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Cuyahoga County Board of Elections

**Hearing on the EVEREST Review of Ohio's Voting Systems and
Secretary of State Brunner's Related Recommendations for Cuyahoga County**

Comment of

Lawrence D. Norden

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at the Brennan Center for Justice at New York University School of Law**

December 17, 2007

The Brennan Center thanks the Cuyahoga County Board of Elections for holding this meeting to discuss the Project EVEREST review of Ohio's voting systems, as well as Secretary of State Brunner's related recommendations. Project EVEREST's Risk Assessment Study of Ohio Voting Systems is a disturbing document, confirming many security and reliability flaws that many experts had previously identified in the current generation of electronic voting systems. These findings deserve serious study, and Ohio must take action to ensure that the security flaws identified in this report do not affect the integrity of its elections.

Regrettably, the recommendations made by Secretary of State Brunner in response to Project EVEREST's findings could cause more problems than they solve. If instituted quickly, without input from experts who have studied these issues for many years, they will almost certainly lead to serious problems in Ohio in the most complex election year of the four-year election cycle, potentially disenfranchising tens of thousands of voters in Cuyahoga County alone.

Fortunately, Cuyahoga County and the state of Ohio can take immediate and relatively simple steps to strengthen the integrity of its elections without risking the chaos and disenfranchisement that are likely to result if Secretary Brunner's recommendations are implemented without adequate study, input from experts, meaningful public education campaigns, and the development of entirely new election procedures.

I. The Brennan Center's Work on Voting System Security

The Brennan Center is a nonpartisan think tank and advocacy organization that focuses on issues of democracy and justice. We are deeply involved in the effort to ensure fair and accurate voting and voter registration systems and to promote policies that maximize participation in elections.

For the last three years, in collaboration with the nation's leading technologists, election experts, security professionals, and usability and accessibility experts, I have led the Brennan Center's work to make the country's voting systems as secure, reliable and accurate as possible. From 2004 to 2006, I chaired the Brennan Center Task Force on Voting System Security, which conducted the first systematic analysis of voting system security. I am also lead author of the nation's first comprehensive and empirical review of electronic voting systems entitled *The Machinery of Democracy: Voting System Security, Accessibility, Usability and Cost*.¹ In 2007, I co-authored a book on voting system security, *The Machinery of Democracy: Protecting Elections in an Electronic World*,² as well as a report of the Brennan Center and the Samuelson Law, Technology and Public Policy Clinic at the University of California, Berkeley on post-election audits entitled *Post Election Audits: Restoring Trust in Elections*.³

In all of this work, the Brennan Center has concluded that there are serious security and reliability flaws in the current generation of voting technology – be it direct recording electronic (“DRE”), precinct based optical scan (“PBOS”), or central count optical scan voting systems. We have also concluded that the most troubling vulnerabilities in each of these systems can be substantially remedied. While many more jurisdictions have adopted such procedures in the last two years, most states – including Ohio – have not.

While highlighting the security and reliability vulnerabilities of electronic voting systems, the Brennan Center has consistently noted that the move away from punch-card and lever machines to in-precinct electronic voting systems (be they optical scan or direct recording electronic machines) has had some important benefits. And we have emphasized that before taking dramatic action to address the very serious flaws of the current generation of electronic voting systems, jurisdictions must consider how these actions will affect overall accessibility, usability, and integrity of the election system. Failing to do so risks creating problems that are even greater than those we hope to solve.

¹ Lawrence Norden *et al.*, THE MACHINERY OF DEMOCRACY: VOTING SYSTEM SECURITY, ACCESSIBILITY, USABILITY AND COST (2006), available at http://brennancenter.org/stack_detail.asp?key=97&subkey=38150&init_key=105.

² Lawrence Norden & Eric Lazarus, THE MACHINERY OF DEMOCRACY: PROTECTING ELECTIONS IN AN ELECTRONIC WORLD (Academy Chicago 2007).

³ Lawrence Norden *et al.*, POST ELECTION AUDITS: RESTORING TRUST IN ELECTIONS (2007), available at http://brennancenter.org/dynamic/subpages/download_file_50227.pdf.

II. Project EVEREST Findings

The Brennan Center commends Secretary of State Brunner for initiating Project EVEREST and for taking its findings seriously. This historic and thorough analysis of the electronic voting systems used in Ohio reveals that all systems used in the state have significant security and reliability vulnerabilities which pose a real danger to the integrity of statewide and local elections.

These findings echo findings made by the Brennan Center's Task Force on Voting System Security, as well as those made by the University of California's Top to Bottom Review of that state's voting systems.⁴ And they provide Ohio with an opportunity to become a leader for the country in the area of voting integrity.

At the same time, the identification of security flaws in Ohio's voting systems does not, in and of itself, make clear what steps Ohio should take to address those vulnerabilities. We believe that many of the Secretary's recommendations warrant serious study. Others risk unnecessarily disenfranchising voters. None should be implemented unless they are first pilot-tested to be sure that they do not inadvertently create new problems.

III. Secretary of State Brunner's Recommendations

Secretary of State Brunner makes a number of recommendations to address the Project EVEREST findings. Here, I focus on four recommendations that are the most troubling.

