EXHIBIT H

IN THE UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF GEORGIA ATLANTA DIVISION

DONNA CURLING, et al. **Plaintiff,** **vs.** **BRIAN P. KEMP, et al.** **Defendant.**	**CIVIL ACTION FILE NO.: 1:17-cv-2989-AT**

THIRD SUPPLEMENTAL DECLARATION OF PHILIP B. STARK

PHILIP B. STARK hereby declares as follows:

1. This statement supplements my declarations of September 9, 2018, September 30, 2018, and October 22, 2019. I stand by everything in the previous declarations.
2. I have read portions of the State Defendants' Combined Response in Opposition to Curling Plaintiffs' and Coalition Plaintiffs' Motions for Preliminary Injunction, dated November 13, 2019 ("Combined Response"). This declaration responds primarily to assertions made in the Combined Response, including the declaration of Juan E. Gilbert, Ph.D., contained therein ("the Gilbert declaration").

AUDITS

3. The most compelling reason for post-election audits is to provide public evidence that the reported outcomes are correct, so that the electorate and the losers' supporters have reason to trust the results. Audits that cannot provide evidence that outcomes are correct

are little comfort. A transparent, full hand count of a demonstrably trustworthy paper record of votes can provide such evidence. So can a risk-limiting audit of a demonstrably trustworthy paper record of votes. The advantage of risk-limiting audits is that they are often more economical and efficient than a full hand count; the disadvantage is that they can fail to correct a wrong outcome. What makes an audit "risk limiting" is that the chance it fails to correct a wrong outcome is guaranteed not to exceed a pre-specified limit, the "risk limit."

4. Indeed, by definition, a risk-limiting audit must have a known minimum chance of correcting the reported outcome if the reported outcome is incorrect. A risk-limiting audit corrects the reported outcome by conducting a full manual tabulation of the votes in the paper trail: just like a recount, it requires a trustworthy paper trail. If there is no trustworthy paper trail, a true risk-limiting audit is not possible, because an accurate full manual recount would not necessarily reveal who won. Because BMD printout is not trustworthy, applying risk-limiting audit procedures to BMD printout does not yield a true risk-limiting audit.

5. Defendants assert that a post-election audit can demonstrate that BMDs function correctly during elections. As I wrote in my October 22, 2019, supplemental declaration, audits of BMD-marked ballots (printouts) cannot reliably detect whether malfunctioning BMDs printed the wrong votes or omitted votes or printed extra votes. (Here, as before, I use the term *malfunction* generically to include problems due to bugs, configuration errors, and hacking.) As I wrote then, that is true even if the malfunctions were severe enough to make losing candidates appear to win.

6. Applying risk-limiting audit (RLA) procedures to securely curated BMD printouts can check the accuracy of the tabulation of the printouts. It can provide confidence that if errors in scanning and tabulation were large enough to change the reported winner(s), that fact would be detected and corrected.

7. But such an audit does *nothing* to check whether the BMDs printed incorrect votes, omitted votes, or printed extra votes. Risk-limiting audit procedures check the *tabulation of BMD printouts*; they do not check the *functioning of the BMDs*. They cannot confirm the outcome of elections conducted using BMDs.

8. Indeed, there is no known pre-election or post-election procedure that can tell reliably whether BMDs will malfunction or did malfunction during an election. Nor is there any practical procedure that can reliably detect outcome-altering BMD malfunctions during an election.[1]

9. Therefore, there is no way to establish that BMD printout is a trustworthy record of what the BMD displayed to the voter or what the voter expressed to the BMD.

10. While it is crucial to maintain secure custody of the election paper trail—whether the paper trail consists of hand-marked ballots or BMD printouts—even if BMD printouts have been maintained verifiably securely, they are not a trustworthy record of what voters did, what they saw on the BMD screen, or what they heard through the BMD audio interface, because there is vulnerable software between the voter and the printout. In contrast, computer hacking, configuration errors, and bugs cannot cause pens to put the wrong marks on hand-marked paper ballots.

[1] Stark, P.B., 2019. There is no reliable way to detect hacked ballot-marking devices. ArXiV, https://arxiv.org/pdf/1908.08144.pdf (last visited 20 October 2019).

11. Voters can err in hand-marking ballots and in using a BMD. But BMD printouts are also vulnerable to bugs, misconfiguration, and hacking; hand-marked paper ballots are not.
12. The tabulation of both kinds of paper record is subject to bugs, misconfiguration, and hacking. Rigorous audits can ensure (statistically) that tabulation errors did not alter the reported outcomes. But they cannot ensure that errors in BMD printouts did not alter the reported outcomes.
13. Some voters check their BMD printouts, and, if they notice errors, will request a fresh opportunity to vote. But unless virtually every voter diligently checks the printout before casting it, there is no reason to believe that an accurate tabulation of BMD printouts will show who really won.
14. The evidence suggests that less than ten percent of voters check their printouts, and that voters who do check often overlook errors. See paragraph 30(d), *infra*. As a result, errors in universal-use BMD printouts could alter margins by very large amounts: virtually every contest is decided by fewer votes than undetected, uncorrected errors in BMD printouts could produce.
15. But even if ninety percent of voters check their printouts and correct any errors they find, misprinted votes on the remaining ten percent of printouts could alter a reported margin by twenty percent (or even more than twenty percent, for contests that are not on every ballot). Many contests are decided by margins of less than twenty percent.
16. In an actual election, there is no way to know how many voters checked their BMD printouts for accuracy.

THE NOVEMBER 2019 PILOT RISK-LIMITING AUDIT IN GEORGIA

17. I invented risk-limiting audits in 2007 and published the first peer-reviewed papers about them in 2008.[2] I collaborated with election officials in California and Colorado to conduct the first dozen or so pilot RLAs, starting in 2008.[3] In 2011, I invented and published the particular RLA method[4] used in the 2019 pilot audit of two contests in Cartersville, Georgia, conducted with the assistance of Verified Voting and VotingWorks.[5] (I was not involved in the Cartersville pilot audit.) The method, "ballot polling," was published more formally in 2012 in two peer-reviewed papers I co-authored.[6] I provided open-source software implementing ballot-polling RLAs,[7] which became the basis of the State of Colorado RLA regulations, the software the State of Colorado currently uses for its audits, and the Arlo software used for the Georgia pilot audit. Indeed, I understand that VotingWorks, the company that built the Arlo audit

[2] Stark, P.B., 2008. Conservative statistical post-election audits, *The Annals of Applied Statistics, 2*, 550–581. Reprint: http://arxiv.org/abs/0807.4005
Stark, P.B., 2008. A Sharper Discrepancy Measure for Post-Election Audits, *The Annals of Applied Statistics, 2*, 2008, 982–985. Reprint: http://arxiv.org/abs/0811.1697

[3] Hall, J.L., L.W. Miratrix, P.B. Stark, M. Briones, E. Ginnold, F. Oakley, M. Peaden, G. Pellerin, T. Stanionis and T. Webber, 2009. Implementing Risk-Limiting Audits in California, *2009 Electronic Voting Technology Workshop/Workshop on Trustworthy Elections (EVT/WOTE '09)*

[4] https://www.verifiedvoting.org/philip-stark-report-on-second-risk-limiting-audit-under-ab-2023-in-monterey-county-california/ (last visited 9 December 2019).

[5] Mark Lindeman, Verified Voting, personal communication, 9 December 2019.

[6] Lindeman, M., P.B. Stark, and V.S. Yates, 2012. BRAVO: Ballot-polling Risk-Limiting Audits to Verify Outcomes. *2012 Electronic Voting Technology Workshop/Workshop on Trustworthy Elections (EVT/WOTE '12*)
Lindeman, M., and P.B. Stark, 2012. A Gentle Introduction to Risk-Limiting Audits. *IEEE Security and Privacy, 10*, 42–49.

[7] https://www.stat.berkeley.edu/~stark/Vote/ballotPollTools.htm (last visited 12 December 2019).

software, used my software as a touchstone to ensure that they had implemented the method correctly.[8]

18. Ballot-polling audits are a bit like exit polls, but instead of asking randomly selected voters how they voted, they manually inspect randomly selected cast ballots to see the votes they contain. If a large enough random sample of ballots shows a large enough majority for the reported winner(s), that is strong statistical evidence that the reported winner(s) really won. It would be very unlikely to get a large majority for the reported winner(s) in a large random sample of ballots if the true outcome were a tie, or if some other candidate(s) had won. There is deep mathematics behind proving out how large is "large enough" to control the risk to a pre-specified level, such as five percent. However, the calculations that determine when the audit can stop examining more ballots are relatively simple.

19. No auditing method can check whether BMD printout correctly recorded voters' expressed intent.

20. Ballot polling, the audit method used in Cartersville, does not check whether any BMD printout was tabulated correctly. Ballot-polling audits only check whether a full hand count of the BMD printout would find the same winners. In particular, the vote tabulation system in Cartersville could have mistabulated every single BMD printout and still passed the audit.

21. The Cartersville pilot audit did not—and in principle could not—confirm that the reported outcomes were correct, because it did not and could not show that the BMDs functioned correctly. All the audit did was provide statistical evidence that a full manual

[8] Ben Adida, VotingWorks, personal communication, 8 November 2019.

tabulation of the BMD printouts would find the same winners that were reported in the two audited contests. If the BMD printouts contained outcome-changing errors, the audit would have had no chance of detecting that, nor of correcting the reported outcomes.

