their ballots. The graphic below shows that approximately 95% of Alaskans live where votes are machine counted. Approximately 5% of voters live in communities where the paper ballots are counted by hand. Regardless of how votes are counted at each of the 438 precincts in Alaska, paper ballots and electronic equipment (optical scanners and touch-screen machines) must be present on Election Day.

*Source: Alaska Division of Elections*

*Based on 2010 voter registration of 494,876*
Alaska’s Voting System
The graphic below describes Alaska’s Voting System and how Alaskans choose to vote either at polling places, by voting early, by mail or fax, by absentee, or by questioned ballot. Once all of the votes have been received and counted, the final results are certified by the Director of the Division of Elections. This can sometimes take several weeks because although all mailed and absentee ballots must be postmarked on Election Day, it takes time for election workers to receive and count all of the ballots. Alaska law allows ballots to be received up to 10 days after the election if mailed within the U.S. or 15 days if mailed from international locations. All elections require great scrutiny to make sure that the results accurately reflect voter intent. This becomes even more critical in close elections.

Though Alaska’s election system is among the most secure in the country, there is always room for improvement. The following summary recommendations describe and recommend opportunities to further strengthen Alaska’s election system.
Equipment Security Analysis

Introduction
The State of Alaska Division of Elections Election Security Project Report (Phase 1 and 2, September 2007-May 2008) (See Appendix B) (hereto referenced as “the 2008 report”) produced a comprehensive description of security enhancement recommendations. A significant portion of the 2008 report was devoted to analysis of equipment security. In the 2008 report, the State of Alaska’s election system was broken into three major sections:

1. Defense in Depth
2. Fortification of Systems
3. Confidence in Outcomes

Security of the election equipment (voting machines and hardware) and the associated system software spans all three sections of the 2008 report. Among the recommendations in the 2008 report one specific item is of particular interest. The Assure 1.2 software upgrade to the voting equipment addressed a number of issues identified by third parties as significant security risks.

The State of Alaska Division of Elections has implemented all of the recommended security enhancements relating to equipment security (hardware and software systems). This includes the recently certified and adopted Assure 1.2 software revision.

Currently, no new software updates are available from the equipment vendor and considering that all of the previously recommended equipment security enhancements have been adopted no new recommendations are made in this report. One issue has been identified as a result of the Assure 1.2 upgrade. This issue is in relation to the hash code verification recommendation made in 2008. The Division of Elections adopted hash code verification of software images prior to adoption of the Assure 1.2 software. Following the adoption of the Assure 1.2 software the Division of Elections discovered that the National Software Reference Library (NSRL) did not archive the required hash code information for verification of the Assure 1.2 software integrity. Federal certification requires the Voting System Test Lab to submit the software to the NRSL. The division reported this issue to the Election Assistance Commission (EAC). The EAC has indicated that they will get the required information to the NRSL. In the meantime, the EAC provided the certified hash code and the division has verified the new software.

2008 Election Security Project Equipment Security Review
This section presents a review of recommendations made in the 2008 Division of Elections security report. Within the “Summary of Recommendations” section of the 2008 report a recommendations matrix is presented which details all of the recommended security enhancements. Listed below are the major recommendations presented in the report. A short description of each recommendation is provided as well as the current status of this recommendation within the Division of Elections.
Assure 1.2 Upgrade
The cost and process to upgrade Premier Election Solutions (formerly Diebold) system software and firmware to Assure 1.2 software version was examined. The result of this analysis determined that upon certification by the Election Assurance Commission (EAC) the Division of Elections should adopt Assure 1.2 software for all of the hardware systems within the Division: Accu-Vote Optical Scan (AV-OS), AV-TSX and Premier Election Solutions Global Election Management Systems (GEMS).

Hash Code Verification
The GEMS.exe application should be validated by calculating both MD5 (Message-Digest 5) and SHA (Secure Hash Algorithm) hash functions. These hash codes should be compared with those registered with the National Software Reference Library (http://www.nsrl.nist.gov/votedata.html). Known vulnerabilities exist with the MD5 hash function and as a result both the MD5 and SHA hash functions should be calculated (Premier’s Windows Configuration Guide, Revision 3.0, Section 10, 2007).

Upon adopting the Assure 1.2 software version, the Division of Elections discovered that hash code verification of the Assure 1.2 software was not possible using the National Software Reference Library (NSRL) website. Prior to adoption of the Assure 1.2 software, the Division used the NSRL website to calculate hash codes for all software used in the Division’s ballot tabulation system software. After installation and commissioning of Assure 1.2, the Division of Elections discovered that the NSRL website did not contain the required hash codes.

Hash code verification is a method used to confirm that a file has not been corrupted by comparing the hash value to a previously calculated value. If the values match, it is presumed that the file has not been modified.

Password Management
A complete password management methodology was presented in the 2008 Division of Elections report. These password management recommendations encompassed all levels of the equipment ranging from system BIOS to operating system and election software passwords.

Key Card Tool
Key Card Tool is a software application created by Premier Election Systems for use with the Accu-Vote Touchscreen (AV-TSX) system. The Key Card Tool application allows users to create authentication keys and passwords on a personal computer platform and to write those authentication keys to smart cards for use in the touchscreen voting system.

Functional and Accuracy Testing
A complete set of functional and accuracy tests are provided within the 2008 report. These tests detail a set of test procedures to ensure that the voting equipment performs according to the functional requirements and that the system produces accurate tabulation results.
2011 Election Security Project Equipment Security Discussion
As discussed in the introduction to this report, the Division of Elections has adopted all of the recommended security enhancements presented in the 2008 report. This section presents the current status of these recommendations.

Assure 1.2

Current Status
In March 2011, the Division of Elections began the process to upgrade all ballot tabulation system equipment and software to Assure 1.2. The upgrade included replacing the hardware and software in the division’s eight GEMS computers, upgrading software in 510 touch screen units, upgrading software in 1,188 voter card encoders and upgrading the firmware used in the division’s 356 optical scan units. The division has completed the upgrade of all of all the equipment.

After upgrading to Assure 1.2, the division discovered that the new GEMS programming software changed how the number of precincts reporting appears on the election results reports. The election summary report, which is used to report election results, showed the number of precincts reporting for each district along with the results for each candidate. When watching election results, candidates and the public rely on the number of precincts reporting to get an indication if all precinct results have been reported.

Prior to upgrading the State of Alaska Accu-Vote system to Assure 1.2 the Division of Elections had the capability to report closed precinct statistics when a precinct uploaded the data from either the AV-OS or AV-TSX machines. After upgrading to Assure 1.2 a precinct was reported closed only after both the AV-OS and AV-TSX machines had uploaded the data to the GEMS server.

