



**PUBLIC COMMENT ON
THE VOTING SYSTEM PILOT PROGRAM TESTING &
CERTIFICATION MANUAL***

**Submitted to
The United States Election Assistance Commission**

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1 Introduction

1.1 ACCURATE Background

A Center for Correct, Usable, Reliable, Auditable and Transparent Elections (ACCURATE),¹ a multi-institution, interdisciplinary, academic research center funded by the National Science Foundation's (NSF) "CyberTrust Program,"² appreciates the opportunity to provide these comments on the draft *Voting System Pilot Program Testing & Certification Manual*³ to the Election Assistance Commission.

ACCURATE was established in 2005 to conduct fundamental research into methods for improving voting technology. ACCURATE's Principal Investigators direct research investigating software architecture, tamper-resistant hardware, cryptographic protocols and verification systems as applied to electronic voting systems. Additionally, ACCURATE evaluates voting system usability and how public policy, in combination with technology, can better support elections.

Since receiving NSF funding in 2005, ACCURATE has made many important contributions to the science and policy of electronic voting.⁴ With experts in computer science, systems, security, usability, and technology policy, and knowledge of election technology, procedure, law and practice, ACCURATE is uniquely positioned to provide helpful guidance to the EAC as it attempts to strengthen the specifications and requirements that ensure the functionality, accessibility, security, privacy and trustworthiness of our voting technology.

1.2 Overview of the Voting System Pilot Program Testing & Certification Manual

The draft *Voting System Pilot Program Testing & Certification Manual*⁵ ("VSPPTC Manual", or "the Draft Manual") would establish a new path to federal certification, outside of the existing testing and certification program governed by the *Testing and Certification Program Manual*⁶ ("TCP Manual"). ACCURATE submitted a public comment on the *TCP Manual* in 2006,⁷ and much of that commentary still stands, particularly regarding how to handle trade secrets in materials submitted by manufacturers and in VSTL materials.⁸ This document focuses on the special demands—and opportunities—of pilot projects.

The Draft Manual would administer conformance testing to an unspecified and apparently open-ended set of pilot program standards.⁹ The current testing and certification, by contrast, is tied to the Voluntary Voting System Guidelines (VVSG). (For this reason, we refer to the current program

¹See: <http://www.accurate-voting.org/>.

²National Science Foundation Directorate for Computer & Information Science & Engineering, CyberTrust, see: http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=13451&org=CISE.

³U.S. Election Assistance Commission. *Voting System Pilot Program Testing & Certification Manual*. Apr. 2010. URL: http://www.eac.gov/News/docs/voting_system_draft_pilot_program_testing_and_certification_manual-03-31-10-final-public-comment.pdf/attachment_download/file.

⁴See ACCURATE's annual reports: A Center for Correct, Usable, Reliable, Auditable and Transparent Elections. *2006 Annual Report*. Jan. 2007. URL: <http://accurate-voting.org/wp-content/uploads/2007/02/AR.2007.pdf>; A Center for Correct, Usable, Reliable, Auditable and Transparent Elections. *2007 Annual Report*. Jan. 2008. URL: <http://accurate-voting.org/wp-content/uploads/2008/01/2007.annual.report.pdf>; A Center for Correct, Usable, Reliable, Auditable and Transparent Elections. *2008 Annual Report*. Jan. 2009. URL: <http://accurate-voting.org/wp-content/uploads/2008/12/2008annualreport.pdf>

⁵U.S. Election Assistance Commission, *VSPPTC Manual*, see n. 3.

⁶U.S. Election Assistance Commission. *Voting System Testing and Certification Program Manual*. Dec. 2006. URL: http://www.eac.gov/voting%20systems/docs/testingandcertmanual.pdf/attachment_download/file.