22. In contrast, if the election had been conducted with hand-marked paper ballots and those ballots had been properly secured, the same audit procedure could have provided strong evidence that the reported winners really won.

23. I resigned from the Board of Directors of Verified Voting Foundation over their president's refusal to clarify publicly that the Cartersville pilot audit did not "confirm outcomes" or show that the voting system worked correctly.

THE NATIONAL ACADEMIES REPORT

24. Defendants claim that the 2018 National Academies of Science, Engineering, and Medicine report *Securing the Vote: Protecting American Democracy* ("NASEM Report") recommends BMDs. In fact, the NASEM Report draws important distinctions between BMDs and hand-marked paper ballots, and points out that additional research on BMDs should be conducted before BMDs are deployed widely:

    a. "The U.S. Election Assistance Commission, National Institute of Standards and Technology, U.S. Department of Homeland Security, National Science Foundation, and U.S. Department of Defense should sponsor research to: [] determine voter practices regarding the verification of ballot marking device–generated ballots and the likelihood that voters, both with and without disabilities, will recognize errors or omissions[.]" NASEM Report, at 11–12.

b. "Research suggests that DRE VVPATs[9] tend not to be voter verified. This suggests that VVPATs may be of little value as a check on the accuracy of DREs. See, e.g., Everett, S. P., "The Usability of Electronic Voting Machines and How Votes Can Be Changed Without Detection," doctoral dissertation, Rice University, Houston, Texas and Campbell, Bryan A. and Michael D. Byrne, "Now Do Voters Notice Review Screen Anomalies? A Look at Voting System Usability," Proceedings of EVT/WOTE, 2009. Research on the rate of voter verification of BMD ballots relative to the rate of verification of VVPATs or voter-marked paper ballots has been limited." NASEM Report, at 44.

c. "Unless a voter takes notes while voting, BMDs that print only selections with abbreviated names/descriptions of the contests are virtually unusable for verifying voter intent."[10] NASEM report, at 79.

d. "By hand marking a paper ballot, a voter is, in essence, attending to the marks made on his or her ballot. A BMD-produced ballot need not be reviewed at all by the voter. Furthermore, it may be difficult to review a long or complex BMD-produced ballot. This has prompted calls for hand-marked (as opposed to BMD-produced) paper ballots whenever possible." NASEM Report, at 79.

25. Recent congressional testimony of Dr. Matt Blaze of Georgetown University[11] echoes these concerns:

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[9] VVPAT stands for "voter-verified paper audit trail," a printout similar to a cash register receipt that some DREs provide. As explained by NASEM, such receipts are rarely "verified" by voters: the acronym is a misnomer.

[10] I understand that the BMDs Georgia is using are of this type.

[11] Blaze, Matt. Testimony Before the US House of Representatives Committee on Homeland Security, Subcommittee on Cybersecurity, Infrastructure Protection, and Innovation. Hearing on Defending Against Election Interference, November 19, 2019.

> "BMD-based voting systems are controversial, since, by virtue of their design, the correctness of their behavior cannot be effectively audited except by every individual voter carefully verifying his or her printed ballot before it is cast. A maliciously compromised BMD could subtly mismark candidate selections on ballots in a way that might not be noticed by most voters. If BMDs fail or must be rebooted at a polling place, there may be no way for voters to create marked ballots, making BMDs a potential bottleneck or single point of failure on election day.
>
> As a relatively new technology, BMD-based systems have not yet been widely examined by independent researchers and have been largely absent from practical election security research studies. However, even with relatively little scrutiny, exploitable weaknesses and usability flaws have been found in these systems. This underscores the need for more comprehensive studies and for caution before these systems are purchased by local jurisdictions or widely deployed." Blaze testimony, at 8.

26. Defendants claim that "Plaintiffs cannot point to any real security risk or hacking potential the use of BMDs poses." There are countless studies showing that BMDs and other electronic voting equipment have serious security vulnerabilities and can be hacked. The 2018 Def Con Voting Village Report found easily exploited vulnerabilities in the

https://www.congress.gov/116/meeting/house/110238/witnesses/HHRG-116-HM08-Wstate-BlazeM-20191119.pdf (last visited 12 December 2019).

Dominion ImageCast Precinct BMD,[12] which I understand is of the same make that Georgia has deployed, but possibly not the identical model.

DR. GILBERT'S DECLARATION

27. Dr. Gilbert questions my credentials regarding election security, dismissing me as a statistician. I am on the cybersecurity subcommittee of the Board of Advisors of the U.S. Election Assistance Commission. I have authored or co-authored more than 15 peer-reviewed articles in journals and conference proceedings on cybersecurity, information forensics, and the security of electronic voting technology; my co-authors are an international who's-who of cybersecurity experts and cryptographers. I have been a keynote speaker at numerous international conferences on cybersecurity and elections. I have given two distinguished lectures at the Center for Security, Reliability, and Trust at the University of Luxembourg. I am the co-author of a report on election forensics for the Venice Commission of the Council of Europe. I have testified to the California legislature on election security several times, and to the California Little Hoover Commission. I have advised the California Secretary of State and the Colorado Secretary of State on mitigating electronic threats to elections. I have advised the governments of Denmark, Nigeria, and Mongolia on election security. I have been a Visiting Professor of Theoretical Computer Science at the IT University of Copenhagen, sponsored by a Velux/Villum Foundation fellowship to work on election cybersecurity. I am regularly on the program committee of two international election security conferences. And, as

[12] https://media.defcon.org/DEF%20CON%2027/voting-village-report-defcon27.pdf at 18–19. (last visited 12 December 2019).

mentioned above, I invented risk-limiting audits, widely regarded to be the best tool for verifying election outcomes even in the face of hacking and computer malfunctions (provided there is a trustworthy paper trail of votes).

28. Dr. Gilbert's expertise related to elections is in usability. He does not represent himself to be an expert in computer security, statistics, or auditing. I have read his CV dated 24 November 2019.[13] His research focuses on usability, accessibility, inclusion, and the use of technology in teaching and mentoring, for instance, making self-driving cars more accessible, inclusive university admission policies, using "chatbots" to mentor graduate students, "designing a humorous workplace," cyberbullying, and similar subjects. He has two refereed paper related to electronic voting in 2012 and 2013. Both are usability studies, not security studies. His only publication in a security-related journal was in 2008, with eight co-authors, introducing a BMD system he helped design. That paper describes the system and some measures they took to secure it but does not include a formal security analysis of the system. He published a paper on risk analysis of software design (not implementation) with three co-authors, in what appears to be an Alabama-based industrial trade show in 2012.[14] I was unable to find a copy of that paper. His credentials in cybersecurity are limited and inapposite.

29. Many of Dr. Gilbert's pronouncements on security and auditability of BMD systems are erroneous. I shall not rebut them all, but I shall point out a few particularly serious errors.

[13] https://www.cise.ufl.edu/~juan/cv.pdf (last visited 14 December 2019)
[14] AlaSim: https://10times.com/alasim (last visited 14 December 2019) "The annual AlaSim International Conference & Exposition showcases the vibrant, multi-domain, modeling and simulation (M&S) industry in Alabama."

30. Defendants claim, partly on the basis of Dr. Gilbert's declaration, that "BMDs are far more like hand-marked paper ballots than they are like DREs." Combined response, at 2; Gilbert declaration, at 11ff. That is not true from the perspective of technology, security, auditability, or evidence. The only thing BMDs have in common with hand-marked paper ballots is that both involve paper tabulated by scanners, while DREs tabulate directly from an electronic record. Aside from that, BMDs (and their attendant risks) are exactly like DREs with VVPAT:

    a. Vulnerable electronic technology is between the voter and the vote record: the paper trail itself is hackable. There is no trustworthy record of the voter's expressed vote with either technology. Both BMDs and DREs can be hacked—from afar, undetectably. Pens have no software to hack.

    b. In contrast to Defendants' claim that for BMDs (and, by implication, DREs) "there are no questions of voter intent" (Combined Response, at 2), BMDs *obscure all direct evidence* voter intent. This is an example of "the ostrich principle": because BMDs make the problems impossible to detect, Dr. Gilbert concludes that the problems do not exist. It is impossible to know from BMD printout what the voter expressed to the machine or what the BMD presented to the voter on the screen or audio interface. In contrast, voter intent can generally be inferred manually from voters' marks on hand-marked paper ballots.[15]

    c. There is no way a voter can prove that a BMD or DRE printed his or her vote incorrectly, so the underlying "security loop" for both technologies is broken in

[15] See the discussion of the Minnesota recounts in Appel, A., R. DeMillo, and P.B. Stark, 2019. Ballot-marking devices (BMDs) cannot assure the will of the people, SSRN https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3375755 (last visited 20 October 2019).

the same way. Neither system generates any evidence a voter can take to an authority or third party to demonstrate that there was a problem.

d. All extant research of which I am aware suggests that voters rarely check BMD printout or DRE printout, and that voters are not good at catching errors in the printout when they do check.[16]

e. Neither DREs nor BMDs are auditable in practice. Pre-election logic and accuracy testing cannot assure that the devices will perform properly on election day. No practical amount of parallel or "live" testing on election day can provide reasonable assurance that the devices record votes accurately.[17] No post-election procedure can determine whether the devices correctly recorded votes during the election.

f. A DRE can be converted into a BMD by adding a printer and making changes to the software. And a BMD can be converted into a DRE by means of changes to the software alone. The same is not true for hand-marked paper ballots.