In Assure 1.2, the number of precincts reporting on the election summary report included only those precincts where both the optical scan and touch screen memory card were uploaded. Since optical scan memory cards are uploaded into the ballot tabulation system first, the election summary report would show results but not show the number of precincts reporting until the touch screen results were uploaded.

The election summary report could have, caused confusion amongst the candidates and public if they were to see results where the number appearing in the “number of precincts reporting” section was blank because only the optical scan results had been uploaded. The Division met with Dominion to discuss this issue. On March 28, 2012 this item was resolved with the vendor and the results reporting issue was fully addressed.

Recommendations
No new software revisions exist which are applicable to the State of Alaska’s system. The current software (Assure 1.2) is the recommended software revision. If the current vendor of the state’s election hardware develops and releases a new software version, and if this software is subsequently certified by the EAC, it is recommended that this software be analyzed for relevance to
the state’s system. If this analysis produces positive results it is recommended that the State adopt that new version of software.

**Hash Code Verification**

**Current Status**
Upon adopting the Assure 1.2 software version, the Division of Elections discovered that hash code verification was no longer possible using the National Software Reference Library (NSRL) website. Prior to adoption of the Assure 1.2 software the Division used the NSRL website to calculate hash codes for all software used in the system’s software. After installation and commissioning of Assure 1.2 the Division of Elections discovered that the NSRL website did not contain the required hash codes.

**Recommendations**
It is recommended that the Division of Elections contact EAC and inquire why Assure 1.2 software hash codes have not been posted to the NSRL website. At the time of this report, the Division of Elections has received the certified hash code from the EAC and has verified the new software. EAC indicated that they will get the required information to the NSRL.

**Password Management**
No password management recommendations exist for 2011. The Division of Elections has adopted all of the recommendations from the 2008 report. No further enhancements are recommended at this time regarding password security.

**Key Card Tool**
Premier Election Systems Key Card Tool software was adopted in 2008 for use with the AV-TSX voting machines. No new Key Card Tool software exists and thus no new recommendations are presented in this report regarding the Key Card Tool.

**Functionality and Logic and Accuracy Testing**
A complete set of functionality and logic and accuracy tests and procedures were presented in the 2008 report. Since an entirely new software revision has been adopted it is recommended that all of the functional and accuracy tests be revisited to ensure that the new software revision maintains all required functionality and continues to provide accurate results. Any functional tests that are no longer relevant or applicable should be removed or modified to ensure that each of the retained functional tests continue to provide useful results. Testing should be conducted to ensure that all results are accurate and are produced with the expected format and content.
Accu-Vote Touchscreen (AV-TSX)

Argonne National Laboratory Vulnerability Assessment Team (VAT) Exploit
A man-in-the-middle exploit recently exposed by the Argonne National Laboratory Vulnerability Assessment Team (VAT) is relevant to the State of Alaska's electronic voting system. This exploit relies upon an attacker gaining access to the Accu-Vote Touchscreen (AV-TSX) voting machine in order to install a relatively inexpensive piece of custom hardware that might be used to subvert election results. The exploit presented by the Argonne National Laboratory VAT could even be installed so that remote activation is possible. The vulnerability exploits the interface between the touchscreen and the CPU of the AV-TSX machine. Information entered by the touchscreen is transferred to the CPU via the ribbon cable shown in Figure 1.

Figure 1. Touchscreen to CPU Ribbon Cable

Upon reviewing the proposed attack it is the belief of the UAA research team that the addition of two additional tamper evident machine seals would sufficiently secure the machine integrity of the AV-TSX hardware. The exploit presented relies upon gaining internal access to the AV-TSX machine.

Disassembly of the voting hardware is achieved by splitting the plastic case. Currently a serialized tamper evident seal is utilized on the top of the machine to ensure that the case is not opened without authorization. The current seal is placed across the top section of the AV-TSX unit (see Figure 2).
Figure 2. AV-TSX Current Tamper Evident Seal Location

The UAA research team was able to remove the unit screws, open the AV-TSX case and replace the screws in less than 5 minutes. The individual performing the demonstration had no prior knowledge of unit disassembly and only a simple Phillips head screwdriver was required. The unsecure nature of the AV-TSX unit in polling places requires increased security. Figure 3 shows the AV-TSX unit screw locations. Removal of these eight (8) Phillips head screws is all that is required to gain access to the interior of the AV-TSX unit.
Figure 3. AV-TSX Disassembly Screw Locations

Gaining access to the touchscreen/CPU ribbon cable does not require the current tamper evident seal to be compromised. The tamper evident seal remains intact while the rogue hardware could be installed. Figure 4 shows the touchscreen portion being lifted from the base with sufficient clearance for interior access while the tamper evident seal remains intact.
The addition of two (2) additional seals (one on each side of the case, both seals crossing the midpoint where the case is split) is required to provide sufficient security from unauthorized access since in no case would the attacker be able to open the case without cutting or damaging the seal. Figures 5 and 6 show the suggested tamper evident seal locations to ensure that unauthorized access has not occurred.
Figure 5. AV-TSX Left Side

Figure 6. AV-TSX Right Side

Following the opening of the case the tamper evident seal on the top of the AV-TSX unit was inspected to ensure that the integrity of the seal was maintained. As can be seen in Figures 7 and 8, there is no evidence that the AV-TSX enclosure was opened.
Serial number verification of the tamper evident seals is crucial to the success of this method. All seal serial numbers must be reviewed and logged prior to and following each election to ensure that a security breach has not occurred while the machine was in storage or while the election was in progress.

**Recommendation**

The Division of Elections should add two additional serialized tamper evident seals, in addition to the existing serialized tamper evident seal (for a total of three). This is the most reasonable, cost effective way to ensure AV-TSX machine security in the State of Alaska. Total election outcome security is further enhanced by the fact that the statistical use of the AV-TSX machine in elections is generally 1% or less of the total votes tallied. Thus, even if an attacker were successful in implementing the exploit (which is extremely unlikely once the tamper evident seals have been installed), the attackers ability to affect election outcomes is limited. With these additional tamper evident seals, it is highly unlikely that such an attack could occur at a polling place on Election Day or otherwise. This additional security step requires verification of seal integrity before and after the election.