OH-SOS Recommendation: Elimination of DREs and Precinct-based Optical Scan Voting Machines that tabulate votes at polling locations, and moving to Central Counting of Ballots

Project EVEREST found serious flaws in all three voting system architectures used in Ohio: DRE, PBOS and Central Count Optical Scan voting machines. Secretary Brunner proposes to address this problem by "eliminat[ing] points of entry creating unnecessary voting system risk" by ending the use of in-precinct DRE and PBOS voting machines to count votes and "instead migrating to central counting of ballots."⁵

There are at least two potentially serious problems with this solution. First, the exclusive use of Central Count Optical Scanners to count votes is likely to cause the disenfranchisement of thousands of voters, and in particular low-income and minority voters. Central Count Optical Scanners do not give voters the notice and

⁴ Matt Bishop, Principle Investigator, University of California, Davis, *Overview of Red Team Reports* (2007), http://www.sos.ca.gov/elections/voting_systems/ttbr/red_overview.pdf

⁵ Project EVEREST (Evaluation & Validation of Election-Related Equipment, Standards, & Testing), *Risk Assessment Study of Ohio Voting Systems* 76-7 (Dec. 14, 2007), available at <http://www.sos.state.oh.us/sos/info/EVEREST/00-SecretarysEVERESTExecutiveReport.pdf>.

opportunity to correct errors. In-precinct DRE and PBOS voting systems have dramatically decreased the number of uncounted votes, previously caused when voters made errors by inadvertently overvoting in elections.⁶ In fact, it has been estimated that this technologically-provided overvote protection helped to save approximately one million votes in the 2004 election.⁷ This has disproportionately benefited low-income and minority voters in Ohio who, prior to the move to DREs and PBOS, experienced much higher lost vote rates than other voters.⁸

Second, counting all votes in a central location without the benefit of precinct totals is a recipe for massive error, particularly if there is no post-election audit of the Central Count Optical Scanner (which is not part of the Secretary's recommendations). To put it plainly, a programming error, software glitch or insider attack on the Central Scanner could result in incorrect totals on a massive scale, in a way that is far less likely to occur if votes are first tallied and published at individual precincts.

The recommendation to move exclusively to central count scanning risks disenfranchising tens of thousands of voters in Cuyahoga County. Moreover, without precinct counting or audits, it is also likely to *increase* security and reliability risks in Ohio's elections. Accordingly, I urge you to refrain from adopting this recommendation until you can consult more thoroughly with election integrity and voting rights experts.

OH-SOS Recommendation: Move to Vote By Mail

Secretary of State Brunner recommends requiring "all Special Elections [...] held in August 2008 to be voted by mail" and that the state "adopt legislation to allow a county to vote on whether it desires to vote by mail for a temporary or permanent period of time."⁹

Absent a massive public education effort, for which there is probably not enough time before the August 2008 Special Elections, a move toward a completely vote-by-mail system carries the same risks already discussed above, namely, disenfranchisement of tens of thousands of voters (particularly elderly, low literacy, low-income, and minority voters) who will not have the benefit of overvote protection, along with increased security and reliability risks of counting all county ballots in a single location.

⁶ Norden *et al.*, *supra* note 1, at 99-100.

⁷ Charles Stewart III, *Residual Vote in the 2004 Election*, 5 Election L.J. 158 (2006), available at http://www.vote.caltech.edu/journals/ELJ-Stewart_06.pdf.

⁸ Norden *et al.*, *supra* note 1, at 101. Recent research by Norman Robbins, MD, PhD, Research Director for the Greater Cleveland Voter Coalition and Emeritus Professor at Case Western Reserve University School of Medicine confirms that low-income and minority voters in Ohio, like those throughout the nation, have disproportionately benefited from the overvote protection provided by PBOS and DREs.

⁹ Project EVEREST, *supra* note 5, at 80.

Additionally, Ohio has no experience delivering a high volume of ballots through the postal service, and has not developed the appropriate security measures to ensure that ballots are not tampered with or replaced. I am extremely concerned about trying this for the first time in a presidential election year, with very little time for planning and development of good procedures. Finally, there is at least some evidence that vote-by-mail could negatively impact low-income and minority turnout while disproportionately benefiting affluent voters.¹⁰

None of this is meant to argue that Ohio should never move toward a vote-by-mail system. But certainly, such a drastic change should only come after thorough study with comparative assessment of the risks and benefits of vote-by-mail and other voting methods, the development of adequate security procedures at the county and state levels, and a comprehensive public education effort.

OH-SOS Recommendation: For the March 2008 primary election require counties utilizing DREs to offer paper ballots to voters who do not vote on DREs

As noted above, if voters are provided paper ballots without in-precinct optical scanners that will notify them of errors, they are far more likely to make errors, and their votes will not be counted accurately. Again, this could impact tens of thousands of voters, and will disproportionately affect low-income and minority voters.

In addition, I am very concerned that without adequate time to develop good procedures and train poll workers, many votes cast on paper ballots in DRE counties will not be handled properly, leaving them vulnerable to being replaced or tampered with, lost, or wrongly treated as provisional ballots.

Providing voters with the choice of voting on paper, without the benefit of a machine that will notify them if they have made errors, does little to solve the security risks associated with using electronic voting systems, while at the same time creating new risks that will have the potential to disenfranchise voters.

OH-SOS Recommendation: Move to Vote Centers, Eliminating Voting at Individual Polling Places of Less than 5 Precincts

Secretary of State Brunner recommends eliminating polling places with more than 5 precincts, and developing "Vote Centers" of five to ten precincts in their place.¹¹ While this would have the benefit of expanding early voting in Ohio, it would also mean the closure of many existing polling places. I am particularly concerned that elderly and low-income voters with limited transportation means could find that this transformation makes it very difficult, if not impossible, to vote.

¹⁰ Michael Slater & Teresa James, *Vote-by-Mail Doesn't Deliver*, TomPaine.com (June 29, 2007), available at http://www.tompaine.com/articles/2007/06/29/votebymail_doesnt_deliver.php.

¹¹ Project EVEREST, *supra* note 5, at 78

The Secretary recommends a pilot program in two or three counties in the March primary.¹² This could be a useful initial experiment, but given the dramatic differences between, for instance, Cuyahoga and Jefferson Counties, I hope that many more pilots in a broad number of Ohio counties will be launched and thoroughly analyzed before there is any effort to eliminate precincts. Until there is a thorough analysis of how the closures will affect specific voters' ability to vote, a statewide move to vote centers is premature and could have very serious consequences. Finally, if it is determined that such an action will increase voter turnout without negatively impacting on the ability of low-income and elderly voters to get to the polls, the state must have allocate resources toward a massive public education campaign to make sure that voters understand their previous polling places may have closed.