⁷Aaron J. Burstein, Joseph Lorenzo Hall, and Deirdre K. Mulligan. *Public Comment on the Manual for Voting System Testing & Certification Program (submitted on behalf of ACCURATE to the U.S. Election Assistance Commission)*. Oct. 2006. URL: http://accurate-voting.org/wp-content/uploads/2006/11/ACCURATE_VSTCP_comment.pdf.

⁸*Ibid.*, 17-19.

⁹See U.S. Election Assistance Commission, *VSPPTC Manual*, see n. 3, §3.2.2:

throughout this document as “VVSG Certification.”¹⁰) This form of certification would be available for voting systems used in “pilot election projects.” As the Draft Manual notes, the goal of this new testing and certification program is to “encourage the voting systems industry to pursue technological innovation and experimentation in relation to the design of voting systems and the methods of providing a better and more secure voting experience for United States citizens.”¹¹

We applaud the EAC’s recognition that further innovation is necessary to improve all dimensions of voting system performance, including security, reliability, accessibility, usability, and auditability. We also acknowledge and appreciate the strides the EAC has made to provide data from voting system test labs,¹² hold them to much stricter standards than were applied before the EAC instituted its testing and certification program,¹³ and to hold the labs accountable when they do not meet these standards.¹⁴ Still, we recommend a number of changes in the Draft Manual that would take into account the fact that pilot programs may involve new architectures and new standards.

Ideally, a pilot certification process would be part of a feedback loop in which requirements, design, production, and deployment are linked to produce continually improving technology.¹⁵ Additionally, a pilot certification process must strike a balance between ensuring that a voting system that is used experimentally in a real election is sufficiently trustworthy, and requiring changes in a system before it becomes cost-prohibitive for the manufacturer to do so. The pilot certification process should also take advantage of real-world use—something that is missing from testing under the VVSG and *TCP Manual*—to gather data about voters’ assessments of the pilot system. Finally, the process should make available as much data as possible about pilot systems, to allow independent analysis.

The Draft Manual does an admirable job of incorporating some of these approaches, but we believe that it can and should go further. The remainder of this comment suggests how the EAC might go about doing this. Our recommendations fall into four categories. First, the EAC should amend the Draft Manual to provide more details about what separates pilot certification from certification under the current, VVSG-based certification program. Specifically, the EAC should clarify what qualifies as a voting system pilot program, how it will decide whether to allow a manufacturer to pursue pilot cer-

Voting systems certified under this pilot program are tested to a set of voluntary requirements that voting systems must meet to receive a Federal certification. These standards may be the applicable versions of the EAC Voluntary Voting System Guidelines (VVSG) or other testable requirements developed for specific pilot program scenarios.

¹⁰We follow the Draft Manual’s usage in referring to the VVSG as “standards.” See, e.g., §1.16 (“All new voting system standards are issued by the EAC as Voluntary Voting System Guidelines.”) (emphasis added). As the EAC has pointed out in numerous places, the technical requirements of the VVSG are not binding on states or manufacturers. However, given the prevalence of state-level requirements for federal certification, testing to federal standards, or testing by a federally accredited test lab, it is common to call the VVSG “standards.” The Draft Manual adopts this usage (see, e.g., §2.3.2.4, which refers to the “VVSG standards”) and we will follow the EAC’s lead by referring to the VVSG and any other technical requirements the EAC may adopt in the future as “standards.”

¹¹U.S. Election Assistance Commission, *VSPPTC Manual*, see n. 3, §1.4.

¹²See Aaron Burstein, Joseph Lorenzo Hall, Matt Bishop, et al. *Letter Concerning Top-To-Bottom Review Results in iBeta Test Plans*. Oct. 2009. URL: <http://accurate-voting.org/wp-content/uploads/2009/10/ttbr-letter-eac-200910.pdf>; Aaron Burstein and Joseph Lorenzo Hall. *Letter Concerning Top-To-Bottom Review Results in iBeta Test Plans (Reply)*. Nov. 2009. URL: <http://accurate-voting.org/wp-content/uploads/2009/11/ttbr-reply-eac-20091105.pdf> (noting that “[t]he EAC has done a great service by making these [test report] documents available”).