**End-End Ballot Security**

**Overview of Ballot Security**

The primary issue is voting **validity**. The election process is designed to assure that all voters’ choices are correctly counted. Several basic principles serve to assure that the ballot distribution process works correctly; beginning at the printing of the ballots to the ballots reaching the Division of Elections offices...
in Juneau following the election. DOE has developed procedures that are followed at all steps in the election process to assure that no eligible voters are disenfranchised, that all eligible votes are counted, that ineligible votes are not counted, and that no individual’s vote is counted more than once.

A report of the process steps was originally outlined in Appendix C: The State of Alaska Election Security Project Phase 2 Report (2008) in the following sections:

- Section 1.6 – Chain of Custody
- Section 1.9 – Redundancy
- Section 1.10 – Paper Ballot Tampering Vulnerabilities
- Appendix F: Ballot and Election Equipment Distribution and Chain of Possession

The accountability and control of the process is addressed here along with the details regarding the specific measures taken at each step to assure validity.

<table>
<thead>
<tr>
<th>LOCATION/TRANSFER</th>
<th>SECURITY MEASURES</th>
<th>RESPONSIBILITY</th>
<th>Notes</th>
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<tbody>
<tr>
<td>Ballot Printer</td>
<td>Ballots are sequentially numbered. Ballots are shrink-wrapped in quantities of 25. Sequence numbers are recorded. Packing lists document the sequence numbers, including which ballots are contained in each box for transport.</td>
<td>Printer</td>
<td>Creates ballots printed (with sequential numbers) according to ballot requirements and specifications submitted by DOE. The Alaskan print shop has a track record of high quality ballot printing.</td>
</tr>
<tr>
<td>Contract Courier Service or Direct Delivery by Printer</td>
<td>The ballot printer delivers the printed ballots for the Absentee Office and Region II Office. Ballots for Fairbanks, Juneau and Nome are shipped by the printer.</td>
<td>Printer and Transport Company</td>
<td>Ballots are shrink-wrapped and sealed in transported boxes.</td>
</tr>
<tr>
<td>DOE Regional Offices</td>
<td>Ballot bundles are inspected and assigned for shipment to election hubs or precinct officials.</td>
<td>DOE Staff</td>
<td>Election supervisors compare each package to the ballot order to verify all sequence numbers are received and packaged correctly for the assigned precinct location as specified on master ballot order. The ballot receipt is placed with ballots for transport to election officials. Ballot bundles are inspected and assigned for shipping to election hubs or precinct officials.</td>
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<tr>
<td>Election Hubs</td>
<td>Precinct chairperson verifies stub numbers match ballot receipt, signs receipt, and gives it to DOE. Ballot statement included in the election supplies includes the total number of ballots sent to the precinct and the stub numbers of the ballots.</td>
<td>Regional Election Supervisor</td>
<td>Anchorage, Fairbanks, Juneau, Mat-Su and Nome precincts pick up their ballots directly from DOE regional office. Ballots for all other precincts are mailed directly to precinct chairperson via USPS.</td>
</tr>
<tr>
<td>United States Postal Service (USPS)</td>
<td>All ballot packages are sealed and contain ballot receipt that election officials sign and return to DOE.</td>
<td>USPS</td>
<td>Ballots shipped via USPS include delivery confirmation and are sent separate from all other election materials. Ballot receipt is included with the ballots.</td>
</tr>
<tr>
<td>Election Officials</td>
<td>Ballots are not delivered to the polling place until election morning. Chairperson is instructed to verify ballot stub numbers against their receipt and keep ballots in secure location until being transferred to polling station. Quantity of ballots and stub numbers are also included on ballot statement that is sent to election board separately. The ballot numbers are compared to the numbers recorded on the precinct register prior to the opening of the polls.</td>
<td>Precinct Election Board Chairperson</td>
<td>Chairperson holds ballots until Election Day.</td>
</tr>
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<tr>
<td>Polling Station</td>
<td>After polls close, the bipartisan election board opens the ballot box and removes the voted ballots. Regular voted ballots are sealed in special tamper-evident Tyvek™ envelopes and workers are instructed to sign across the seal. Voted ballots are mailed directly from the precinct chairperson to the Director’s Office in Juneau from all precincts except those delivered to hub locations or directly to a DOE office. Questioned and special needs ballots are mailed to the regional election supervisor for counting. Unused and damaged ballots are destroyed at the precincts.</td>
<td>Bi-Partisan precinct election board consisting of approximately 3-7 election officials.</td>
<td>After the poll is closed, the election board completes the ballot statement which accounts for how ballots were used. The ballot statement shows the number of voters signing the register, number of questioned ballots issued, the number of special needs ballots issued, and the number of spoiled ballots. Tallying (or these up provides a total number of ballots issued in each precinct. The ballot statement also includes an area where the election board records the first unused ballot stub number and the starting stub number. The starting number is subtracted from the first unused to get the total number of ballots used. The total used is then compared to the total issued to verify they match. The voted ballots are then secured for transport to the Division of Elections. (See note below).</td>
</tr>
<tr>
<td>Regional Office</td>
<td>The voted ballots are secured in sealed tamper-evident Tyvek™ envelopes. Ballots from Anchorage, Mat-Su and Fairbanks are then placed in canvas transport bags that are secured with cable tie. Upon arriving at the regional office, regions complete a receiving log and give the transport bags to the secure courier who provides chain of custody documentation to DOE.</td>
<td>Precinct election officials, DOE Regional Offices and Secure Courier</td>
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<tr>
<td>Secure Courier</td>
<td>Secure courier keeps ballots locked in alarmed area until delivered to delivery contractor. Chain of custody document maintained showing number of pieces, weight, airline moves and billing. Ballots from Wasilla are maintained with Anchorage ballots. Ballots from Fairbanks and Anchorage are placed in reserved igloo from Alaska Airlines to eliminate the possibility of being delayed. Ballots from Juneau Region I office are delivered to the Director's office. Secure contractor provides chain of custody.</td>
<td>Secure contractor and delivery contractor</td>
<td>Questioned, absentee and special needs ballots are reviewed and counted at the regional elections offices. The counted ballots are placed inside sealed, tamper-evident Tyvek™ envelopes and placed in boxes for transport by secure courier to the DOE ballot storage facility. Secure courier provides chain of custody with each delivery.</td>
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<tr>
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<td>DOE Director’s Office Juneau</td>
<td>As ballots arrive at the Director's office, DOE staff checks in each transport bag on a ballot log. The log indicates the district/precinct, precinct name and the number of voted ballot envelopes. The sealed voted ballot envelopes are then placed in labeled archive boxes in district/precinct order. The room used to store ballots is alarmed and all ballot envelopes are sealed. Access to ballot storage room is limited to authorized DOE personnel. After the election is certified, ballots used in a federal election are archived for 22 months at the State Archive location in Juneau.</td>
<td>DOE staff</td>
<td>Ballots from all locations in the state are secured and stored in the DOE ballot room until archived. If a recount of ballots is held off-site, a secure contractor is hired to deliver ballot, sealed inside voted ballots envelopes and placed in sealed archive boxes, to the counting facility. Each time ballots are removed from the storage room, a log is signed off showing which ballots were removed. When the ballots arrive at the counting location, they are verified against the log signed off when the ballots were removed from storage room. Again, the log is signed indicating all ballots arrived at counting locations. When ballots are transported from the counting location back to storage room, another log is completed and signed off before leaving the counting facility. Upon arriving back at the DOE ballot storage room, again the ballots are verified and signed off that all were transported back.</td>
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**NOTE:** There are 305 precincts that use an optical scan to count ballots throughout the day as the voters insert their ballot into the ballot box. When the polls close, the election board ends voting on the optical scan and the optical scan prints the election results for the precinct. The election board signs two copies of the results tape and immediately transmits results to the State’s ballot tabulation system. One copy of the printed results is placed with the memory card and one copy is placed with the precinct register and ballot statement. Ballots from these precincts are immediately sealed in the tamper-evident Tyvek™ envelopes since they have already been counted. A total of 133 precincts hand-count their ballots. The ballots from these precincts must be tallied by the bipartisan election board before being sealed in the tamper-evident Tyvek™ envelopes. The election board signs the certificate of counting on the tally book.
The unused ballots from all precincts except Anchorage, Fairbanks, Juneau, and Wasilla are destroyed by the election board after the polls close. Unused ballots from precincts in Anchorage, Fairbanks, Juneau, and Wasilla are returned to the regional office for destruction. Unused ballots in these locations are kept in secured location separate from all other materials and are destroyed after the election.