Once again, attempting to make such extraordinary changes over a short period of time, in a presidential election year is not a good idea.

IV. Alternate Steps to Achieving Greater Election Security

I am hopeful that the Cuyahoga Board of Elections accepts Secretary of State Brunner's recommendations as just that – recommendations. More to the point, I hope that they are treated as recommendations that are the *beginning* of a serious conversation about what long-term changes to election administration might be necessary to improve Ohio's elections. I hope that this discussion fully considers the potential benefits and drawbacks of these initial recommendations, and includes the input of independent experts who have studied these complex issues for many years.

In the meantime, there is much that can be done to ensure that the DREs used in Cuyahoga County are as secure, reliable and accurate as possible. There are at least four steps that Cuyahoga County should consider for its upcoming elections:

- **Train poll workers to tell every voter, immediately before she votes, that she should review the voter-verified paper trail and inform the poll worker if the paper trail is illegible, has jammed, or does not reflect the choices that she made.** Cuyahoga County has had serious problems with its voter-verified paper trail. While many of these problems are no doubt due to the poor design of the printers, they have been exacerbated by the fact that voters are not aware of the purpose and importance of the voter-verified paper trail. If voters inform poll workers of problems with the voter-verified paper trail, those problems can be fixed before a significant percentage of votes are affected.
- **Have emergency paper ballots available in case of machine failure.** Poll workers should be trained to provide emergency paper ballots to voters where machine failure or other problems have caused delays at polling places. Poll workers should be trained to give voters appropriate instructions for filling in

¹² *Id.* at 78.

such ballots, as well as for storing such ballots to ensure that they are counted in the same manner as all other regularly cast votes.

- **Conduct pilot post-election audits of the voter-verified paper trail.** The single most effective way to deter fraud, detect error, and determine whether a voting machine has been compromised is to conduct a random audit, before certification of the election results, comparing a percentage of the voter-verified paper trail to the machine tallies of the vote. Cuyahoga County was a national leader in pioneering a statistically reliable, limited post-election audit in 2006, which could be expanded into a pilot program to conduct such elections for the 2008 elections.
- **Conduct parallel testing of voting machines.** “Parallel testing,” or Election Day testing of DREs has been conducted by the states of California and Washington, as well as Palm Beach County, Florida. Parallel testing involves selecting machines at random and testing them as realistically as possible during the period in which votes are cast. If implemented correctly, parallel testing can act as a deterrent to fraud and help jurisdictions detect software-based attacks, as well as subtle software bugs that may not be discovered during pre-election inspection and other testing.

For the longer term, Cuyahoga County may need to replace its DREs and voter-verified printers with paper ballots and optical scanners. This transformation should not take place in the three months before the March primary. The County will need to ensure that new machine and polling place procedures are in place, training and public education materials are drafted and distributed, and equipment adequately evaluated and tested.

Just as importantly, the County should have the time to solicit competitive bids and negotiate for the best possible contract for the people of Cuyahoga County.

If and when the county does move to optical scan voting machines, we urge you to choose precinct-based optical scan machines, which will provide voters with overvote protections. And regardless of the voting system it uses, the County should conduct post-election audits after every election, comparing a percentage of the voter-verified paper records to the machine totals. Ultimately, this is the best protection against security and reliability flaws that the voting system vendors have not yet resolved.

Thank you for your conscientious attention to the needs of Cuyahoga voters.

VIA FACSIMILE AND ELECTRONIC MAIL

January 8, 2008

Jennifer Brunner
Ohio Secretary of State
180 East Broad Street
Columbus, OH 43215

Re: Concerns About Proposal to Move to Central Count of Ballots

Dear Secretary Brunner:

As academics who have devoted our studies to election administration and voting systems for the last several years, we have paid close attention to recent developments in Ohio. We commend you for your recent efforts to ensure that Ohio's 2008 elections are as secure, reliable and accurate as possible.

We are particularly concerned, however, with your recent recommendations to move to central counting of all paper ballots. It is difficult to overstate the benefit of the overvote protection provided by precinct count optical scan machines. But to give you some perspective, it has been estimated that there were approximately one million fewer lost votes in the 2004 presidential election than in 2000, and the shift to precinct-based machines providing overvote protections helped count many votes that would otherwise have been rejected. Voter correction features tend to benefit low-income and minority voters whose votes were previously lost in much higher numbers on other voting machines. For instance, a study shows that up to 6.5% of voters in some low-income Cleveland wards who did not have the overvote protection effectively lost their vote in the 2000 presidential election – and most of those votes would undoubtedly have been saved if those voters had used a machine that provided them with notification of their errors and gave them an opportunity to correct them. After switching to DREs with the error protection feature, no Cleveland ward had a rate of lost votes higher than 3.7% in the 2006 gubernatorial election.

Despite many attempts to reduce residual vote rates, without the overvote protection of precinct count optical scanners or DREs, we have not seen convincing evidence that “voter education” or other methods without such protections are effective in reducing such errors.

In addition to saving tens of thousands of votes, mandating the use of precinct count optical scanners to count paper ballots at the polling place will have other benefits. For instance, these precinct-based scanners can greatly reduce the rates of voters marking paper ballots in ways that a scanner cannot read. The precinct-based notification allows the voter to be promptly informed of problems and request a new ballot to record voting choices in machine-readable ways. The benefits accrue not only to the voters but also to

election administrators because the precinct-based scanner greatly reduces the number of ballots that later cause disputes over voter intent, and substantially reduces the necessity of remaking or duplicating flawed ballots. Central count scanning alone will lead to many more election challenges and further undermine confidence in Ohio's election administration.

We understand that your objective in central count scanning was to increase election security, especially by eliminating multiple routes of transmitting viruses and other malicious code into the central tabulation. It is possible to use precinct-based scanning to provide effective notices to voters of overvotes and defective ballot marking, and still use central count scanning for tabulation.