¹³See generally Burstein, Hall, and Mulligan, see n. 7

¹⁴U.S. Election Assistance Commission. *EAC Announces Intention to Suspend SysTest Labs*. Oct. 2008. URL: http://www.eac.gov/News/eac-announces-intention-to-suspend-systest-labs/base_view.

¹⁵ACCURATE has long championed this kind of systems approach to voting system development. See, e.g., A Center for Correct, Usable, Reliable, Auditable and Transparent Elections. *Public Comment on the 2005 Voluntary Voting System Guidelines*. Sept. 2005. URL: http://accurate-voting.org/accurate/docs/2005_vvsg_comment.pdf, 6-9 (describing importance of feedback among different stages of voting system technical development).

tification for a given system, and what conditions are attached to pilot certification. Second, the pilot certification program should accept feedback from, and establish a systematic process for responding to, voters. Third, the EAC should strengthen the Draft Manual’s provisions for engaging with manufacturers at the system design stage and feeding data from pilot elections back to the design stage. Finally, the EAC should address the question of balance between piloting relatively mature systems and permitting pilots to force potentially major changes in pilot system design. This involves questions of the time and expense involved in pilot certification. We summarize our recommendations in the Appendix.

2 Better Defining the Boundaries of Pilot Program Certification

The Draft Manual defines a “voting system pilot program” to mean a program that uses a voting system with an “experimental purpose and limited duration and scope.”¹⁶ The Draft Manual further specifies that a pilot program involves a “limited roll out of a new system, in order to test it under real world conditions, prior to use by an entire organization.”¹⁷

Making use of a voting system in a real election is a significant change from VVSG Certification, where voting systems are evaluated before being used. The other major difference between pilot certification and VVSG Certification is that the pilot program would award federal certification for conformance to a wider variety of standards than the existing testing and certification program.¹⁸ We recommend two changes to the Draft Manual:

1. Set a default rule for the expiration of certification.
2. Ensure that pilot program technical standards are made available for public comment.

2.1 Clarify Provisions for Pilot Certification Expiration

The Draft Manual wisely provides that the EAC “will specify the date of expiration for the pilot program certification.”¹⁹ In other words, there will be no permanent pilot projects. This provision is consistent with the EAC’s statement that pilot projects are temporary and limited in scope, as well as the need to achieve a balance between using voting systems that are fit for real elections and experimenting with new technologies. Still, we recommend that the EAC clarify several aspects of a pilot certificate’s duration and significance.

First, the expiration provision is buried in the Draft Manual. It is a crucial provision that should be highlighted, perhaps by making it a separate element of § 4 or by calling attention to it in the introduction to § 4.

Second, we recommend adding provisions that more specifically indicate how the EAC will set the expiration date. A reasonable default rule might be that the certification will expire after the federal election in which the pilot system will be used, unless the manufacturer can show cause for extending the certification. The manufacturer’s case could include data collected from the pilot election and any other materials the EAC would consider relevant. Extensions of certification should be granted on a case-by-case basis, at the EAC’s sole discretion. Of course, if the election reveals the need for the manufacturer to modify the pilot voting system, the rest of the *VSPPTC Manual* would require re-certification. To

¹⁶U.S. Election Assistance Commission, *VSPPTC Manual*, see n. 3, at 8.

¹⁷*Ibid.*, at 8.

¹⁸The *VSPPTC Manual* does not specify which standards will be considered for pilot certification. We discuss this point further below.

¹⁹U.S. Election Assistance Commission, *VSPPTC Manual*, see n. 3, § 4.15.

address instances of unreported changes—as well as the possibility that the manufacturer, pilot jurisdictions, or the the EAC learns of defects that cannot be addressed before a pilot election—the EAC should also consider adding an explicit decertification procedure to the *VSPPTC Manual*.