The Division of Elections carries out the election process as specified by State of Alaska Statutes, and administrative procedures are established to coordinate the control of ballots throughout the election. The challenges faced in an election are mitigated by following procedures, and relying on experienced DOE staff and volunteers who serve in several capacities as poll workers, election board members, and support staff.

As required by state statute and as established by the Division of Elections procedures for completing an election cycle, the procedure followed to keep the voting process under control has been carefully considered. These procedures were outlined in documents provided by DOE. This same procedural information is outlined in staff and volunteer training prior to Election Day.

When polls close on Election Day, 305 of 438 precincts (representing 95% of voted ballots) report their results electronically. Currently, unused ballots are either returned to regional offices along with other election material or destroyed at local precincts. The unused ballots returned to the regional offices are completely segregated from voted ballots, placed in secure storage and later shredded. The voted ballots are sent to Juneau where there is an independent validation of the electronic record (for optical scan precincts) and the register. At that point, if there is a significant difference between the number of people who voted (as recorded in the register) and the electronic tally, a “red flag” would be triggered. The stub numbers for voted ballots are recorded and certified at each precinct at the close of the election. The total number of spoiled or unused ballots is also recorded. In Juneau, the independent validation of the registry (number of people who voted), the actual number of paper ballots, and the electronic record are independently verified and then compared for accuracy. A similar “red flag” would be triggered if a significant number of ballots were used and scanned compared to the actual number of voters in an optical scan district, or if a hand-count precinct (133 precincts representing 5% of voted ballots) recorded a significant discrepancy between the number of voted ballots and the number of ballots used (ballots either voted or spoiled).

In hand-count precincts, the entire bi-partisan precinct board would have to work in collusion in order to replace voted ballots with fraudulently marked “unused” ballots and to falsify the ballot statement. The independent verification of the election material (registry, voted paper ballots, and ballot statement) in Juneau would likely reveal any such discrepancies, and would prompt further scrutiny and action.

Returning all unvoted ballots to Juneau could eliminate this risk, however, since all voted ballots are also returned to Juneau, new risks might be introduced by having all voted and unused ballots in the same location. In addition to security risks that could result from returning all unused ballots to Juneau, it is also very costly (transportation and storage).
Recommendations

The voted ballots are handled as outlined in this section with the chain of custody and responsibilities as described. Currently, the unused and spoiled ballots at the remote polling locations are destroyed as part of the procedures after the polls are closed. Unused ballots from optical scan precincts in Anchorage, Fairbanks, Juneau and Wasilla are returned to the regional office where they are kept segregated from voted ballots and destroyed. Because the unused ballots in these locations are kept in secured locations separate from all other materials and are destroyed after the election, there is no chance that they can re-enter the election process.

There is little risk of ballot tampering because there are duplicate and independent tallies of the results from the voting machines and the transmitted results. Any subsequent discrepancies would be a "red flag" regarding the counts. In the case of the 133 precincts where the voting is compiled by hand-count, the immediate tally is also transmitted by phone to preclude any changes occurring.

In order to further secure the unvoted ballots and mitigate the risk of fraudulently marked unvoted ballots entering the election system, we recommend that the full board of election officials in optical scan precincts record, certify and sign-off the remaining unused and spoiled ballot stub numbers and secure the unused and spoiled ballots in boxes with tamper evident seals BEFORE the voted ballot boxes are opened. Further, the precincts should seal the boxes of unvoted/spoiled ballots with tamper evident seals prior to returning them to the regional offices. If a precinct attempts to deliver unused ballots to the regional office in an unsealed box, the regional office election staff should require them to account for the unused ballots and seal the box. Those sealed boxes returned to the regional offices will then be transferred to an external agency (e.g., Shred Alaska) for destruction following certification. In hand count precincts we recommend that the unused and spoiled ballot stub numbers be recorded, certified and signed off by the full precinct board, and the unvoted/spoiled ballots be destroyed BEFORE opening the voted ballot box. This additional recording, certification, and sign-off of the ballot statement, including the unvoted and spoiled ballots, will add the same level of formality and accountability for unvoted and spoiled ballots as for voted ballots. This action will cause a short delay in counting voted ballots, but will improve the security of the process. The Division of Elections should include these instructions in training materials, procedures and checklists for poll workers prior to and on Election Day.

In both optical scan and hand-count precincts, the unused/spoiled ballots should be processed or destroyed prior to opening the voted ballot boxes. This additional step will ensure that no fraudulently completed or spoiled ballots can become comingled with or replace secured voted ballots.