We strongly caution you against using the March 2008 primary as a "test case" for whether it is acceptable to do away with the overvote protection statewide, or to give voters at polling places the option of voting without using a precinct count optical scanner. The March primary is unlikely to be representative of the electorate in a general election.

We would welcome the opportunity to discuss this issue with you in greater detail. Thank you for your attention.

Sincerely,

Stephen Ansolabehere, Professor of Political Science, MIT

Henry Brady, Professor of Political Science and Public Policy, University of California, Berkeley

Paul S. Herrnson, Professor of Government and Politics and Founding Director of the Center for American Politics and Citizenship, University of Maryland, College Park

Douglas W. Jones, Associate Professor of Computer Science, University of Iowa

David Kimball, Associate Professor of Political Science, University of Missouri, St. Louis

Martha E. Kropf, Assistant Professor of Political Science, University of Missouri, Kansas City

Richard Niemi, Don Alonzo Watson Professor of Political Science, University of Rochester

Ted Selker, Director, Caltech/MIT Voting Technology Project

CC: All Ohio Boards of Elections

Signatories

The information provided about each signatory is for identification purposes only and does not represent an endorsement of this letter by their organizational affiliations.

Stephen Ansolabehere is Professor of Political Science at Massachusetts Institute of Technology. Professor Ansolabehere studies elections, democracy, and the mass media. He is coauthor (with Shanto Iyengar) of *The Media Game* (Macmillan, 1993) and of *Going Negative: How Political Advertising Alienates and Polarizes the American Electorate* (The Free Press, 1996). His articles have appeared in *The American Political Science Review*, *The British Journal of Politics*, *The Journal of Politics*, *Legislative Studies Quarterly*, *Public Opinion Quarterly*, *The Quill*, and *Chance*. His current research projects include campaign finance, congressional elections, and party politics. Professor Ansolabehere is also a member of the Caltech/MIT Voting Technology Project.

Henry Brady is Professor of Political Science and Public Policy at the University of California, Berkeley. He is also Director of UC Data Archive & Technical Assistance, UC Berkeley's principal archive of computerized social science and health statistics, and of the university's Survey Research Center. Professor Brady is a Fellow of the American Academy of Arts and Science and the American Association for the Advancement of Science. He is also former Vice President and Treasurer of the American Political Science Association. Professor Brady testified before the Carter-Baker Commission on voting systems and has served as an expert witness in punch card and butterfly ballot design cases in California, Illinois, and Florida. He has published half a dozen books and more than fifty articles on political science, and half a dozen articles and monographs on voting systems.

Paul S. Herrnson is Professor of Government and Politics and Founding Director of the Center for American Politics and Citizenship at the University of Maryland, College Park. He has published numerous books, including *Congressional Elections: Campaigning at Home and in Washington*, *The Financiers of Congressional Elections*, and *War Stories from Capitol Hill*. Professor Herrnson has written more than 100 journal articles and book chapters and is the editor of the Real Politics in America book series with Prentice Hall. The principal investigator of the National Science Foundation and the Carnegie Corporation funded Project to Study Voting Technology and Ballot Design, Professor Herrnson has also directed a U.S. Election Assistance Commission project to recruit, train, and retain election judges, and the Campaign Assessment and Candidate Outreach Project, funded by the Pew Charitable Trusts. He has served as Vice President of the Southern Political Science Association and an American Political Science Association Congressional Fellow. He has advised the U.S. Congress, the Maryland General Assembly, the Federal Election Commission, and the State of Maryland's Commission to Revise the Election Code on matters pertaining to campaign finance, political parties, and election reform.

Douglas W. Jones is Associate Professor of Computer Science at the University of Iowa. His research focuses primarily on computer security and electronic voting. Professor Jones was appointed to the Iowa Board of Examiners for Voting Machines and Electronic Voting Systems in 1994 and served as chair of the board from 1999 to 2003. He has testified before the U.S. Commission on Civil Rights, U.S. House Committee on Science, and Federal Election Commission on voting issues. He is also a member of NSF ACCURATE.

David C. Kimball is Associate Professor of Political Science at the University of Missouri, St. Louis. He has conducted research and authored many papers on residual vote rates and ballot design. His work has appeared in the *American Political Science Review*, *Journal of Politics*, *Public Opinion Quarterly*, *Election Law Journal* and edited volumes. He is the co-author with Barry Burden of *Why Americans Split Their Tickets: Campaigns, Competition and Divided Government* (University of Michigan Press, 2002).

Martha E. Kropf is Assistant Professor of Political Science at the University of Missouri, Kansas City. Previously, she was Project Coordinator at the University of Maryland Research Center. She has conducted research and authored papers on voting technology, ballot design, and residual votes.

Richard Niemi is the Don Alonzo Watson Professor of Political Science at the University of Rochester. His current research includes projects on college student voting, state legislative elections, voting machines, and ballot design. He is co-author of *Voting Technology: The Not-So-Simple Act of Casting a Ballot*, a work on usability aspects of voting machines and ballot design recently published by the Brookings Institution Press.

Ted Selker is Associate Professor of Media Arts and Sciences at Massachusetts Institute of Technology and is the Director of MIT's Context Aware Computing Lab. He is also the MIT director of the Caltech/MIT Voting Technology Project. For the Caltech/MIT voting technology project, Selker is building and testing technology for improving security and accuracy in voting. Before coming to MIT, Professor Selker was an IBM fellow and directed IBM's User Systems Ergonomics Research Lab. He has served as a consulting professor at Stanford University, taught at Hampshire College, the University of Massachusetts at Amherst, and Brown University, and worked at Xerox PARC and Atari Research Labs. He was co-recipient of the Computer Science Policy Leader award from Scientific American Magazine (2004) for his work on voting technology.