Finally, the EAC should consider strengthening the rules about representations of EAC certification in § 4.18. The current rule states that a manufacturer may not represent a system as certified when it is not, and may not represent certification as an EAC “endorsement” of the system. While these rules are warranted, they do not draw sufficient attention to the fact that the system has attained a pilot certification only. This is important for two reasons. First, the significance of pilot certification under state election laws is unclear. Whereas some states that require federal certification refer specifically to the 2002 Voting System Standards or the VVSG,²⁰ others are more open-ended and might permit a state to use voting systems certified to other standards.²¹ It would be unfortunate if the distinction between VVSG Certification and pilot certification were lost, and states that do not require conformance with a specific standard (such as the VSS or VVSG) adopted a pilot system on the basis of an ambiguous “federal certification.”

The EAC could forestall this confusion by requiring manufacturers to state more clearly the standard(s) to which their systems are certified. For example, the *VSPPTC Manual* should require manufacturers to add a disclaimer “in brochures, on Web sites, on displays, and in advertising/sales literature”²² stating that the system is certified on a pilot basis, and specifying which standard was used for certification.²³

2.2 Ensure Public Review of Pilot System Technical Standards

The *VSPPTC Manual* seeks to encourage experimentation and innovation primarily by accommodating standards other than the VVSG.²⁴ The *VSPPTC Manual* states that “[t]he EAC will certify only those

²⁰See, e.g., Delaware Code Ann. tit. 15 § 5001 (as quoted in U.S. Election Assistance Commission. *State Requirements and the Federal Voting System Testing and Certification Program*. 2009):

Any voting device, machine or system purchased by the State shall be certified by the National Association of State Election Directors or the Election Assistance Commission as meeting or exceeding the voluntary voting systems standards or guidelines as promulgated by the Federal Election Commission or the Election Assistance Commission. . .

²¹See, e.g., Georgia Code Ann. § 21-2-324 (as quoted in *ibid.*):

Prior to submitting a voting system for certification by the State of Georgia, the proposed voting system’s hardware, firmware, and software must have been issued Qualification Certificates from the EAC. These EAC Qualification Certificates must indicate that the proposed voting system has successfully completed the EAC Qualification testing administered by EAC approved ITAs.

See also Virginia Code § 24.2-629(C)(viii), <http://leg1.state.va.us/cgi-bin/legp504.exe?000+cod+24.2-629> which directs the State Board of Examiners to determine whether a voting systems “meets federal requirements” without specifying which requirements apply.

²²U.S. Election Assistance Commission, *VSPPTC Manual*, see n. 3, § 4.18.

²³The “no mark of certification” requirement is not adequate to achieve this end. Though one could infer from the absence of a mark of certification that a voting system does not have a VVSG Certification, such an inference requires, at minimum, seeing an instance of the system. This is too subdued a way of drawing attention to an important fact about the system.

²⁴In theory, the *VSPPTC Manual* could also encourage experimentation by making the testing and certification process less costly. Given the broad similarities between the *TCP Manual* and the *VSPPTC Manual*, it is evident that the EAC does not wish to redesign the basic structures of the certification framework, such as using federally accredited test labs. In light of the advances the EAC has made in test lab accountability and openness, this seems a wise choice.

Still, there may be some room to reduce the burden of obtaining a pilot certification. In particular, the audit requirements (§ 6.4) are potentially onerous but bring little obvious benefit to evaluating a pilot voting system. Manufacturers’ and the EAC’s resources might be better spent in areas such as expanding data collection from voters and elections officials in pilot jurisdictions, as we describe in Section 3.

voting systems tested to standards that the EAC has identified as valid for the specific pilot certification effort.”²⁵ This provision will help prevent obviously unsound or unworkable standards from becoming the object of federal certification efforts.

We recommend, however, that the EAC go further, and allow public review and comment on pilot standards. The EAC has acknowledged the value of public comments on standards and has done an admirable job of gathering them on a variety of proposals, including the 2005 VVSG, VVSG 1.1, VVSG II, and UOCAVA Pilot Program Testing Requirements.