31. Dr. Gilbert opines that various properties of BMDs make them preferable, on balance, to hand-marked paper ballots. Gilbert declaration, at 11. His declaration generally does not address the security aspects of BMDs, which are at the heart of the issue. Many of his opinions are contradicted by the available data and by his own research.

32. Most of the advantages he claims universal-use BMDs have over hand-marked paper ballots fall into four categories:

[16] In addition to the studies cited by Appel et al. (2019), I am aware of another study of whether and how well voters check BMD printout that is currently in peer review.
[17] Stark, P.B., 2019.

a. *They are not actually advantages*. Issues of ballot layout and design are in this category: bad layout can greatly increase voter errors for both BMDs and hand-marked paper ballots. Indeed, his own work points out examples where bad screen layout and bad user interfaces in touchscreen voting equipment evidently caused a high undervote rate.[18] Undervote protection also falls partly in this category: both BMDs and precinct-count optical scan hand-marked paper ballots can offer protection against undervotes and overvotes (depending on system configuration); however, BMDs offer an "attack surface" that would allow malware to insert votes in contests the voter deliberately chose not to vote in. That cannot occur with hand-marked paper ballots.

b. *They ride on a misuse of terminology*. For instance, he conflates "ambiguous mark" with "a mark a scanner cannot read." Similarly, his conclusion that hand-marked paper ballots are not strongly software independent ignores part of the definition of strong software independence. And he conflates auditing the tabulation of votes with auditing electoral outcomes—which requires a trustworthy paper record of the votes.

c. *The claimed advantages occur only if the BMDs function correctly*. Usability and overvote and undervote protection also fall partly in this category. The primary problem with BMDs is that there is no way to ensure that they function correctly. They are vulnerable to bugs, misconfiguration, and malicious hacking. This was brought home in the recent election in Northampton, PA, where BMDs were

[18] Gilbert, J.E., J. Dunbar, A. Ottley and J.M. Smotherman, 2013. Anomaly detection in electronic voting systems, *Information Design Journal*, *20*(3), 194–206, at 195–196.

miscalibrated and misconfigured. The configuration errors—which were not discovered by pre-election logic and accuracy tests—were so severe that *voter instructions* (rather than candidates) *received thousands of votes*![19]

d. *The advantages might occur for some BMD systems but not others*. Usability advantages fall in this category: he makes blanket statements that BMDs are usable by voters with disabilities. Gilbert declaration, at 19. A number of BMDs have failed usability testing in other states.[20] (Moreover, increases in usability in recording selections electronically are largely undermined, because the equipment cannot be relied upon to print those selections accurately.) Gilbert makes blanket statements about the usability of By his own admission, he has not inspected the BMD system Georgia is deploying. Gilbert declaration, at 16, 20.

33. I now give more specific examples of incorrect security assessments he made.

34. Dr. Gilbert overlooks the fact that BMD printouts have every security vulnerability that hand-marked paper ballots do, *plus* cyber risks that cannot feasibly be mitigated. In

[19] "An instructional message regarding cross-filed candidates created an error in the machines' database. As a result, thousands of electronic votes were mistakenly cast for the instructional message instead of the correct candidate." T. Shortell and Christina Tatu, The Morning Call, 12 December 2019. https://www.mcall.com/news/elections/mc-nws-northampton-county-election-voting-machine-problems-reason-20191212-6icnnb2fqjfw5dencuy73n66wm-story.html, last visited 13 December 2019. According to this report, the manufacturer admits that 30% of the machines were misconfigured—and that the misconfiguration was not detected by pre-election logic and accuracy testing.

[20] For instance, the Dominion Democracy 5.5 system, including the ImageCast Precinct and the ICX Prime BMD, failed testing in Texas for reasons of security and accessibility. https://www.sos.state.tx.us/elections/laws/jan2019_dominion.shtml (last visited 14 December 2019). The ES&S ExpressVote and ExpressVote XL BMDs failed usability testing in Pennsylvania with several "show stopper" flaws; moreover, the review found that it was "possible but challenging" to verify the BMD printout: https://www.dos.pa.gov/VotingElections/Documents/Voting%20Systems/ESS%20EVS%206021/EVS%206021%20Secretary%27s%20Report%20Signed%20-%20Including%20Attachments.pdf (last visited 14 December 2019)

particular, he makes much of risks involving the physical security of hand-marked paper ballots but ignores the fact that BMD printouts face the same physical security risks (and additional cyber risks).

35. Dr. Gilbert ignores the fragility and unreliability of BMDs and the fact that BMDs produce a bottleneck in the voting process.[21] There are many instances where voting machines did not boot up or misbehaved on election day, preventing voting or undermining voter confidence.[22] Providing an inadequate number of BMDs in polling places will also discourage or prevent voting by creating long lines.

36. He treats risks that require a large conspiracy, insider malfeasance, and physical access to ballots as if they were equivalent to cyber risks, where nation states—or individual hackers—can undetectably alter election results without physical access to any part of the voting system. The primary threats to hand-marked paper ballots are of the first kind. BMDs face exactly the same threats of the first kind, but also face threats of the second

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[21] See paragraph 25, *supra.*

[22] There are many examples of election equipment failures and malfunctions on election day. Here are a few, including some failures of relatively new or brand new equipment: https://www.mcclatchydc.com/news/politics-government/election/midterms/article221196655.html (last visited 16 December 2019) https://www.postandcourier.com/free-times/news/local_and_state_news/richland-county-failed-to-count-hundreds-of-november-election-ballots/article_849a1c98-c21a-5728-afc5-c58aae39e126.html (last visited 16 December 2019) https://www.commoncause.org/media/south-carolina-voting-machine-failure-underscores-need-for-swift-federal-action-for-voting-security/ (last visited 15 December 2019) https://www.pennlive.com/news/2019/11/gop-officials-file-legal-action-in-pa-after-massive-voting-machine-malfunctions-ballots-placed-in-suitcase.html (last visited 15 December 2019) https://www.kansascity.com/news/politics-government/election/article221198575.html (last visited 16 December 2019) https://www.pbs.org/newshour/politics/which-states-were-hit-by-voting-problems-on-election-day (last visited 16 December 2019) https://www.montgomeryadvertiser.com/story/news/2017/12/12/new-voting-machines-cause-senate-election-problem-montgomery-polling-place/944247001/ (last visited 16 December 2019) https://www.upi.com/Top_News/US/2018/10/26/Texas-voters-report-error-with-electronic-voting-machines/9211540569616/?ilink=1 (last visited 16 December 2019)

kind that cannot be controlled by auditing. His discussion of "undervote hacks" and "overvote hacks" on hand-marked paper ballots commits this error.

37. He implies—contrary to the evidence and contradicting his own publications—that voters will catch and correct errors in BMD printout. Every extant study I know of finds that voters rarely check BMD printout, and that when they check, they often fail to notice errors that are present. This is consistent with research on DRE printouts also.[23] His own publications cite research that "no more than half of study participants notice [voting machine] review screen anomalies."[24,25]

38. He claims that BMDs and hand-marked paper ballots are equally auditable. The *tabulation* of both kinds of paper record can be audited, but no practical amount of auditing can offer any assurance that *BMDs themselves* did not malfunction and were not hacked to produce erroneous paper records.[26]

39. The advantages Dr. Gilbert claims BMDs have (undervote and overvote protection, accessibility, etc.) are predicated on the BMDs functioning correctly. But that is precisely the problem: BMDs cannot be relied upon to function correctly, nor is there a reliable way to detect malfunctioning BMDs. Moreover, if BMD malfunctions are detected, there is no way to determine which printouts were affected and what the correct electoral outcome is. The only remedy is to hold a new election.

40. Dr. Gilbert's analysis of overvote and undervote protection assumes that what BMDs print is identical to what the BMD shows voters on the screen or presents voters through

[23] See paragraph 24(b), *supra*, and note 16, *supra.*
[24] Gilbert et al., 2013.
[25] Of course, noticing an anomaly on a review screen and noticing an anomaly on BMD printout are not the same task, and a BMD can print something other what the review screen shows.
[26] Stark, P.B., 2019.

audio. That ignores the possibility of BMD malfunctions and hacking. A BMD can print selections that differ from what the voter was presented on the screen or the audio interface. It can omit contests or votes, add contests and votes, and alter votes. BMDs provide *no* protection against overvotes and undervotes created by BMD malfunctions. Dr. Gilbert assumes away the essential problem: BMD technology is not trustworthy.

41. Dr. Gilbert alleges that there is no effective protection against overvotes or undervotes in hand-marked paper ballot systems. In fact, many, if not all, precinct-count optical scan systems for tabulating hand-marked paper ballots can warn voters of undervotes and overvotes, and can return the ballot to the voter if the voter wishes to re-mark the ballot in response, or allow the voter to override the warning and cast the ballot.