Further, we recommend that the division also seal (using tamper evident tape) the “banker boxes” that are used to transport the sealed voted ballot packages within the Juneau office for further hand-count verification. This step would ensure that no inadvertent packages of voted ballots could be inserted into the boxes. The seal for the box and the subsequent seals of the envelopes inside could be broken under appropriate supervision at the proper point in the hand-count verification process.
Post-election Audit and Hand Count Procedures

The purpose of the post-election audits is to verify results and maintain public trust. Audits do this by independently verifying that the machine counts were correct and confirming that a manual recount would not change the outcome. In the following section, we describe the process for counting absentee, questioned, and early vote ballots. We also discuss the role of the State Review Board and the hand-count verification process in validating election results.

Absentee and Early Voting

Absentee voting is a major component of the election process. In the 2010 general election, 21% of voters voted absentee or early ballots. There are two broad categories of absentee voting. The first category includes absentee by mail, fax, and special advanced requests. The second category is called “in-person absentee.” It includes special needs voting, early voting, and absentee in person voting.

Absentee and early voting can begin 15 days prior to Election Day. Absentee and early ballots are issued at the house district level, not at the precinct level because the division’s existing voter registration and election management (VREMS) database is programmed and designed to track absentee and early ballots by house district.

When the regional office receives voted absentee ballots, they record the daily total on a spreadsheet. Regional staff record that a voted ballot was received on each voter’s record in VREMS. Each ballot entered is assigned a sequence number. A count report is produced from VREMS showing the total number of ballots entered. After ballots are logged into VREMS, the bipartisan Absentee Ballot Review Board (ARB) reviews the ballots and records on their audit logs the number of ballots reviewed and the type of count (full count, partial count, or rejected ballot). The voted ballots that are eligible for counting are given to the Regional Accu-Vote Board (RAB) for counting and inclusion into the election results.

Before the ARB begins to count absentee and early ballots, the division conducts a duplicate analysis to verify that the voter did not vote more than once. The division cannot conduct the duplicate analysis until they have updated all voter history from the precinct registers used in the polling places. Once the division has manually updated all voter history, they can begin to open and count the absentee ballots. AS 15.20.201 requires that all absentee ballots be reviewed, opened, and counted by the 15th day after the election.

Having this system to manage absentee and early ballots by house district allows the division to verify that the number of ballots accepted for counting matches the number of actual ballots reported in the election results. This is critical to the integrity of the ballot accountability process.

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1 258,746 people voted in the 2010 General Election. Of these, 192,978 voted in-person at the polling place in their precinct; 40,834(16%) voted an absentee ballot; 13,246(5%) voted an early ballot; and 11,688 (4%) voted a questioned ballot.
Accounting for Absentee/Questioned Ballots
Ensuring that all absentee, questioned, and early voted ballots are counted is a three part process — receive, review, and count. Each step is performed independently to provide a check and balance which ensures that all ballots are accounted for.
Summary of Absentee, Questioned and Early Voting Ballot Checks

Each of the four regional offices receives voted ballots from their region. Absentee ballots can be received daily before an election through the 15th day following Election Day. The daily total is recorded on a spreadsheet. Questioned ballots are only received one time (after Election Day) and are recorded on the audit log. The total number of ballots received is verified by the Questioned Ballot Review Board (QRB).

Regional election staff enter that a voted ballot was received into each voter’s record in the division’s Voter Registration and Election Management System (VREMS). Each ballot entered is assigned a sequence number. A count report is produced from VREMS showing the total number of ballots entered for both absentee and questioned ballots.

After ballots are logged into VREMS, the bipartisan QRB and Absentee Ballot Review Board (ARB) review the ballots and record on their audit logs the number of ballots reviewed and type of count (full count, partial count, or rejected ballots). Each of these processes—VREMS and the audit logs—produce independent results that can be compared to assure that the number of ballots voted is the same as the number reviewed.
The voted ballots that are eligible for counting are given to the Regional Accu-Vote Board (RAB) for counting and inclusion into the election results. The election results are then sent to the State Review Board (SRB) along with all the other election materials so that the board can complete the statewide election audit.

**Review Boards**

The integrity of post-election procedures is established when all the independent processes come together and balance. To ensure the integrity of the system, the State of Alaska by Statute has provided for bipartisan review boards at both the regional and state level. The ARB, QRB, and the RAB operate at the regional level. The SRB in Juneau is the final check prior to certification of the election. In addition to auditing the paper ballots and the electronic counts, the SRB conducts hand-count verifications for each of the 40 House districts to make sure that the election results are correct. We describe these review boards and hand-count verification procedures below. Together they establish that the election is verifiable and that the public can be confident of the outcome.

**Absentee Ballot and Questioned Ballot Review Boards**

Thirty days before the election, each regional election supervisor appoints an ARB and a QRB for each district in the region. Under AS 15.20.190, each board must be composed of at least four members. The board members work in bi-partisan teams of two when reviewing ballots. Team members must be from different political affiliations. Each team will review ballots one district at a time. The teams review ballots using the absentee ballot register or the questioned ballot register. During the review process, observers who represent a candidate or a ballot issue may be present. Ballot review begins seven days before Election Day for absentee ballots, and two days after Election Day for questioned ballots. Counting of the questioned and absentee ballots that have been reviewed begins after Election Day as soon as election workers have updated the voter registration records and completed their duplicate analysis to ensure that no one has cast more than one vote. All ballots received must be reviewed and counted by the 15th day following the election (AS 15.20.201).

The review board is responsible for the following:

- Verifying ballots are stored in a secure location with limited access.
- Reviewing each voted ballot envelope to determine whether the voter is qualified to vote and if the ballot was properly cast.
- Verifying that the appropriate accept or reject code has been assigned to the ballot and that there is a ballot envelope for each voter appearing on the absentee ballot register.
- Maintaining ballot accountability and verifying that the number of ballots received equals the number of ballots reviewed and counted. Each ballot entered into VREMS must be accounted for.

In addition to the absentee and questioned ballots, there are early voted ballots in each region. Early voted ballots are issued beginning 15 days prior to the election at the Regional Voting Station. At the time of voting, the voting station official enters the ballot on the voter record in VREMS. VREMS keeps track of each voter and the number of ballots issued.
At the end of each day, the voting station completes an absentee ballot accountability report showing the number of early ballots issued. The accountability report is compared to the VREMS early vote count report to make sure the number of ballots match.

When the voting period is over, a final VREMS report is printed showing the number of early ballots received. The early voted ballots are then given to the Regional Accu-Vote Board for counting and inclusion into the elections results.

**Regional Accu-Vote Board**

The election supervisor in each region also appoints a bipartisan Regional Accu-Vote Review Board (RAB) made up of no more than eight members. No more than two members may be of the same political party. The RAB is responsible for overseeing the counting of absentee and questioned ballots and for assisting the division in pre-election testing processes (6 AAC 25.030).