There is no reason to treat pilot program standards differently. Indeed, given the lack of definition in the *VSPPTC Manual* about the kinds of systems that might be part of a pilot certification—perhaps including general remote voting systems, or end-to-end cryptographic voting systems—the need for public scrutiny of the technical standards is every bit as great as in the past.²⁶ It follows from this suggestion that the EAC should not consider standards that are not freely available for public review.

The EAC’s own approval of standards, however, does not require any cooperation or involvement during the pilot testing process from the jurisdiction(s) that will try out the voting system. Indeed, the Manual does not appear to require a manufacturer to identify the pilot election project that creates the need to seek certification. The manufacturer registration requirements instead focus on collecting information about the manufacturer’s organization²⁷ and establishing its agreement to abide by the rules of the pilot certification program.²⁸ Perhaps manufacturers will seek pilot certification before marketing their systems and seeking to partner with election jurisdictions on pilot election projects. In that case, manufacturers should be required to keep the EAC updated with a list of pilot jurisdictions and election official contacts. This would be a reasonable addition to the Draft Manual’s Registration Requirements (§ 2.3).

Information about pilot jurisdictions is important for the EAC’s post-election analysis of pilot projects. Since the Draft Manual relies essentially manufacturers’ self-reporting of anomalies,²⁹ having a list of pilot jurisdictions would allow the EAC to contact those jurisdictions if it wishes to follow up on or verify information that a manufacturer provides.³⁰ It is also important for public analysis and scrutiny of pilot projects.

3 Making Better Use of Feedback from Election Officials and Voters

Just as the EAC’s review of new technical standards will continue to require public comment, so will its review of pilot program results improve if it strengthens the *VSPPTC Manual*’s current provisions for collecting feedback from voters and election officials. Feedback from voters is entirely ignored in the current draft; it does not provide a mechanism for voters who used the pilot system to report on their experiences to the EAC, nor does it require manufacturers to submit this kind of data after an election. This is unfortunate, because collecting data from voters who used a system under real election conditions

²⁵U.S. Election Assistance Commission, *VSPPTC Manual*, see n. 3, § 3.2.2.2.

²⁶The EAC’s current notice and comment policy allows the Commission to extend the default 30-day comment period for “all policies or rules of general applicability.” (U.S. Election Assistance Commission. *Proposed Notice and Comment Policy*. Last accessed April 26, 2010. URL: http://www.eac.gov/about/docs/proposed-notice-and-public-comment-policy-finalchanges-published.pdf/attachment_download/file, § V.A) In our experience—which includes the standards cited in the main text above—comment periods of at least 120 days are conducive to a full and careful analysis of proposed standards. Given the potential range of standards that the EAC will consider, and their wide-ranging impact as pilots, the EAC should liberally extend the default comment period, to ensure that it gives commenters ample time to study proposed standards.

²⁷U.S. Election Assistance Commission, *VSPPTC Manual*, see n. 3, § 2.3.

²⁸*Ibid.*, §§ 2.4-2.6.

²⁹*Ibid.*, § 6.5.

³⁰The Draft Manual would also allow but not require states to report anomalies (§ 6.6).

could yield important insights about voting system performance—particularly along the dimensions of usability and accessibility—that might not become evident during lab testing. Moreover, since an overarching purpose of the pilot certification program is to experiment with new technologies, user feedback would be an especially valuable of identifying problems (and benefits) of casting votes on these systems.

We therefore recommend that the EAC allow *voters* to report on their experiences. The EAC should accept reports on a broad range of issues, not just anomalies. (We recommend a similar extension of scope for election official reports, as discussed below.) These voter reports should be made available for public review.