42. BMDs are vulnerable to "presentation attacks," where bugs, misconfiguration, or hacking causes the device not to display a contest the voter has a right to vote in (denying the voter the opportunity to vote in that contest). This can *create* undervotes that the BMD would not help the voter "detect." While contests might be omitted from pre-printed paper ballots, standard pre-election procedures can detect that. In contrast, there is no practical procedure—before, during, or after the election—that can provide a reasonable level of assurance that a BMD presented voters the correct opportunities to vote.

43. Dr. Gilbert's concern about "undervote hacks" identifies an important problem with all paper-based systems, including BMDs: the paper trail must be kept demonstrably secure from additions, subtractions, substitutions, and alterations. That is just as true for BMD printouts as it is for hand-marked paper ballots. A crucial difference he omits, however, is that altering hand-marked paper ballots is intrinsically a "retail" fraud problem: it takes many people, a lot of time, and physical access to the ballots to alter a large number of

ballots. In contrast, BMD printouts are subject to "wholesale" fraud and error as a result of bugs, hacking, or misconfiguration. It does not require many accomplices or physical access to the voting system or the printouts to alter outcomes of elections conducted on BMDs.

44. He expresses concern that systems that lack undervote protection (meaning hand-marked paper ballots) will have disparate impact on minority voters, citing experience in 2000. Gilbert declaration, at 27. More recent data belie this claim. I understand that the DREs in use in Georgia in the 2018 election had undervote protection. But the rate of undervotes in the 2018 Lt. Governor's contest was much higher for voters who used DREs than it was for voters who used hand-marked paper ballots, including ballots cast by mail, which do not have undervote protection. That differential undervote rate was generally *higher* in precincts with higher percentages of Black voters, by an amount that was large and statistically significant.[27]

45. Dr. Gilbert says that BMDs avoid the problem of ambiguous marks. Gilbert declaration, at 18, 29. That is true, but misleading. First, while BMD marks might be unambiguous, they are not trustworthy. *Voter intent on BMD printouts is entirely ambiguous*. No BMD mark can be trusted to represent what the voter expressed to the BMD or what was presented to the voter on the review screen or audio interface. Second, he confuses "ambiguous" with "not machine readable." Some handmade marks are not machine readable, but marks that are ambiguous to human readers are evidently rare. For instance,

[27] Ottoboni, K. and P.B. Stark, 2019. Election Integrity and Electronic Voting Machines in 2018 Georgia, *Proceedings of E-Vote ID 2019. Lecture Notes in Computer Science, 11759*, R. Krimmer, M. Volkamer, V. Cortier, B. Beckert, R. Küsters, U. Serdült and D. Duenas-Cid (Eds.) Springer Nature, Switzerland.

there was a manual recount of 2.9 million hand-marked paper ballots cast in the 2008 Minnesota gubernatorial election. Of those 2.9 million ballots, between 99.95% and 99.99% were unambiguously marked.[28] A risk-limiting audit can rigorously account for hand-made marks that are not machine readable and/or are genuinely ambiguous, but there is no way to protect against the possibility that machine-made marks are incorrect, because they obscure all evidence of voter intent. Trading the trustworthiness of the entire paper trail to save the labor of manually adjudicating some marks that are not machine-readable—but are clear to human readers—is a Faustian bargain.

46. Dr. Gilbert claims that hand-marked paper ballots are not strongly software independent, because they can be tampered with. Gilbert declaration, at 30. Physically tampering with ballots is not a change to the voting system software: it has nothing to do with software independence or strong software independence. Securely curated hand-marked paper ballots are, in fact, the canonical example of a strongly software independent voting system. Software independence and strong software independence were invented to capture key security properties of properly curated hand-marked paper ballots.

47. He claims that the 2018 de Millo et al. study of whether voters check BMD printout is flawed because it did not study whether voters check hand-marked paper ballots. Gilbert declaration, at 31. He missed the point: there is no way that hacking, misconfiguration, or bugs can cause hand-marked paper ballots to be mismarked. Whether voters check their own work us up to them, but essentially every voter must accurately check BMD output or hacking, misconfiguration, or bugs can alter election outcomes. See paragraphs 14–16, *supra*.

[28] Appel et al., 2019.

48. Dr. Gilbert makes blanket statements about the accessibility of BMDs, including systems he has not inspected. Gilbert declaration, at 19ff. I understand that the accessibility of BMDs varies widely, and that a number of current BMD systems have failed multiple states' certification for lack of accessibility. See note 20, *supra*.

49. Dr. Gilbert writes, "If individuals with disabilities vote one way and everyone else votes a different way, this provides fertile ground for an attack. When an attacker knows the specific limitation of the population using a certain system, it is easier for that attacker to tailor an attack without being detected." Gilbert declaration, at 21. In fact, attacks on vulnerable populations are *facilitated* by universal-use BMDs: BMDs know how long the voter takes to vote, whether the voter increases the font size, whether the voter uses the audio interface, whether the voter uses a sip-and-puff device, whether the voter uses a foreign-language ballot, whether the voter reviews and revises selections, whether the voter skips contests, etc., so all those variables can be used by a hacker to target attacks against older voters, voters with cognitive disabilities, voters with physical disabilities, voters with visual disabilities, voters who are not native English speakers, *et al.*[29] Reducing the number of voters who use BMDs decreases the "attack surface" (there are fewer machines), reduces the number of votes that can be altered, and makes attacking BMDs less attractive, because fewer votes are vulnerable.

50. Dr. Gilbert implies that ballot design problems only occur with paper ballots. Gilbert declaration, at 30, 31. But BMD screens (and BMD printout) have the same issues.

[29] Stark, P.B., 2019.

Design always matters, whether the options are displayed on a screen, by audio, or on paper. Indeed, Gilbert's own research supports this.[30]

51. He claims that "[touchscreen miscalibrations] are exceedingly rare in modern touchscreen BMDs unlike older DRE touchscreen machines." Gilbert declaration, at 32. This assumes that the equipment will function as intended, while the threat model must include the possibility of malicious hacking, misconfiguration, negligence, and interference.
52. For instance, a brand-new ES&S ExpressVote XL BMD system in Northampton, PA, was grossly miscalibrated in an election last month—to the point that voter instructions "received thousands of votes." See note 19, *supra.*
53. Deliberately miscalibrating a touchscreen to cause a BMD to record votes incorrectly is simple: I personally performed exactly that hack at Def Con this summer. In about 30 seconds, I was able to re-calibrate a touchscreen voting device so that it registered votes for the wrong candidate.[31]
54. Dr. Gilbert asserts "In essence, a BMD is nothing more than an ink pen—but one that can avoid ambiguous marks that belie voter intent." Gilbert declaration, at 30. In fact, a BMD is a *hackable* pen that leaves no reliable evidence of voter intent. See paragraphs 24, 25, 40, 45, *supra.*

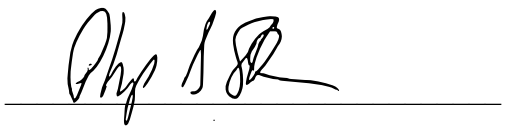
[30] Gilbert et al., 2013.
[31] For an example of voting machine screen miscalibration altering votes "in the wild," see https://www.jconline.com/story/news/2019/11/05/faulty-machines-again-blamed-switching-votes-greater-lafayette-races/4163625002/ (last visited 16 December 2019)

MISCELLANY

55. Plaintiffs mention my service on the EAC Board of Advisors in conjunction with the fact that no systems have been certified to VVSG 1.1 or VVSG 2.0. I do not understand the point they are trying to make. The EAC has been very slow to adopt new standards, despite more than a decade of evidence of problems and gaps in the current standard. Many systems have been certified under VVSG 1.0, but not all the systems are equally good, as measured by trustworthiness, reliability, usability, auditability, cost, and other factors. Auditability and software independence were not even recognized as important criteria until VVSG 2.0. As a member of the EAC Advisory board and its Cybersecurity Subcommittee, I have proposed resolutions regarding a several aspects of voting systems that are crucial to provide evidence that reported outcomes are correct, to ensure that the paper trail is trustworthy, and to enable efficient, effective audits. There are a number of commercial systems certified under VVSG 1.0 that accomplish those goals. The universal-use BMD system Georgia chose to deploy does not.

I declare under penalty of perjury, in accordance with 28 U.S.C. § 1746, that the foregoing is true and correct.

Executed on this date, December 16, 2019.



Philip B. Stark

EXHIBIT I

IN THE UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF GEORGIA ATLANTA DIVISION

DONNA CURLING, et al. **Plaintiff,** **vs.** **BRAD RAFFENSPERGER, et al.** **Defendant.**	**CIVIL ACTION FILE NO.: 1:17-cv-2989-AT**

SUPPLEMENTAL DECLARATION OF KEVIN SKOGLUND

KEVIN SKOGLUND declares, under penalty of perjury, pursuant to 28 U.S.C. § 1746, that the following is true and correct:

1. I have personal knowledge of all facts stated in this declaration, and if called to testify, I could and would testify competently thereto.
2. This a supplemental declaration to my declaration dated October 22, 2019. I stand by all of the statements I made therein.
3. I have reviewed Dr. Juan Gilbert's Declaration, dated November 13, 2019. All paragraph references herein refer to that document.
4. Dr. Gilbert's statement in § 37-A, that scanners for hand-marked paper ballots do not allow intentional undervotes, shows a lack of familiarity with current technology. All of the EAC-certified scanners currently

being sold—including the Dominion ImageCast Precinct scanner—can be configured not only to detect undervotes, but also to show a notification which asks the voter if they want to change the undervote or cast it as-is. This notification is similar to the one Dr. Gilbert describes in § 37-B as being unique to BMD systems. Both systems can detect undervotes and will permit intentional undervotes.