The voted ballots that are eligible for counting in each region are given to the Regional Accu-Vote Boards for counting and inclusion into the election results.

**State Review Board**

The director of the division appoints the State Review Board (SRB) at least 30 days before the election. Alaska Statutes require the director to review the counting of the ballots with the assistance of and in the presence of the appointed representatives from the political parties. The State Review Board (SRB) is a bipartisan review board made up of at least 8 members for primary and general elections, and at least 4-6 members for state conducted local elections. The SRB is responsible for testing the ballot count programming prior to the election. No later than 16 days after the election, the SRB is required to begin the review all precinct registers, absentee site documentation, absentee and questioned voter registers, tally sheets, and ballot tabulation tapes to ensure that reported election returns are accurate and complete (AS 15.15.420-450).

Completing the audit of statewide election returns involves a review and comparison of the election results reported on the district statement of votes cast (SOVC) report printed from GEMS with the information provided on precinct registers, absentee documents, questioned registers, tally sheets, and other materials to assure that they are accurate.

Prior to certifying the election the SRB also conducts a hand-count verification in at least one precinct in each of the 40 House districts in the state. The selected precinct must account for at least 5% of the ballots voted in that district.

**Hand-count Verification Process – Additional Requirement for Verification**

In 2005 the Alaska Legislature — in response to the heightened public scrutiny of electronic voting and the passage of the Help America Vote Act (HAVA) — set out the procedure for the hand-count
verification process in AS 15.15.30. Hand-count verification is performed on one randomly selected precinct in each of the 40 house districts. The precinct selected must account for at least 5% of the votes cast in the district as reported election night. This requirement ensures that the selected sample size is large enough to be statistically significant but not so large that hand-counting votes delays certification of election results.

DOE staff determines which precincts in each district represent 5% of ballots cast in that district. DOE staff then writes the numbers of the qualifying precincts on pieces of paper and put these in envelopes by district. Two bi-partisan SRB review board members select the random sample by drawing a precinct for each district. The ballots in the selected precincts are then hand-counted by about 40 election workers. If there is a discrepancy of greater than 1%, the entire district is recounted by hand. There has never been a discrepancy of 1% during the 6 years that this statute has been in effect. All the discrepancies that the division has found have been caused by marginally marked ballots. If a voter does not completely fill in an oval on the ballot, the optical scan machine at the election precincts might not detect the vote on Election Day. This is why the Division of Elections reminds voters in the voting booth to completely fill in the oval in order to make sure that their vote is counted.

Alaska began hand-counting ballots for these audits in 2006, shortly after the legislature unanimously passed H.B. 459 and signed it into law (2005). At that time, Alaska was only the sixth state in the nation to commit to using the manual audit. In 2008, at the time of the last report, Alaska was one of only 12 states (Norden 2007) to routinely conduct post-election manual audits to verify whether electronic and mechanical voting equipment was properly counting, recording, and storing voting information. In 2011, according to the Verified Voting Foundation (www.verifiedvoting.org), there are at least 21 states that have passed similar legislation requiring post-election manual hand counts of voter-verified paper records (VVPR) for their audits. But not all audits work like Alaska’s. Some states sample 1% of all precincts. In Florida, the audit follows election certification, and some states randomly select a larger proportion of precincts, but only audit one result. California has plans to test alternative sample size and audit methodologies but it is uncertain when that research will take place and if the results would have any applicability in a small population state like Alaska.

It is important to take into account the unique characteristics of Alaska when comparing it to other states. Alaska has a statewide election system with uniform procedures and a small and geographically diverse population. When the Alaska legislature included the current sampling system in the Alaska Statutes, they balanced the importance of having a sample size large enough to detect any potential error in the ballot count with the practical consideration of not hand-counting so many votes that the verification procedure would unduly delay certification of elections results.

The current system reflects the intent of the legislature and ensures that Alaska’s random selection process is transparent since observers only need to go to one place to witness the audit by the State

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2 Prior to the passage of AS 15.15.430 in 2005, the Division of Elections had been hand-counting votes to verify electronic counts in races where a recount was required. These recounts never demonstrated a discrepancy of 1% and the discrepancies were always because of marginally marked ballots.
Review Board. Current reported research, along with the fact that there has never been a discrepancy of 1% since the statute has been in effect, indicates that the current system is working.

**Precinct Election Boards**
Precinct Election Boards are the core of the electoral process. The regional supervisors begin recruiting election workers to serve on bipartisan precinct election boards around March of every election year. The election supervisor appoints a chairperson for each board, and the chairperson then helps the division to recruit registered voters to serve on the precinct board (AS 15.10.120). The precinct board usually consists of about 3 to 7 election workers.

Election worker recruitment is one of the more time consuming tasks in conducting a successful election. There is a precinct election board for each of the 438 precincts in the state. As part of the recruitment process, the division notifies the political parties that they are eligible to nominate election workers for each precinct election board. These nominations must be made by April 15<sup>th</sup> of an election year. The election supervisor appoints one nominee from the governor’s political party and one from the party that received the second highest number of votes in the last statewide election.

Political parties do not always nominate election board members for every precinct. In the 2010 election, there were occasions when a board was composed entirely of non-affiliated election workers.

Precinct election board members attend regional training offered by the Division of Election before Election Day. Board members are paid for the time they spend at training. On Election Day, they operate the polling place. This includes setting up equipment, assisting voters, checking voter identification, making sure voter’s sign the precinct register, and ensuring that ballots are confidential and voters have placed their ballots in the optical scan machines or the ballot box. After the polls close, these election workers are also responsible for counting ballots in hand-count precincts. All precinct workers must be sure that all ballots and registers are returned to their regional office on election night.

**Real-time Voter History Solutions Descriptions and Evaluation (See Appendix E: Real-time Voter History Solution Evaluation)**

**Voter Eligibility**

**Eligible Voters**
Article V of the Alaska Constitution gives every citizen of the United States, who is 18 years old and has registered to vote in Alaska at least 30 days before an election, the right to vote in any state or local election. Qualification and registration of voters is further described in AS 15.05.010-15.07.200.

**Ineligible Voters**
The division’s responsibility under the law is to enfranchise voters and make sure that their vote counts. If the person’s name is on the precinct register, he or she is allowed to vote. If there is a doubt with
regard to eligibility, they will be asked to vote a questioned ballot and the reason will be written on the ballot envelope. The information provided by voters is signed under penalty of perjury. The Division of Elections does not question the information provided by voters. However, when information is brought to the Division’s attention regarding voter eligibility, the Division reviews this information and can make a determination regarding eligibility.