VIA FACSIMILE AND ELECTRONIC MAIL

January 8, 2008

Jennifer Brunner
Ohio Secretary of State
180 East Broad Street
Columbus, OH 43215

Re: Comments on Security Recommendations for Ohio Voting Systems

Dear Secretary Brunner:

We have read Project EVEREST's review of Ohio's voting systems with great interest. We congratulate you for the leadership you have taken since the report's release to make sure that Ohio's voting systems are as secure as possible in 2008 and beyond. Along these lines, we write to offer suggestions for ensuring that the security recommendations you have proposed for Ohio lead to more reliable, secure, accurate and accessible elections.

As a group, we have spent thousands of hours studying security flaws in electronic voting systems, as well as the systems changes and election administration procedures that can best address those flaws. We applaud your decision to begin to improve security in Ohio's voting systems. However, if your efforts are to significantly add to the integrity of Ohio's elections, we strongly recommend that the following steps be taken:

- A. **Mandate use of *precinct count* optical scanners in all polling places where paper ballots are used.** Given the security risks associated with "virus" based vulnerabilities identified in the EVEREST study, we can understand your desire to count ballots centrally. However, counting all ballots at the county level, without any counting at the precinct level, poses its own serious risks. For instance, there is a risk that paper ballots will be altered in transit from the precincts to the central count facility. At the same time, the presence of corrupt software, software bugs or other failures on a central count machine could result in incorrect totals on a massive scale, in a way that is far less likely to occur if votes are first tallied and published at individual precincts. Mandating that paper ballots be scanned at the precinct would allow election officials to use summary tapes from these the precincts to substantially reduce security and reliability risks associated with moving to central count optical scanners. It would also greatly increase the likelihood of public confidence in election results. Even if there is no manipulation of ballots between the precinct and the central count facility, there could be charges of such manipulation, and there is absolutely no way to prove them false unless there are precinct totals. This could leave a pall over final election results that Ohio and the country do not need.

Secondly, mandating the use of precinct count optical scanners would give voters the benefit of overvote protection mandated by HAVA, which many social scientists have concluded has substantially reduced the voter error rate. This could be done without transferring electronic media between optical scanners and Election Management Systems.

- B. **Put in place a rigorous, transparent, statistically sound audit process.** All voting systems that run on software – whether DREs, or central or precinct count optical scanners – are vulnerable to software bugs and malicious code. Regardless of the voting systems used in Ohio counties, post-election audits will be critical to ensure the integrity of elections. Such audits should follow the principles articulated in the Brennan Center/Samuels Clinic report and in the California’s Post-Election Audit Group report.
- C. **Work with independent security experts, election officials and independent election administration specialists to develop good chain of custody practices.** Centralized counting demands rigorous procedures well beyond the strong precinct-based procedures that are already in practice. Physical security of paper ballots is always important. It is particularly important when there is a delay between the time a voter makes her selection and the time the vote is tabulated. A move to central count of voter’s votes means Ohio’s chain of custody procedures for transporting and counting ballots should be re-examined in consultation with independent security experts and election officials to ensure that such procedures are as secure and transparent as possible.

We must add that, to the extent that Ohio moves to a system where all votes are counted on paper ballots, it is essential that the disabled are not disenfranchised in violation of HAVA and the ADA. Paper ballots cannot be marked and verified by some voters with visual and/or physical impairments. This problem can be ameliorated by providing ballot marking devices with suitable assistive interfaces at the precinct level.

In addition to the above points, we would very much like to speak to you in an off-the-record meeting or conference call about your recommendations to move to Ohio’s elections to vote centers and/or a vote-by-mail system. Many of us have serious concerns about the security implications of moving to either system too precipitously. We welcome the opportunity to discuss with you in greater detail steps that Ohio can take to ensure that its elections are as secure, reliable and accurate as possible.

We are grateful to your commitment to secure and accurate elections. Project EVEREST’s findings deserve a careful and thorough policy response that will adequately address voting system vulnerabilities without creating new and unnecessary security or reliability risks. We collectively offer our support and assistance for your efforts to respond decisively and responsibly to the excellent security analysis that Project EVEREST provided.

Sincerely,

David L. Dill, Professor of Computer Science and Electrical Engineering, Stanford University

Edward W. Felten, Professor of Computer Science, Princeton University

David R. Jefferson, computer scientist, Center for Applied Scientific Computing, Lawrence Livermore National Laboratory

Douglas W. Jones, Associate Professor of Computer Science, University of Iowa

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CC: All Ohio Boards of Elections (via facsimile only)

Signatories

The information provided about each signatory is for identification purposes only and does not represent an endorsement of this letter by their organizational affiliations.

Lillie Coney is Associate Director with the Electronic Privacy Information Center (EPIC) in Washington, DC. She is the Public Policy Coordinator for the National Committee for Voting Integrity (NCVI), and has testified before the Election Assistance Commission. She served on the Brennan Center Taskforces on the Security and Usability of Voting Systems. Ms. Coney also served as a member of the ACM Committee on Guidelines for Implementation of Voter Registration Databases. She participated as a contributor in the academic paper “Towards a Privacy Measurement Criterion for Voting Systems.” She has written several law journal articles on voting, and contributed to the development of the Election Incident Reporting System. She is a contributor to the *New York Times* Best Seller, *50 Ways to Love Your Country*. Ms. Coney serves in an advisory capacity to several organizations, which include Verified Voting, ACCURATE, Voting System Performance Rating, and Open Voting Consortium. She is also on the board of Computing Professionals for Social Responsibility.

David L. Dill is Professor of Computer Science and, by courtesy, Electrical Engineering at Stanford University. He has been working actively on policy issues in voting technology since 2003. He is the author of the “Resolution on Electronic Voting”, which calls for a voter-verifiable audit trail on all voting equipment, and which has been endorsed by thousands of people, including many of the top computer scientists in the U.S. Professor Dill has served on the California Secretary of State's Ad Hoc Task Force on Touch-Screen voting, the Citizens DRE Oversight Board of the Santa Clara County Registrar of Voters, and on the IEEE P1583 Voting Equipment Standards Committee. He has testified on electronic voting before the U.S. Senate and the Commission on Federal Election Reform, co-chaired by Jimmy Carter and James Baker III. He is the founder of Verified Voting Foundation and VerifiedVoting.org and is on the board of those organizations. In 2004, Professor Dill received the Electronic Frontier Foundation's “Pioneer Award” for “for spearheading and nurturing the popular movement for integrity and transparency in modern elections.”