5. In § 37-C, Dr. Gilbert describes an "Undervote Hack" and, in § 37-D, uses it to make an alarmist, non sequitur about Disparate Impact on Minority Voters. In § 38-C, Dr. Gilbert describes an "Overvote Hack" which uses a similar technique of adding marks to a ballot to change the evidence of a voter's intent. However, Dr. Gilbert omits any discussion of how such hacks might be practically performed.

6. Dr. Gilbert's "Undervote Hack" and "Overvote Hack" would require an election insider with enough access to ballots to be able to go through them one by one, completely unobserved, looking for targets of opportunity. An insider with unfettered access to impounded ballots would have the opportunity to do far worse damage to the election than to steal a handful of undervotes. The type of ballot (hand-marked or machine-marked) and the manner of altering the ballots would not be significant. The insider would be able to add, remove, exchange, or deface as many ballots as they liked.

7. Dr. Gilbert's statement in § 38-A, that scanners for hand-marked paper ballots provide no limitation to prevent overvoting and "in theory… could be programmed to reject an overvoted ballot," shows a surprising lack of knowledge about voting systems. A significant requirement in the Help America Vote Act (HAVA) passed in 2003 was that *all* voting machines *must* alert voters to overvotes. They all do.
8. Dr. Gilbert goes on to speculate that overvote detection "could result in long lines" and "could lead to voter frustration and voters choosing not to vote." Since HAVA passed, there is no evidence to give credence to these speculative fears. My personal experience as a Judge of Election has been that voters appreciate when an overvote is detected. I have never observed overvote detection resulting in lines, voter frustration, or voters opting not to vote at all.
9. Dr. Gilbert's asserts, in § 40-C and §40-D, that Plaintiffs are asking voters with disabilities to use the same BMDs which Plaintiffs warn are insecure. This misunderstands how cybersecurity evaluates vulnerabilities and risks. Experts weigh risks by examining the likelihood and the impact of exploiting a vulnerability. Moving most voters off of insecure BMDs reduces risks in two different ways: by reducing the overall systemic risk (less voters affected), and by making the insecure BMDs a less attractive target because the impact of any manipulation will

be small and ineffective on the election results. When the effort and risk of attracting attention greatly outweigh the rewards, attackers seek targets with more impact. All voters benefit from fewer risks.

10. For this reason, I could not disagree more strongly with Dr. Gilbert's claim in § 40-F that "from a security perspective, it is better to have a diversity of voters using the same equipment rather than isolating a certain demographic of voters by type of equipment or voting process." He makes a logical leap that makes no sense and contradicts basic security principles. Exposing parts of a system—in this case, voters—to fewer risks will always be more secure.

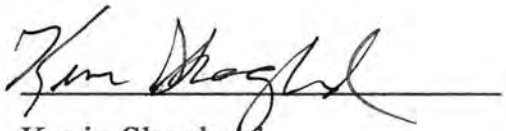
11. In § 65, Dr. Gilbert mischaracterizes my testimony about long lines by conflating it with the speed of voting. While it may be true that a single voter can cast a ballot faster on a BMD than by hand-marking (Dr. Gilbert does not provide his evidence), it is irrelevant. Systems where voters hand-mark paper ballots have shorter lines due to the rate at which a *series* of voters can move through the polling place. Dr. Gilbert does not address or dispute that these systems have higher voter throughput due to significantly increased parallelization of voting.

12. In fact, allowing each voter to vote more slowly is a benefit of hand-marked paper ballot systems. Voters who have cognitive or language challenges can take their time marking a ballot at one of many vote

marking stations. Faster voters do not need to wait for them because there can be many stations. With BMDs, these voters may feel pressure that a long line is forming behind them while they monopolize one of only a few voting booths.

13. In § 66, Dr. Gilbert dismisses touchscreen miscalibration errors as "exceedingly rare." Yet there were widely reported problems in Texas in November 2018, when touchscreens switched votes in a high-profile Senate contest from Beto O'Rourke to Ted Cruz, and vice versa. In November 2019, touchscreen miscalibration was rampant in Philadelphia and Northampton County, enough that two candidates feared for their election and sought the court's help on election day.

Executed on this date, December 16, 2019.



Kevin Skoglund

EXHIBIT J

IN THE UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF GEORGIA ATLANTA DIVISION

DONNA CURLING, et al. **Plaintiff,** **vs.** **BRAD RAFFENSPERGER, et al.** **Defendant.**	**CIVIL ACTION FILE NO.: 1:17-cv-2989-AT**

SUPPLEMENTAL DECLARATION OF KEVIN SKOGLUND

KEVIN SKOGLUND declares, under penalty of perjury, pursuant to 28 U.S.C. § 1746, that the following is true and correct:

1. I have personal knowledge of all facts stated in this declaration, and if called to testify, I could and would testify competently thereto.
2. This a supplemental declaration to my declaration dated October 22, 2019. I stand by all of the statements I made therein.
3. I have reviewed Dr. Juan Gilbert's Declaration, dated November 13, 2019. All paragraph references herein refer to that document.
4. Dr. Gilbert's statement in § 37-A, that scanners for hand-marked paper ballots do not allow intentional undervotes, shows a lack of familiarity with current technology. All of the EAC-certified scanners currently

being sold—including the Dominion ImageCast Precinct scanner—can be configured not only to detect undervotes, but also to show a notification which asks the voter if they want to change the undervote or cast it as-is. This notification is similar to the one Dr. Gilbert describes in § 37-B as being unique to BMD systems. Both systems can detect undervotes and will permit intentional undervotes.

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6. Dr. Gilbert's "Undervote Hack" and "Overvote Hack" would require an election insider with enough access to ballots to be able to go through them one by one, completely unobserved, looking for targets of opportunity. An insider with unfettered access to impounded ballots would have the opportunity to do far worse damage to the election than to steal a handful of undervotes. The type of ballot (hand-marked or machine-marked) and the manner of altering the ballots would not be significant. The insider would be able to add, remove, exchange, or deface as many ballots as they liked.

7. Dr. Gilbert's statement in § 38-A, that scanners for hand-marked paper ballots provide no limitation to prevent overvoting and "in theory… could be programmed to reject an overvoted ballot," shows a surprising lack of knowledge about voting systems. A significant requirement in the Help America Vote Act (HAVA) passed in 2003 was that *all* voting machines *must* alert voters to overvotes. They all do.
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9. Dr. Gilbert's asserts, in § 40-C and §40-D, that Plaintiffs are asking voters with disabilities to use the same BMDs which Plaintiffs warn are insecure. This misunderstands how cybersecurity evaluates vulnerabilities and risks. Experts weigh risks by examining the likelihood and the impact of exploiting a vulnerability. Moving most voters off of insecure BMDs reduces risks in two different ways: by reducing the overall systemic risk (less voters affected), and by making the insecure BMDs a less attractive target because the impact of any manipulation will

be small and ineffective on the election results. When the effort and risk of attracting attention greatly outweigh the rewards, attackers seek targets with more impact. All voters benefit from fewer risks.

10. For this reason, I could not disagree more strongly with Dr. Gilbert's claim in § 40-F that "from a security perspective, it is better to have a diversity of voters using the same equipment rather than isolating a certain demographic of voters by type of equipment or voting process." He makes a logical leap that makes no sense and contradicts basic security principles. Exposing parts of a system—in this case, voters—to fewer risks will always be more secure.

11. In § 65, Dr. Gilbert mischaracterizes my testimony about long lines by conflating it with the speed of voting. While it may be true that a single voter can cast a ballot faster on a BMD than by hand-marking (Dr. Gilbert does not provide his evidence), it is irrelevant. Systems where voters hand-mark paper ballots have shorter lines due to the rate at which a *series* of voters can move through the polling place. Dr. Gilbert does not address or dispute that these systems have higher voter throughput due to significantly increased parallelization of voting.

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Executed on this date, December 16, 2019.

Kevin Skoglund

IN THE UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF GEORGIA ATLANTA DIVISION

DONNA CURLING, et al. **Plaintiff,** **vs.** **BRAD RAFFENSPERGER, et al.** **Defendant.**	**CIVIL ACTION FILE NO.: 1:17-cv-2989-AT**

DECLARATION OF HARRI H. HURSTI

HARRI H. HURSTI declares, under penalty of perjury, pursuant to 28 U.S.C. §1746, that the following is true and correct:

1. My name is Harri H. Hursti.

2. I have personal knowledge of all facts stated in this declaration, and if called to testify, I could and would testify competently thereto.