Felons
A person convicted of a crime that is considered a felony involving moral turpitude under state or federal law may not vote unless he or she has completed the sentence, including probation or parole (AS 15.05.030). Alaska’s restriction on voters with felony convictions is not a lifetime ban. Any person who is unconditionally discharged, can re-register to vote. The division is required to make reasonable efforts to obtain names of convicted persons (AS 15.07.135(b)).

The division has a process in place to remove voters that have been convicted of a felony involving moral turpitude. According to Alaska Statute, nearly all felonies involve moral turpitude. The Division regularly receives electronic information from the Alaska Corrections Offender Management System (ACOMS) relating to convicted state felons. Using the ACOMS data, DOE staff matches offenders on the ACOMS list with voter registration files. If a registered voter is convicted of a felony involving moral turpitude, the division inactivates the voter registration record. When the courts unconditionally discharge a felon following completion of a sentence, the division and the voter receive a Notification of Restoration of Voting Rights. The division indicates on the voter registration record that the voter has been discharged and the voter is then eligible to re-register to vote.

The division matches ACOMS and voter registration data, at a minimum, on a monthly basis. The most difficult time to perform this match is immediately prior to generating the precinct registers needed to conduct an election. Registers must be created approximately three weeks prior to an election so the division has time to distribute the paper registers throughout the state. Since registration activity is the highest at the 30-day registration deadline for an election, staff resources are busy with processing registration applications received on or before the registration deadline so registers can be created. If the felon list from ACOMS is not processed immediately prior to the registers being created, or if a person is convicted of a felony between the time the register is created and Election Day, there is a

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3 "Felons involving moral turpitude" include those crimes that are immoral or wrong in themselves such as murder, manslaughter, assault, sexual assault, sexual abuse of a minor, unlawful exploitation of a minor, robbery, extortion, coercion, kidnapping, incest, arson, burglary, theft, forgery, criminal possession of a forgery device, offering a false instrument for recording, scheme to defraud, falsifying business records, commercial bribe receiving, commercial bribery, bribery, receiving a bribe, perjury, perjury by inconsistent statements, endangering the welfare of a minor, escape, promoting contraband, interference with official proceedings, receiving a bribe by a witness or a juror, jury tampering, misconduct by a juror, tampering with physical evidence, hindering prosecution, terroristic threatening, riot, criminal possession of explosives, unlawful furnishing of explosives, promoting prostitution, criminal mischief, misconduct involving a controlled substance or an imitation controlled substance, permitting an escape, promoting gambling, possession of gambling records, distribution of child pornography, and possession of child pornography.
possibility that convicted felons could appear on the register and vote. However, nearly all felons convicted of crimes of moral turpitude are incarcerated following their conviction and are not available to vote.

Although there is a possibility for a convicted felon to appear on the register if the person was convicted in the timeframe after the register is created and before Election Day, the number of potential felons is quite low compared to the statewide number of registered voters. In 2010, on average, the division inactivated approximately 25 registered voters each time the ACOMS list was matched with VREMS. By processing the ACOMS list immediately before generating registers, the number of potential state felons that appear on the register and have the opportunity to vote is less than .005%.

In addition to the ACOMS list, the division receives notices of federal felony convictions from the U.S. District Court. Like the ACOMS list, the division looks up each name on the federal felon list in the VREMS to determine if the person is a registered voter. If the person is a registered voter, the division inactivates the record if the person is convicted of a federal felony involving moral turpitude. However, the division does not have direct access to the federal felon database so must rely upon the federal court staff to provide the notices.

The division is dependent upon the ACOMS data provided by the Division of Corrections and information provided by the U.S. District Court when staff removes felons from the voter registration rolls. If the data provided to the division is current and accurate, and the division processes the data quickly and before the precinct registers are created, the probability that a convicted felon remains registered and votes is very low.

**Recommendations**
Division procedures are adequate to prevent felons convicted of crimes of moral turpitude from voting. The division should continue their efforts to strengthen integration of data sources with state and federal courts and the Department of Corrections.

**Non-U.S. Citizens**
Alaska requires a prospective voter to sign an affidavit attesting to his or her citizenship in the United States. When a voter registers to vote before a registrar, they must show identification. If no identification is provided, the registrar notes on the registration form that no ID was presented. When the division processes this form, the voter’s identity is verified through the Division of Motor Vehicles (DMV) database and/or through a direct application between DMV and the Social Security Administration (SSA). When a voter registers to vote by mail, their identity is also verified through these databases.

If the identity of a voter cannot be verified through either the DMV or SSA databases, the division notation appears next to the voter’s name on the precinct register that the voter must show identification prior to voting. A voter who is personally known by an election worker cannot have the identification requirement waived if this notation is next to the voter’s name on the precinct register.
If the division receives information that a voter is not qualified because they are not a U.S. citizen, the division requests verification of U.S. citizenship through the voter and/or the Immigration and Naturalization Service. If it is found that the voter is not a U.S. citizen, the division will inactivate the voter registration record.

Federal law — the National Voter Registration Act — allows voters to register without documentation but stipulates that lying about citizenship is perjury.

In Alaska you can get a driver’s license or a Permanent Fund Dividend (PFD) without being a United States citizen. You are encouraged to register to vote at the Department of Motor Vehicles and so occasionally a non-U.S. citizen does register to vote there. The PFD application asks you if you are a U.S citizen. The division now has an agreement with the Department of Revenue to match data with the PFD database to determine if a voter has declared that he or she is not a U.S. citizen on the PFD application.

In 2011, the division did a data match of the PFD database and the statewide voter registration list to ensure that the voter rolls contained only the names of eligible voters. Out of 487,162 registered voters, the division found only 380 individuals who marked on the PFD application that they were not U.S. citizens. The division mailed a letter to all PFD applicants who indicated they were not U.S. citizens on their application form. The divisions included a cancellation form with the letter so the applicant could cancel his voter registration if he was not a citizen. As of September 28, 2011, the division has received 153 responses from voters confirming that they are U.S. citizens. Many stated that they became citizens after they applied for the PFD. Seventy-five people responded that they were not U.S. citizens and requested that their voter registration be cancelled.

The division also has an informal agreement with the U.S. Immigration and Naturalization Service in Alaska to receive names from INS once an immigration case is concluded. The division then sends those voters a notice telling them they may not vote if they are not U.S. citizens.