Jeremy Epstein is a security researcher and practitioner with more than 20 years of experience, including the past four years in the area of electronic voting. He was one of the expert reviewers for the widely acclaimed Brennan Center report, is a co-founder of Virginia Verified Voting, has served on two Virginia legislative commissions recommending legislation on electronic voting, and is a consultant to the Kentucky Attorney General on the certification of electronic voting systems.

Edward W. Felten is Professor of Computer Science and Public Affairs at Princeton University, and is the founding Director of Princeton's Center for Information Technology Policy. His research interests include computer security and privacy, and technology law and policy. He has published about eighty papers in the research

literature, and two books. Professor Felton's research on electronic voting has been covered extensively in the popular press. His weblog, at freedom-to-tinker.com, is widely read for its commentary on technology, law, and policy. He has testified before the U.S. House Administration Committee on electronic voting. In 2004, Scientific American magazine named him to its list of fifty worldwide science and technology leaders.

Joseph Lorenzo Hall is a Ph.D. candidate at the University of California, Berkeley School of Information working under information law professors Pamela Samuelson and Deirdre Mulligan. Mr. Hall's academic focus is on mechanisms that promote transparency, as core functions of our government go digital. His Ph.D. thesis uses electronic voting as a critical case study in digital transparency. Mr. Hall holds master's degrees in astrophysics and information systems from U.C. Berkeley and is a founding member of the National Science Foundation CyberTrust ACCURATE (A Center for Correct, Usable, Reliable, Auditable and Transparent Elections). He participated in the review of Hart InterCivic Voting System Documentation as part of California Secretary of State's Top-To-Bottom Review of its electronic voting systems and was an elections legal and procedural consultant for Project EVEREST, Ohio's review of its voting systems.

S. Candice Hoke is Associate Professor of Law at Cleveland-Marshall College of Law and the Director of the Center for Election Integrity at Cleveland State University. Professor Hoke is also the Project Director of Public Monitor of Cuyahoga Election Reform. Her expertise in election issues led to her appointment as a Member of the three-person Cuyahoga Election Review Panel, which investigated the causes and remedies for the May 2, 2006 primary debacle. Professor Hoke served as a Team Leader of the review of Diebold Voting System Documentation as part of California Secretary of State's Top-To-Bottom Review of electronic voting systems. She is also initiator and co-author of the Cuyahoga Collaborative Public Audit of the November 2006 Election.

David R. Jefferson is a computer scientist in the Center for Applied Scientific Computing at the Lawrence Livermore National Laboratory. Before joining LLNL, he spent seven years in Silicon Valley at the DEC/Compaq/HP Labs doing Internet-related work, specializing in election security. Earlier in his career, he was a professor of computer science at UCLA. Mr. Jefferson has served (and continues to serve) on a number of government panels at the state and federal levels, advising on election security issues, especially with regard to electronic and Internet voting. He also sits on the board of directors of the California Voter Foundation. Mr. Jefferson is Chair of the California Secretary of State's Voting Systems Technology Assessment and Advisory Board and is Chairperson of California's Post-Election Audit Standards Working Group.

Douglas W. Jones is Associate Professor of Computer Science at the University of Iowa. His research focuses primarily on computer security and electronic voting. Professor Jones was appointed to the Iowa Board of Examiners for Voting Machines and Electronic Voting Systems in 1994 and served as chair of the board from 1999 to 2003. He has testified before the U.S. Commission on Civil Rights, U.S. House Committee on Science,

and Federal Election Commission on voting issues. He is also a member of NSF ACCURATE.

Lawrence D. Norden is Counsel in the Democracy Program at the Brennan Center for Justice at NYU School of Law. Mr. Norden leads the Brennan Center's research and advocacy on electronic voting systems. From 2004 to 2006, he was chair of the Brennan Center's Task Force on Voting System Security. He is lead author of *The Machinery of Democracy: Voting System Security, Accessibility, Usability, and Cost*, the first comprehensive and empirical review of electronic voting systems. Mr. Norden is the author of *The Machinery of Democracy: Protecting Elections in and Electronic World* (Academy Chicago Press 2007) and a contributor to the Encyclopedia of American Civil Liberties (Routledge 2007).

Aviel D. Rubin is Professor of Computer Science and Technical Director of the Information Security Institute at Johns Hopkins University. Prior to joining Johns Hopkins, Professor Rubin was a research scientist at AT&T Labs. He is also a co-founder of Independent Security Evaluators (securityevaluators.com), a security consulting firm. Mr. Rubin is author of several books including *Brave New Ballot* (Random House, 2006) *Firewalls and Internet Security*, second edition (with Bill Cheswick and Steve Bellovin, Addison Wesley, 2003), *White-Hat Security Arsenal* (Addison Wesley, 2001), and *Web Security Sourcebook* (with Dan Geer and Marcus Ranum, John Wiley & Sons, 1997). He is Associate Editor of IEEE Transactions on Software Engineering, Associate Editor of ACM Transactions on Internet Technology, Associate Editor of IEEE Security & Privacy, and an Advisory Board member of Springer's Information Security and Cryptography Book Series. Professor Rubin serves on the DARPA Information Science and Technology Study Group. In January, 2004 *Baltimore Magazine* name Professor Rubin a Baltimorean of the Year for his work in safeguarding the integrity of our election process, and he is also the recipient of the 2004 Electronic Frontiers Foundation "Pioneer Award."