The *VSPPTC Manual* does better at handling feedback from election officials; they may report “anomalies” to the EAC after an election (obviously, the EAC cannot require them to do so).³¹ Limiting these reports to anomalies—“any irregular or inconsistent action[s] or response[s] from the voting system or system component resulting in some disruption to the election process”³²—is too narrow. A usability problem that voters consistently experience, for example, might not be an “anomaly” under this definition. Even if this kind of problem is a reportable anomaly, it is the voter who should report it—after all, he or she had the experience—rather than an election official. Additionally, the EAC and manufacturers stand to benefit from learning about election officials’ experience with the pilot system throughout the election cycle, from ballot definition to post-election auditing, not merely in the election-day voting process. Restricting election officials’ reports to anomalies is unduly narrow.

Since the EAC is unlikely to *require* voters or election officials file reports, establishing a structure that proactively seeks information from them is warranted. For example, the EAC might conduct post-election interviews or surveys with voters and election officials from pilot program jurisdictions. The Commission could also facilitate independent efforts to gather this information by publishing a list of jurisdictions that will participate in a pilot program election.³³

4 EAC Should Use Pilot Programs to Examine Voting Systems Earlier in the Development Cycle

Pilot voting systems, by definition, consist of architectures, technology and procedures that are new and untested in actual election environments. The pilot project testing and certification program would test voting systems relatively early in the development process, when changes to voting systems could be more easily and comprehensively incorporated into the overall system design.³⁴ Such early testing would be a positive development, since certain properties of a voting system require that designers include them in the early stage of the design process to be effective.

Security, usability, and accessibility are most effectively addressed at the design stage.³⁵ To take security as an example, patching vulnerabilities in software after it is released is usually costly for manufacturers and customers. In the relatively simple context of fixing a single vulnerability in software, creating a patch may require writing a different patch for each affected version and testing and distribut-

³¹U.S. Election Assistance Commission, *VSPPTC Manual*, see n. 3, §6.6.

³²*Ibid.*, §1.16.

³³The current draft does not appear to require manufacturers to report where their pilot systems will be used. The EAC should require this information to be reported and kept up to date as a condition of maintaining registration under §2 of the *VSPPTC Manual*.

³⁴ACCURATE has critiqued the federal certification process in the past as having concentrated testing and evaluation after a system is fully developed, instead of concentrating efforts earlier in the design and development process. A Center for Correct, Usable, Reliable, Auditable and Transparent Elections, *ACCURATE’s Comments on the 2005 VVSG*, see n. 15, at 13–14

³⁵Peter G. Neumann. “Reflections on System Trustworthiness”. In: *Advances in Computing*. Vol. 70. Academic Press, 2007. 269–309; Gary McGraw. *Software Security: Building Security In*. Professional. Addison Wesley, 2006.

ing them.³⁶ When a *system* has a security flaw—as in the case of paperless direct recording electronic (DRE) voting systems, which do not support audits or recounts that may be conducted with records not controlled by the voting system itself—fixing the flaw can be much more complicated and costly.³⁷

Usability and accessibility—a subset of usability focused on users with special needs—similarly require consideration during design stages for effective integration into a system. The disciplines of human factors and human-computer interaction practice *user-centered design*, where users and their needs are included prominently in each phase of product design and testing.³⁸ Given the errors and failures of voting systems in the field due to poor usability³⁹ and/or accessibility,⁴⁰ we suspect that principles of user-centered design and design for accessibility are not given the weight they should have during manufacturer research and design.

Pilot projects present an opportunity to examine these design-critical properties on prototypical systems used in the field during actual elections and to provide feedback that the vendor can use to improve their product, especially if they plan to submit it for VVSG certification. We would hope that the pilot voting system certification program is one step in a larger effort to extend voting system evaluation and review into the design stages of manufacture. Eventually, we would hope that EAC experts—and academic experts such as ACCURATE PIs, advisors and affiliates—could participate in *design reviews* with voting system manufacturers. Design reviews often happen before any software or hardware development has begun and include expert examination of architecture, protocols and other elements of design-critical properties such as security and usability. We suspect this is not something the EAC can mandate under either the *VSPPTC Manual* or the *TCP Manual*, so we do not offer language amendments here. However, creating the ability and support infrastructure for such activities will be a crucial element of streamlining the testing and certification process and combining all of our abilities—experts, administrators and manufacturers—to produce more secure, usable, reliable and transparent voting systems.