3. I am a technologist who has worked in security-oriented IT technology for over 30 years and participated in building the first pan-European Internet Service Provider, EUnet. I have extensive knowledge observing, witnessing and preventing malicious activities in networked environments. My background as a cybersecurity expert started in the mid-1980s with technologies to protect

national security level systems, information, and developing secure communication protocols.

4. I have briefed law and policy makers around the world concerning various election security issues, including the Presidential Advisory Commission on Election Integrity on September 12th, 2017.

5. I have briefed state and local governments on election cyber security.

6. I have been researching US election infrastructure security since 2005. The HBO docume.. ary film 'Hacking Democracy' features my successful proof-of-concept mock election hack to alter reported results in an election machine used in US elections.

7. I participated as a researcher when Ohio's Secretary of State commissioned the "Evaluation and Validation of Election-Related Equipment, Standards and Testing", also known as EVEREST. The purpose of the study was to validate all previous research available about voting systems used in Ohio before conducting further research. The report exposed the significant and varied security vulnerabilities in the state's primary voting systems. While this study was published over 10 years ago, it is still relevant, because many system and software versions evaluated then are still widely in use, and the vulnerabilities have not been adequately addressed.

8. I am a co-founder and co-organizer of the DEF CON Voting Machine Hacking Village. The host event, DEF CON, one of the world's largest and most notable global security research and hacker community conventions, is held annually in Las Vegas, Nevada. DEF CON is a 3-day event which attracts about 30,000 attendees.

9. The Voting Machine Hacking Village is an educational event at DEF CON which allows interested parties to research, learn, and study security properties of the voting machines used in the USA and overseas. It is not security testing or evaluation, it is an event where interested parties come to learn and all discoveries are incidental to the main mission, yet new discoveries happen in volumes every year. In 2018, the Voting Machine Hacking Village was awarded a Cybersec. rity Excellence Award. In 2019, we started the "Unhack the Ballot" initiative, aiming to pair local election officials with volunteer hackers to help the officials gain access to security expertise, and better understand the expanse of very real current threats to the nation's election equipment.

10. Every voting machine presented for security research in DEF CON Voting Machine Hacking Village has been hacked during the event. In security research, the participants are only discovering vulnerabilities and reporting

those. Security research does not include the process of weaponization which would include distribution mechanics and deployment. Security research does not aim to produce demonstrable attacks.

11. DEF CON serves as an important looking glass to understand the state of the art in attack development and the emerging new techniques to discover vulnerabilities around the world. An up-to-date understanding of the newest offensive technologies is important for realistic threat analysis and the development of successful defensive and mitigation strategies. The underlying fundamentals of most threats, attack surfaces, and attack vectors are seldom industry-specific. It is very common that the same root causes repeat themselves across a multitude of industries, enabling attackers to target many systems by easy adoption across the board where similar hardware or software designs and architectures are utilized. Voting technology is utilizing a lot of general-purpose hardware and general-purpose operating systems in many parts of the architecture, and therefore it shares a wide range of commonalities in the threat landscape with other seemingly unrelated industries. These commonalities are used by threat actors to move from one target industry to another with greatly lowered barriers.

12. In August 2019, DEF CON introduced two different models of Ballot-Marking Devices for the first time. One of the devices was stand-alone and the other was an integrated ballot marking device with a paper ballot scanner . this kind of machine is sometimes referred to as a 'hybrid' device. Both devices were hacked for the first time within 8 hours of the beginning of the event. The general characteristics of the discoveries underlined the lack of security in both the architecture and the implementation of these systems.

13. Independent security studies like California's Top-to-Bottom Review or EVEREST has not included Ballot-Marking Devices as target systems. Furthermore, many sub-technologies introduced into the voting process with Ballot-Marking Devices, like 2D barcodes, have not been part of the systems tested.

14. These technologies introduce new known and exposed attack surfaces, for example barcodes implementations have been found to introduce new vulnerabilities in studies which are not election system studies, but share relevant similarities in characteristics and architectural elements with election systems. These vulnerabilities spread over multiple source categories of severe vulnerabilities and attack vectors.

15. Academic research and independent studies such as EVEREST and TTBR have not been conducted on barcode generating BMDs as a general class of devices and specifically, Dominion ImageCastX has not been part of the systems studied. However, without studies, just an inspection of publicly available materials like User Manuals reveal many areas of vulnerabilities. Screenshots in the manuals show that the devices have Internet software installed. Furthermore, the sample ballots in the training materials show consistently that the barcode on the ballot does not contain a human-verifiable representation of the .. ter's choices, and that the barcode utilizes the second-lowest error correction setting available in the standard.

16. Based on my background, the current trends in the hacker and security research landscape and the fundamentals shared between the voting infrastructure and elements which have already been compromised and proven to be a source of vulnerabilities, I find it probable that a system like Georgia's Dominion Voting System can and will be targeted by adversarial parties.

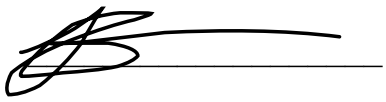
17. Furthermore, considering the available information paired with the threat catalogs at the disposal of the adversaries, it is my professional opinion, a well-funded and motivated adversary can plan and execute a hard-to-detect attack, if not impossible-to-detect the attack against the system. The security community

in general, and election security community specifically considers such attacks as almost inevitable and accepted as such.

18. While the hand marked paper ballot remains the gold standard, Ballot-Marking Devices as computerized systems are subject to cyber-attacks which can compromise the integrity of the paper trail. Without a reliable paper trail, meaningful auditing of the results becomes impossible.

19. A system like Georgia's Dominion V.. ing System has properties which are a target-rich environment for multiple classes of potential threat actors. Based on the documentation available, there are a multitude of exposed attack surfaces for remote and wholesale attacks. Without a thorough security evaluation and analysis of both the system and the deployment plan, the insider attack vectors are harder to enumerate.

Executed on this date, December 16, 2019.



Harri H. Hursti

EXHIBIT K

IN THE UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF GEORGIA ATLANTA DIVISION

DONNA CURLING, et al. **Plaintiff,** **vs.** **BRAD RAFFENSPERGER,, et al.** **Defendant.**	**CIVIL ACTION FILE NO.: 1:17-cv-2989-AT**

SUPPLEMENTAL DECLARATION OF RICHARD DEMILLO

RICHARD DEMILLO declares, under penalty of perjury, pursuant to 28 U.S.C. § 1746, that the following is true and correct:

1. I have personal knowledge of all facts stated in this declaration, and if called to testify, I could and would testify competently thereto.
2. This declaration supplements my declaration of November 21, 2018, and I stand by all statements in my previous declarations.

3. My name is Richard DeMillo, I am the Charlotte B. and Roger C. Warren Professor of Computer Science and Executive Director of the Center for 21st Century Universities at Georgia Tech. I was Dean of the College of Computing from 2002-2009 and before that was Chief Technology Officer for Hewlett-Packard, Vice President and General Manager of Research at BellCore, Director of the Computer and Computation Research Division of the National Science Foundation, and Director of the Software Test and Evaluation Project for the US Department of Defense. My complete CV is attached to this declaration as Exhibit 1.
4. I am not a retained expert for any party to this lawsuit.
5. I receive no compensation from my work on election security beyond the salary I, like every tenured full professor, draw from Georgia Tech to enable the independent pursuit of research.
6. My research specialties include cybersecurity and software engineering, fields in which I have worked for over 40 years, resulting in published articles, reports, and patents related to the security of computer-controlled systems. I have taught graduate and undergraduate courses, supervised PhD students and served on advisory boards and panels, including most recently the Commission on Election Security for the Michigan Secretary of State.

7. I have also served on boards of directors for both public and private companies in the computer security industry. I currently have no memberships, business agreements or financial ties that would affect my independent judgement in matters related to this declaration.

8. My statements in this declaration are offered as a result of reading and analyzing the State Defendant's Combined Response in Opposition to Curling Plaintiffs' and Coalition Plaintiffs' Motions for Preliminary Injunction, dated November 13, 2019 ("Combined Response").

9. This declaration responds primarily to assertions made in the Combined Response and is based on publicly available documents published by Dominion and the State as well as the written literature on cybersecurity as applied to voting systems

10. Defendants' statement that the Dominion BMDs are "far more like hand-marked paper ballots than they are like DREs," is objectively false. Dominion's own description of the BMD known as ImageCast X deployed in Georgia (State of Georgia Request for Information (RFI): New Voting System Event number 47800-SOS0000035" prepared by Dominion by Waldeep Singh, Executive Vice President of Sales August 24, 2018) states that this BMD, "can also be configured as a DRE configuration."

11. What differences exist between Dominion's DREs and BMDs increase vulnerabilities and risks (from "State of Georgia Request for Information (RFI): New Voting System Event number 47800-SOS0000035" prepared by Dominion by Waldeep Singh, Executive Vice President of Sales August 24, 2018):

    a. Unlike existing DREs, the ImageCast X "is comprised entirely of COTS (commercial off-the-shelf) hardware." COTS hardware is not hardened for secure applications like voting and is therefore vulnerable to the same attacks that would be mounted on consumer-grade electronics.

    b. Unlike existing DREs, the ImageCast X transfers electronic records of cast ballots using exposed cables, enabling non-destructive man-in-the-middle attacks.

    c. Unlike existing DREs, the ImageCast X is capable of a "mobile printing" function that would enable completed ballots to be printed at remote facilities, compromising both ballot secrecy and enabling a network-based man-in-the-middle attack.