Howard A. Schmidt is President and CEO of R & H Security Consulting, LLC. He has served as Vice President and Chief Information Security Officer and Chief Security Strategist for online auction giant eBay. He most recently served in the position of Chief Security Strategist for the US-CERT Partners Program for the National Cyber Security Division of the U.S. Department of Homeland Security. Mr. Schmidt was appointed by President George W. Bush as the Vice Chair of the President's Critical Infrastructure Protection Board and as the Special Adviser for Cyberspace Security for the White House in December 2001. Prior to his appointment in the White House, Mr. Schmidt served as Chief Security Officer for Microsoft Corporation. Mr. Schmidt also serves as the International President of the Information Systems Security Association (ISSA) and was the first president of the Information Technology Information Sharing and Analysis Center (IT-ISAC). Mr. Schmidt served as an augmented member to the President's Committee of Advisors on Science and Technology in the formation of an Institute for Information Infrastructure Protection. He is a co-author of *The Black Book on Corporate Security* and author of *Patrolling Cyberspace, Lessons Learned from a Lifetime in Data*

Security, and is appointed to the Information Security Privacy Advisory Board (ISPAB) to advise the National Institute of Standards and Technology (NIST).

Ted Selker is Associate Professor of Media Arts and Sciences at Massachusetts Institute of Technology and is the Director of MIT's Context Aware Computing Lab. He is also the MIT director of the Caltech/MIT Voting Technology Project. For the Caltech/MIT voting technology project, Selker is building and testing technology for improving security and accuracy in voting. Before coming to MIT, Professor Selker was an IBM fellow and directed IBM's User Systems Ergonomics Research Lab. He has served as a consulting professor at Stanford University, taught at Hampshire College, the University of Massachusetts at Amherst, and Brown University, and worked at Xerox PARC and Atari Research Labs. He was co-recipient of the Computer Science Policy Leader award from Scientific American Magazine (2004) for his work on voting technology.

Michael I. Shamos is Distinguished Career Professor of Computer Science at Carnegie Mellon University. He is Co-Director of the Institute for eCommerce and Director of the Universal Library. Professor Shamos has been an examiner of computerized voting systems since 1980 and has performed more than 120 certification examinations for six different states and has testified on electronic voting before four Congressional committees and four state legislatures. He recently wrote "A Glossary of Electronic Voting" for the National Institute of Standards and Technology that contains definitions of over 2000 terms used in voting.

Barbara Simons was a member of the National Workshop on Internet Voting, convened at the request of President Clinton, which produced a report on Internet Voting in 2001. She participated in the Security Peer Review Group for the U.S. Department of Defense's Internet voting project (SERVE), co-authoring the report that led to the cancellation of SERVE because of security concerns. She was President of the Association for Computing Machinery (ACM), the nation's oldest and largest scientific society for computing professionals, from 1998 to 2000. Dr. Simons co-chaired a study of statewide databases of registered voters, commissioned by ACM. She is a Fellow of ACM and the American Association for the Advancement of Science (AAAS), and she is the only woman to have received the Distinguished Engineering Alumni Award from the U.C. Berkeley College of Engineering. Dr. Simons is co-authoring a book on voting machines. She is retired from IBM Research.

Alec Yasinsac is Associate Professor of Computer Science at Florida State University. He is Co-Founder and Co-Director of the Security and Assurance in Information Security (SAIT) Laboratory at FSU. He sits on the Florida Help America Vote Act Planning Committee and was on the Advisory Board for the National Academy of Engineering 2007 National Meeting Symposium On Electronic Voting. He led the first academic source code review in support of an election audit for the 2006 Florida U.S. Congressional District 13 race and has conducted several other electronic voting security code reviews and systems security analysis for the Florida Department of State.

VIA FACSIMILE AND ELECTRONIC MAIL

January 9, 2008

Jennifer Brunner
Ohio Secretary of State
180 East Broad Street
Columbus, OH 43215

Re: Impact of Election Administration Changes on Disadvantaged Communities

Dear Secretary Brunner:

With great interest, we have reviewed Project EVEREST's report on Ohio's voting systems, as well the subsequent steps you have taken in reaction to that report, including: your recommendations of December 14, 2007 (the "Recommendations") calling for statewide changes to Ohio election practices; your letter to the Cuyahoga County Board of Elections on December 21, 2007 requiring a replacement of Cuyahoga's voting systems with central count optical scanners; and your Directive 2008-1, dated January 4, 2008 calling for all Ohio counties using DREs to provide voters with paper ballots to be counted centrally.

Collectively, our organizations have spent years working in the areas of election protection and election administration. We represent a diverse group of Americans and Ohioans who, like you, are anxious to see Ohio transformed into a model of effective election administration where all eligible voters have the opportunity to vote and can be confident that their votes will be counted. We applaud your efforts to ensure that Ohio's elections are as secure and accessible as possible in 2008 and beyond. Unfortunately, we fear that some of the steps you have taken and recommendations you have made – without further study and implementation of important procedures – may have the unintentional effect of disenfranchising many of the communities and voters we represent, making it less likely that they will have confidence in Ohio's elections.

Our concerns fall into three main areas:

- A. **Moving to Central Counting of Paper Ballots:** In your Recommendations, you called for Ohio counties to move toward central counting of paper ballots. Since then, you have directed Cuyahoga County to purchase central count optical scanners, and all counties using DREs to offer voters the option of voting on paper ballots, to be later counted centrally. If you proceed with a plan where all votes will be cast on paper and counted centrally, we strongly urge that the following steps be taken:
 1. **Mandate use of precinct count optical scanners in all polling places where paper ballots are used.** Mandating the use of precinct count

optical scanners would give voters the benefit of overvote protection mandated by HAVA. There is a consensus among social scientists who have studied this issue that the overvote protection mandated by HAVA substantially reduces voter error rates, particularly among infrequent, low-income and low-literacy voters. Any steps to eliminate such protection in Ohio's polling places will disproportionately impact those voters.