5 Conclusion

ACCURATE appreciates the opportunity to comment on the UOCAVA Draft. We would be happy to answer any questions the EAC has about our comments. We also look forward to analyzing the outcome of any pilot conducted according to the final requirements, as well as any future revisions to the requirements themselves.

³⁶See Mary Ann Davidson. “The Good, The Bad, And The Ugly: Stepping on the Security Scale”. In: Annual Computer Security Applications Conference. 2009. URL: <http://www.acsac.org/2009/program/keynotes/davidson.pdf>, 3 (noting that the direct cost to the company in this case of fixing a vulnerability was more than \$1 million).

³⁷For a discussion of some of the security and reliability problems that have arisen from paperless DREs, see A Center for Correct, Usable, Reliable, Auditable and Transparent Elections. *Public Comment on the Voluntary Voting System Guidelines, Version II (First Round)*. May 2008. URL: http://accurate-voting.org/wp-content/uploads/2008/05/accurate_vvsg2_comment_final.pdf, 2-3.

³⁸Sharon Laskowski, Marguerite Autry, John Cugini, William Killam, and James Yen. *Improving the Usability and Accessibility of Voting Systems and Products*. Apr. 2004. URL: <http://www.vote.nist.gov/Final%20Human%20Factors%20Report%20%205-04.pdf>.

³⁹Lawrence Norden, David Kimball, Whitney Quesenbery, and Margaret Chen. *Better Ballots*. Brennan Center for Justice at NYU School of Law. July 2008. URL: <http://www.brennancenter.org/page/-/Democracy/Better%20Ballots.pdf>.

⁴⁰Noel Runyan and Jim Tobias. *Accessibility Review Report for California Top-to-Bottom Voting Systems Review*. July 2007. URL: http://www.sos.ca.gov/elections/voting_systems/ttbr/accessibility_review_report_california_ttb_absolute_final_version16.pdf.

Appendix

For convenience, we provide this summary of our comments, with references to pertinent sections of the *VSPPTC Manual*.

1. § 2.3: Require manufacturers to provide and maintain a list of pilot jurisdictions and contact information for the corresponding election officials. The EAC should publish this list to facilitate independent pilot project observation and analysis.
2. § 3: Put all candidates for pilot program technical standards out for adequate periods of public review and comment.
3. § 4 (generally) and § 4.15 (in particular): Highlight the fact that a voting system's pilot certification expires on the date indicated on its certificate.
4. § 4: Set a default rule for the expiration of pilot certifications. We recommend that pilot certifications expire after the federal election in which the pilot use takes place, unless the EAC finds good cause to extend the certification.
5. § 4.18: Require manufacturers to state clearly on their websites, in their advertising materials, etc. the standards to which their voting systems are certified.
6. § 4: Add a provision for the EAC to decertify a voting system, in response to unreported modifications or the discovery of conformance issues after certification is granted.
7. § 6: Create a mechanism for voters from pilot jurisdictions to submit feedback on their experiences with pilot systems.
8. § 6.6: Expand the scope of election official reporting beyond "anomalies" to include events throughout the election cycle. The EAC should collect information from voters on a similarly broad range of topics.
9. § 6: Develop a program to proactively gather data from election officials and voters in pilot program jurisdictions, rather than relying on election officials' voluntary reporting.
10. Finally, we recommend extending the *VSPPTC Manual's* general direction of conducting testing and (pilot) certification earlier in the voting system development cycle. The EAC could, for example, facilitate hardware and software design reviews by independent experts to help identify security, usability, accessibility, and other system-level flaws when it is less costly to fix them.