12. For these reasons and others noted below, the ImageCast X has all of the DRE system vulnerabilities noted by the Court in its August ruling. If an APT attack

were to be mounted on Georgia's election system, it is my opinion that design weaknesses in the ImageCast X would enable such an attack to succeed.

13. Therefore, detecting such attacks by conducting risk-limiting audits ("RLAs") of the election outcome is a high priority. However, there is a substantial literature, consolidating fifty years of research across many disciplines, indicating that an essential security flaw in ballot-marking devices like the Dominion ImageCast X renders such audits meaningless when attempted on the election results output of such devices. This literature is summarized below and in a report entitled "Ballot Marking Devices (BMDs) cannot assure the will of the voter," which has been posted on the open access journal SSRN (https://dx.doi.org/10.2139/ssrn.3375755). This report has been viewed more than 14,000 times and downloaded 850 times since its publication, and its conclusions have not been rebutted.

14. One particularly vulnerable aspect of the Dominion Democracy Suite™ solution sold to Georgia ("Georgia's Dominion Voting System" referenced in the Coalition Plaintiff's documents) is the incorporation of over 30,000 consumer grade laser printers (the HP LaserJet Pro M402dne printer) as part of the voter-facing voting system. Printing the ballot to be scanned is one of the most critical functions of the BMD. An attack on the printer enables vote switching that reduces the risk to the attacker by bypassing the ImageCast X

Ballot Marking Device completely. These printers are unprotected by security subsystems and subject to man-in-the-middle attacks as mentioned above. The web-based management panel which controls critical printer functions is disabled during system setup by a password-based administrative function. As was disclosed recently (Exhibit 2 attached and tweeted as shown below) Georgia election officials are prone to choosing and universally applying passwords like “1234” that are easy for attackers to guess. (Democracy Suite ImageCast X User Guide, version 5.11-CO::9 June 5, 2019)

15. Without effective, near-universal voter verification, results tabulation audits of machine marked paper ballots are meaningless exercises since, unless voters accurately check printed ballots, the records being examined in the audit of a potentially compromised machine must be presumed to be fraudulent. In that event, all the audit can confirm is that fraudulent ballots might have been correctly counted, limiting the findings to the accuracy of the arithmetic.

16. Defendants' filing paints a false picture of scientific status of voter verification, calling studies "deeply flawed" and giving the impression that there are equally compelling arguments showing just the opposite conclusion. It is significant that neither the Defendants nor their retained experts say what those flaws are and how they affect the conclusions.

17. Even if Defendants were in good faith to refuse to accept the results of proffered studies, it does not automatically follow that voters can verify machine marked ballots in sufficient numbers and with sufficient accuracy to rescue RLAs as a way of detecting error due to hacking, misprogramming or misconfiguration. Defendants and their experts present no evidence whatsoever on that matter.

18. Defendants' experts do speculate on capabilities that might be discovered in the future and incorporated into future Ballot Marking products. None of those

capabilities exist today, however, and there are significant scientific barriers to any such capabilities that would facilitate meaningful post-election audits.

19. There is a rich line of literature on the impossibility of voter verification and cognitively similar tasks that confirms and reinforces Plaintiff's experts' opinions and offers virtually no support for Defendants' contention that voters are capable of verifying their ballots. This literature spans and consolidates fifty years of research findings as reported in hundreds of scientific articles and reports, industry and government standards, and safety-based regulatory rule-making. Furthermore, there is video evidence (see paragraph 21 below) that BMD vendors themselves do not believe voters verify ballots in large numbers and have in fact used this fact to market their devices to election officials around the world.

20. The remainder of this declaration corrects the impression in the Combined Response that there is substantial scientific disagreement among independent experts about the unauditability of Ballot Marking Devices like Dominion's ImageCast X or that such findings are premature and outlines the scientific evidence suggesting it is prudent to reject machine marked ballots as a viable option for auditable elections.

21. BMD vendors seem to know that voter verification is a myth. See for example this ES&S sales video making light of the possibility of voter verification and

telling potential customers how the lack of incentives for effective voter verification keeps wait times to a minimum because voters do not naturally queue up to check their ballots (https://youtu.be/066x9GMGME8 at minute 40:40).

22. Most voters do not examine their ballots:

a. (2018) DeMillo, Kadel and Marks (https://dx.doi.org/10.2139/ssrn.3292208); although Defendants refer to this paper as "flawed" they present no rebuttal whatsoever to the principle conclusion that less than half of all voters check their ballots.

b. (2020) Soon-to-be published work conducted at the University of Michigan also finds that half or more of all highly motivated voters fail to check their ballots.

c. (2019) My own subsequent in person observations in the three BMD pilot voting locations in the November 5, 2019 Georgia municipal elections also confirm that far fewer than half of all voters do more than glance at ballot cards prior to casting the ballot.

d. (2007) Field studies in Nevada and other jurisdictions report that fewer than 40% of voters check their paper ballot summary:

https://arstechnica.com/information-technology/2007/04/congress-finally-considers-aggressive-e-voting-overhaul/.

23. Even voters who choose to view their ballot card contents cannot do it accurately and effectively:

a. (2007) Sarah Everett of Rice University found that two-thirds of test voters did not notice when 8 races disappeared entirely from their review screens: Everett, S. P. (2007). Doctoral dissertation, Rice University, Houston, TX. See especially, discussions on page 77 and 103: http://www.wheresthepaper.org/SarahPEverettDissertation.pdf.

b. (2006)Ted Selker of the CalTech/MIT Voting Project listed these problems that make it difficult for voters to verify: paper looks different, different format than what appeared on the screen, separate thing to look at, extra time and step for voting, poor lighting and poor readability: https://www.nist.gov/system/files/documents/itl/vote/7-Selker.pdf.

c. (2005) Selker also testified to Congress that in a study where test voters cast votes in 108 test elections in which the printed ballot contained errors, test voters found no errors: http://vote.caltech.edu/documents/112/vtp_wp31.pdf.

d. (2020)The University of Michigan study cited above will report the most negative results for voter verification to date: voters left to their own devices detect only 6% of the errors introduced in sample ballots. Various polling place interventions can raise that error detection rate to nearly 15%, but that rate is not sufficient to support RLAs. The authors report one highly intrusive intervention that raised error detection to 85%, but offered no suggestion for how such an expensive intervention with voters could be deployed and monitored or enforced.

e. (2018) The National Academy of Sciences report "Securing the Vote"(http://nap.edu/25120) found that, absent a complete record of votes expressed, voters would be unable to recall all of their prior choices and compared the verification of hand marked paper ballots to machine marked ballots as follows: "Problems arise when a voter does not actually verify his or her ballot, especially when the ballot is being tabulated by a computer that has a software flaw or is infected with malware (see Chapter 5). A ballot that is "voter marked" is by definition voter verified."

24.(1991) Effective performance for voter verification of their ballots is comparable with performance in other cognitively similar tasks. This is

consistent across many fields of endeavor and reflects the ability of people to attend to the original task at hand (e.g., filling out a paper ballot by hand) as opposed to detecting errors when the task is to find them (James Reason, Human Error, Cambridge University Press, 1991, especially Chapter 6).

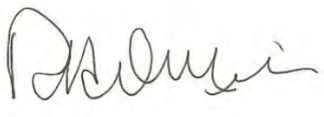
a. While diligent people can be trained to minimized errors in cognitive tasks, error detection rates are between 50% and 80%.

b. There is wide variation between individuals. Experience at the task matters only slightly. In tasks similar to ballot verification, a reasonable expectation is that base rates can be improved upon by only a few percent.

c. Error reporting and correcting seems to require the intervention of a third party, which compromises ballot secrecy.

d. Environmental factors unfavorable to the task of ballot verification have a pronounced negative effect on a person's innate ability to detect errors.

Executed on this date, December 16, 2019.