In addition, the division provides the Alaska Voter Statewide voter list to the federal courts for jury selection. If jurors say they are not U.S. citizens in their response to a notice of jury duty, the court will send their name to the division of elections and the division will contact them to confirm their status.

Other Ineligible Voters
The division has matched the states voter registration list with the state of Washington to see if there are duplicates. The division then wrote to the voters to tell them that they are registered in both states and to ask them to notify the Alaska Division of Elections if they no longer wish to be registered to vote in Alaska. The last time the division did a match, 65.7% of the identified voters wrote back to cancel their registrations. The Division also performed a similar match with the State of Oregon and sent a notice to voters registered in both states. 65.6% of the voters notified in the Oregon match responded to cancel their registrations.

The division actively looks for information on deceased voters. They receive a monthly list from the Alaska Bureau of Vital Statistics. Staff members check obituaries every day and also receive notifications
from family members and election workers. The national Social Security database is so large that it is impractical for the division to match it with VREMS.

**Poll Worker Training**
Poll worker training was not included in the scope of work for this report.

**Confidence in Outcomes**
Division processes for handling public comment are not included in the scope of work for this report.
Summary Recommendations

Equipment Security

Assure 1.2

No new software revisions exist which are applicable to the State of Alaska’s system. The current software (Assure 1.2) is the recommended software revision. If the current vendor of the state’s election hardware develops and releases a new software version, and if this software is subsequently certified by the EAC, it is recommended that this software be analyzed for relevance to the state’s system. If this analysis produces positive results it is recommended that the State adopt that new version of software.

Hash code Verification

It is recommended that the Division of Elections contact Dominion Voting (formally Diebold/Premier Election Systems) and investigate reasons why Assure 1.2 software hash codes have not been posted to the NSRL website. At the time of this report, the Division of Elections has received the hash code from the vendor and has verified the new software. They have also contacted EAC and reported the issue. EAC indicated that they will get the required information to the NRSL.

AV-TSX Touchscreen System Tamper Evident Seals

The Division of Elections should add two additional serialized tamper evident seals, in addition to the existing serialized tamper evident seal (for a total of three), is the most reasonable, cost effective way to ensure AV-TSX machine security in the State of Alaska. Total election outcome security is further enhanced by the fact that the statistical use of the AV-TSX machine in elections is generally 1% or less of the total votes tallied. Thus, even if an attacker were successful in implementing the exploit (which is extremely unlikely once the tamper evident seals have been installed), the attackers ability to affect election outcomes is limited.

End-End Ballot Security

The voted ballots are handled as outlined in that section of this document with the chain of possession and responsibilities as described. Currently, the unused and spoiled ballots at the remote polling locations are destroyed as part of the procedures after the polls are closed. Unused ballots from optical scan precincts in Anchorage, Fairbanks, Juneau and Wasilla are returned to the regional office where they are kept segregated from voted ballots and destroyed. Because the unused ballots in these locations are kept in secured locations separate from all other materials and are destroyed after the election, there is no chance that they can re-enter the election process.

There is little risk of ballot tampering because there are duplicate and independent tallies of the results from the voting machines and the transmitted results. Any subsequent discrepancies would be a "red flag" regarding the counts. In the case of the 133 precincts where the voting is compiled by hand-count, the immediate tally is also transmitted by phone to preclude any changes occurring.
In order to further secure the unvoted ballots and mitigate the risk of fraudulently marked unvoted ballots entering the election system, we recommend that the full board of election officials in optical scan precincts record, certify and sign-off the remaining unused and spoiled ballot stub numbers and secure the unused and spoiled ballots in boxes with tamper evident seals BEFORE the voted ballot boxes are opened. Further, the precincts should seal the boxes of unvoted/spoiled ballots with tamper evident seals prior to returning them to the regional offices. If a precinct attempts to deliver unused ballots to the regional office in an unsealed box, the regional office election staff should require them to account for the unused ballots and seal the box. Those sealed boxes returned to the regional offices should then be transferred to an external agency (e.g., Shred Alaska) for final destruction following certification. In hand count precincts we recommend that the unused and spoiled ballot stub numbers be recorded, certified and signed off by the full precinct board, and the unvoted/spoiled ballots be destroyed BEFORE opening the voted ballot box. This additional recording, certification, and sign-off of the ballot statement, including the unvoted and spoiled ballots, will add the same level of formality and accountability for unvoted and spoiled ballots as for voted ballots. This action will cause a short delay in counting voted ballots, but will improve the security of the process. The Division of Elections should include these instructions in training materials, procedures and checklists for poll workers prior to and on Election Day.

In both optical scan and hand-count precincts, the unused/spoiled ballots should be processed or destroyed prior to opening the voted ballot boxes. This additional step will ensure that no fraudulently completed or spoiled ballots can become comingled with or replace secured voted ballots.

Further, we recommend that the division also seal (using tamper evident tape) the “banker boxes” that are used to transport the sealed voted ballot packages within the Juneau office for further hand-count verification. This step would ensure that no inadvertent packages of voted ballots could be inserted into the boxes. The seal for the box and the subsequent seals of the envelopes inside could be broken under appropriate supervision at the proper point in the hand-count verification process.

Real-time Voter History Solutions (See Appendix E: Real-time Voter History Solution Evaluation)

Voter Eligibility
Division procedures are adequate to prevent felons convicted of crimes of moral turpitude from voting. The division should continue their efforts to strengthen integration of data sources with state and federal courts and the Department of Corrections.

Election Process Auditability Checklist
Maintain a comprehensive election auditability checklist before, during, and after each election to demonstrate that all election procedures have been implemented and have been reviewed by the proper level of authority. An example of this checklist can be found in Appendix F: Election Process Auditability Checklist.
Recommendations for Future Study

The team recommends that the Division of Elections conduct a study to develop a comprehensive long-term voting technology plan for Alaska including a phased migration from existing equipment to newer technologies and platforms and an upgrade of the statewide voter registration system. In the context of that longer term strategy, the Division should further evaluate the benefits of epollbook solutions including RTVH capabilities. In order to ensure that Alaska continues to provide a secure, participative, and effective election system into the future, this research could also explore the implications of emerging technologies on current election processes, evolving security risks, voter participation and perception, as well as the impacts on recruitment and training of future election officials and poll workers.

Appendix A: Glossary of Acronyms in Report

Appendix B: 2010 General Election Review, April 1, 2011


Appendix D: Division of Elections: Election Process Review Statement of Work

Appendix E: Real-time Voter History (RTVH) Solution Evaluation

Appendix F: Election Process Auditability Checklist