2. **Ensure that disabled voters have access to ballot marking devices.** The need for security in elections should not disenfranchise the disabled in violation of HAVA and the ADA. Unfortunately, central count optical scanning completely ignores the accessibility needs of voters with disabilities. The problem can be ameliorated by providing ballot marking devices with suitable assistive interfaces at the precinct level. It is critical to note the current ballot marking devices do not yet provide fully accessible vote verification and vote casting, especially for voters with motor impairments.
- B. **Moving to Vote By Mail.** In the Recommendations of December 14, 2007, you counsel requiring "all Special Elections (issues only) held in August 2008 to be voted by mail" and that the state "adopt legislation to allow a county to vote on whether it desires to vote by mail for a temporary or permanent period of time." Regarding this Recommendation, we urge the following steps:
1. **Do not institute any move toward expansion of vote-by-mail until your office has thoroughly consulted with independent experts and developed a plan to address the possible negative impacts of such a move.** Absent a massive public education effort, for which there is probably not enough time before either the August 2008 Special Elections or November 2008 General Elections, a wholesale move to vote-by-mail carries a substantial risk of disenfranchising tens of thousands of elderly, low-literacy, low-income and minority voters who will not have the benefit of overvote protection provided by DREs and precinct count optical scanners. Additionally, there is substantial evidence that vote-by-mail systems often negatively impact low-income and minority turnout while disproportionately benefiting affluent voters. We encourage your office to work with independent experts to study this issue and determine what can be done to ameliorate these negative effects before proceeding with any plans to institute a broader vote-by-mail process.
 2. **Ensure continued access for disabled voters.** Of course, no move to vote-by-mail should make it more difficult for disabled voters to use HAVA-compliant voting systems that allow them to vote independently and privately. Without mechanisms available to support accessible vote-by-mail, which currently do not exist, it is likely that a move to vote-by-mail will create access barriers for voters with disabilities.

- C. **Establishing Vote Centers and Eliminating Polling Places With Fewer Than Five Precincts.** While we have no objection to the study and piloting of vote centers, we believe that a widespread move to vote centers in 2008 would raise serious problems. We are particularly concerned that low-income and disabled voters without cars or access to convenient public transportation could be negatively impacted by such a change. We strongly caution against attempting to make such an extraordinary change in 2008, and again urge you to work with independent experts to study thoroughly how such an action could increase voter turnout without negatively impacting the ability of low-income and disabled voters to get to the polls and ensuring that all polling places are fully accessible to individuals with disabilities.

The Project EVEREST study's findings deserve a careful and thorough policy response that will adequately address voting system vulnerabilities without making it more difficult for historically disadvantaged citizens to vote, and without making it less likely that their votes will be counted accurately. We welcome the opportunity to talk to you as you consider additional steps that Ohio might take to reach our shared goal of ensuring that its elections are secure, accessible and accurate as possible.

Sincerely,

Melanie Campbell, Executive Director/CEO, National Coalition on Black Civic Participation

Diane Golden, Board Director, Association of Assistive Technology Act Programs

Jon Greenbaum, Director, Voting Rights Project, Lawyers' Committee for Civil Rights Under Law

Ellis Jacobs, Dayton Edgemont Neighborhood Coalition

Karla M. Lortz, Ohio Women With Disabilities Network

Laughlin McDonald, Director, Voting Rights Project, American Civil Liberties Union Foundation, Inc.

Lawrence Norden, Counsel, Brennan Center for Justice at NYU School of Law

Shaun Tucker, Ohio State Coordinator, People for the American Way

VIA FACSIMILE AND ELECTRONIC MAIL

January 9, 2008

Jennifer Brunner
Ohio Secretary of State
180 East Broad Street
Columbus, OH 43215

Re: Steps After EVEREST Findings

Dear Secretary Brunner:

Our organizations are committed to ensuring secure, accurate and accessible elections. We are aware that letters were sent to you in the last day by security experts, computer scientists, academics and civil rights groups. Like them, we applaud the completion of the Project EVEREST study and your efforts to address its disturbing findings. We join them in urging you to exercise your powers and influence to ensure that Ohio and its counties take the following steps:

- **Mandate use of *precinct count* optical scanners in all polling places where paper ballots are used;**
- **Put in place a rigorous, transparent, statistically sound post-election audit process;**
- **Work with independent security experts, election officials and independent election administration specialists to develop good chain of custody practices; and**
- **Ensure that disabled voters have access to Ballot Marking Devices where paper ballots are used.**

We agree with those who have urged Ohio to **refrain from instituting large-scale moves toward all vote-by-mail or eliminating polling places with fewer than five precincts** until your office has thoroughly considered the potential consequences of such changes and has consulted with the appropriate independent experts. We can identify many possible negative impacts of such dramatic changes and believe these have not received sufficient attention or weight in the policy-making process. In particular, *we strongly urge your office not to adopt or push for these large-scale changes to election administration in 2008.*

As you consider next steps in planning for Ohio's elections in 2008 and beyond, we ask that you utilize the knowledge of election processes possessed by the undersigned organizations to assist your office in crafting policy and administrative improvements. We all share your desire to see Ohio become a model for the nation in election administration.

Sincerely,

Bob Edgar, President, Common Cause

Jon Greenbaum, Director, Voting Rights Project, Lawyers' Committee for Civil Rights Under Law

S. Candice Hoke, Director, Center for Election Integrity, Cleveland State University

Ellis Jacobs, Dayton Edgemont Neighborhood Coalition

Mary Keith, State Board Chairman, Ohio ACORN

Karla M. Lortz, Ohio Women With Disabilities Network

Maxine Nelson, President, Project Vote

Norman Robbins, Ph.D., Member, Advisory Council, Ohio Voting Rights Institute

Pam Smith, President, Verified Voting Foundation

Shaun Tucker, Ohio State Coordinator, People for the American Way

Catherine Turcer, Ohio Citizen Action

Michael Waldman, Executive Director, Brennan Center for Justice at NYU School of Law

Noah T. Winer, Election Integrity Campaign Director, MoveOn.org Political Action