Richard A. DeMillo

EXHIBIT

1

Richard A. DeMillo

Curriculum Vita

Present Position

- Georgia Institute of Technology, Atlanta GA 30332
  - Charlotte B. and Roger C. Warren Professor of Computing
  - Professor of Management,
  - Executive Director, Center for 21st Century Universities

Education

- BA, Mathematics, 1969, College of St. Thomas, St. Paul Minnesota
- Ph.D., Information and Computer Science, 1972, Georgia Institute of Technology, Atlanta, Georgia

Professional Experience

2015-Present	Charlotte B. and Roger C. Warren Professor of Computing Executive Director, Center for 21st Century Universities Georgia Institute of Technology Atlanta, GA 30332
2013-2014	Distinguished Chief Scientist Qatar Computing Research Institute Qatar Foundation Doha, Qatar
2002-Present (On Leave 2013-2014)	Professor of Management John P. Imlay Dean of Computing (2002-2009) Director, Georgia Tech Information Security Center (2002-2004) Georgia Institute of Technology Atlanta, Georgia 30332
2000-2002	Chief Technology Officer Vice President Hewlett-Packard Company 3000 Hanover Street Palo Alto, CA 94303
2000	General Manager Internet Systems Group Telcordia Technologies (Formerly Bellcore) 445 South Street Morristown, NJ 07960
1994-2000	Vice President and General Manager Information and Computer Sciences Research Telcordia Technologies (Formerly Bellcore) 445 South Street Morristown, NJ 07960
1994	Visiting Professor Department of Electronics and Informatics University of Padua Padua, Italy
1989-91	Director Computer and Computation Research Division National Science Foundation 1800 G Street NW

	Washington, DC
1987-96	Professor of Computer Science and Director Software Engineering Research Center Purdue University West Lafayette, Indiana
1985-87	Director Software Engineering Research Center Georgia Institute of Technology Atlanta, Georgia
1984-87	Assistant Director for Research School of Information and Computer Science Georgia Institute of Technology Atlanta, Georgia
1981-87	Professor of Information and Computer Science School of Information and Computer Science Georgia Institute of Technology Atlanta, Georgia
1976-81	Associate Professor of Information and Computer Science School of Information and Computer Science Georgia Institute of Technology Atlanta, Georgia
1972-76	Assistant Professor Department of Electrical Engineering and Computer Science University of Wisconsin, Milwaukee Milwaukee, Wisconsin
1969-72	Research and Teaching Assistant School of Information and Computer Science Georgia Institute of Technology Atlanta, Georgia
1969-71	Research Assistant Los Alamos National Laboratory Los Alamos, New Mexico

Research and Consulting Experience

Rich has been a consultant to many major corporations and other organizations. Detailed descriptions of recent consultantships are available upon request:

Board Memberships

Rich has been a board member and director of many public and private corporations, foundations and philanthropic organizations. Detailed descriptions of recent board memberships are available upon request:

Professional Recognition

ANAK, Outstanding Faculty Award (2106)

American Publishers Association Best Book Award (Education, 2016)

Inaugural Fellow of the Lumina Foundation

Fellow of the Association for Computing Machinery

Fellow of the American Association for the Advancement of Science

Panels and Advisory Positions

1983:	Secretary of Defense Blue Ribbon Panel (The Eastman Panel) to Define the Software Engineering Institute (SEI)
1983-1985:	IBM Software Tools Advisory Board
1984:	Congressional Office of Technology Assessment Panel on Research Directions in Software Engineering.
1987:	National Research Council Committee on Computer Security
1993-1996:	National Research Council committee on Statistical Methods in Software Engineering
1992-1993:	FAA VSCS Independent Fault Analysis Team
1995:	National Research Council committee on Commercial Software Practices in Defense Software
1995-2000:	Princeton University Computer Science Advisory Committee
1998-2000:	Advisory Board of the College of Computing, Georgia Tech
2000-3:	Georgia Tech Advisory Board
2001-2005:	Advisory Board of the Johns Hopkins University Computer Sciences Department
2003-2005:	National Research Council Committee on Telecommunications Research
2004-2005:	National Research Council Committee on Network Science and the Army's Future Needs
2005	Defense Science Board Committee on Security of Software
2010-2013	Strategic Advisory Committee (Chair) Qatar Computing Research Institute
2012	AMA Advisory Board on Medical Education
2012-2016	World Economic Forum Global Action Council on the Future of Universities
2012-2015	Pacific Northwest National Laboratories National Security Advisory Council
2012-2016	Western Governors University Advisory Board
2013-2016	Singapore Institute of Technology and Design Advisory Board
2015	IEEE Computer Society, Research Advisory Board
2019	Michigan Commission on Election Security, Department of State, State of Michigan

Editorships

1990-96	Series Editor, *Software Science and Systems*, Plenum Publishing Company
1989-96	Editorial Board, *ACM Transactions on Software Engineering and Methods*
1988-94	Editorial Board, *IEEE Transactions on Software Engineering*
1985-87	Editorial Board, *Information and Control*
1982-85	Editorial Board, *ACM Transactions on Mathematical Software*

Biographical

- American Men and Women of Science
- Who's Who in America
- Who's Who in the World

Professional Societies

- Association for Computing Machinery
- American Mathematical Society
- Mathematical Association of America
- Society for Industrial and Applied Mathematics
- American Association for the Advancement of Science
- Association for Symbolic Logic
- IEEE

Rich has served on numerous program committees for professional meetings. In addition, Rich has served as Chairman or Program Chairman for the following annual conferences

- 15th International Conference on Software Engineering, 1993
- ACM SIGSOFT Annual Symposium, 1989 (Testing, Analysis and Verification)
- ACM Computer Science Conference, 1988
- ACM Symposium on Theory of Computing, 1984
- NSIA Conference on Test and Evaluation, 1983
- ACM Symposium on Principles of Programming Languages, 1982
- First IEEE Symposium on Security and Privacy, 1981

Publications

Books

- R. A. DeMillo, *An Education without Measure: Teaching and Learning the Science of Everyday Life, to be published 2019*
- R. A. DeMillo, *Revolution in Higher Education: How A Small Band of Innovators will Make College Accessible and Affordable*, MIT Press 2015 (foreword by Amb. Andrew J. Young)
- R. A. DeMillo, *Abelard to Apple: The Fate of American Colleges and Universities,* MIT Press, 2011.
- R. A. DeMillo and J. R. Rice, Editors, *Studies in Computer Science*, Plenum Press 1994
- R. A. DeMillo, W. M. McCracken, R. J. Martin, J. F. Passafiume, *Software Testing and Evaluation*, The Benjamin-Cummings Publishing Company, Inc. 1986.
- G. I. Davida, R. A. DeMillo, D. P Dobkin, M. A. Harrison, R. J. Lipton, *Applied Cryptology, Cryptographic Protocols, and Computer Security*, American Mathematical Society (Applied Mathematics Series), 1984, American Mathematical Society. (Also: Indonesian edition, translated by Pangeran Sianipar, 1994)
- R. A. DeMillo, D. P. Dobkin, A. K. Jones, and R. J. Lipton, Editors, *Foundations of Secure Computation*, Academic Press, 1978

Special Publications

- Deliberate Innovation, Lifetime Education: Report of the Commission on Creating the Next In Higher Education," Atlanta Georgia 2018 http://www.provost.gatech.edu/commission-creating-next-education

- "Statistics and Software Engineering", National Academy of Sciences, National Research Council Committee on Statistics, Document Number, 1996, Washington, DC.
- "Report of the Voice Switching and Control System (VSCS) Independent Fault Tolerance Analysis Team (VIFTAT)," A Report to the Federal Aviation Administration, MITRE Report (January, 1993).
- "Computer and Information Security in the Department of Energy's Classified Environment" (U), National Academy of Sciences, National Research Council Committee on Computer Security Doc. No. 88-EEB-2, 1988, Washington, DC (Classified Report)
- R. A. DeMillo, "Operational Readiness of the Patriot Air Defense System Software"(U), Report to Director Operational Test and Evaluation, USDRE, 1985 (Classified Report)
- R. A. DeMillo, "Software Test and Evaluation Manual: Volume 1, Guidelines for the Treatment of Software in Test and Evaluation Master Plans", Sept., 1984. Issued by the Office of the Secretary of Defense as Attachment to Department of Defense Directive 5000.3 ("Test and Evaluation") DoDD 5000.3-M-3.
- "Software Testing", *Encyclopedia of Information and Computer Science, 3rd Edition*, Anthony Ralston
- "Observing the 2006 Presidential Elections in Venezuela: Final Report of the Technical Mission," The Carter Center, 2007
- "New Ecosystems in Higher Education and What They Mean for Accreditation and Assessment, in WASC Concept Papers, 2nd Series: The Changing Ecology of Higher Education and its Impact on Accreditation, March 2013, Western Association of Schools and Colleges, Accrediting Commission for Senior Colleges and Universities.
- "Governance for a New Era: A Blueprint for Higher Education Trustees," Project on Governance for a New Era, Benno Schmidt, Chairman, August 2014
- "Deliberate Innovation, Lifetime Education: Report of the Commission on Creating the Next In Education," March, 2018. Georgia Tech

Recent Articles, Op-Ed and Opinion

"Replace Georgia's Risky Touchscreen Voting Machines," Atlanta Journal-Constitution, July 27, 2018,https://www.ajc.com/news/opinion/opinion-replace-risky-touchscreen-voting-machines/IjncsjZgBylGqekhN7L3cJ/

"This Will Go On Your Permanent Record! How Blockchains Can Transform Colleges in a Networked World," The EvoLLLution, May 5, 2017, https://evolllution.com/programming/credentials/this-will-go-on-your-permanent-record-how-blockchains-can-transform-colleges-in-a-networked-world/

"The Human Element and the Power of Big Data in Higher Education." The EvoLLLution, March 25, 2017

"Georgia's Election System Can't be Trusted." Bloomberg View, December 18, 2017, https://www.bloomberg.com/view/articles/2017-12-18/georgia-s-election-system-can-t-be-trusted

"Election Hacking is Going to Happen. Here's What We Can Do Now to Protect Our Vote," (with Candice Hoke and Duncan Buell) USA Today, March 25, 2018, https://www.usatoday.com/story/opinion/2018/03/15/russian-election-hacking-what-we-can-do-now-protect-democracy-buell-demillo-hoke-column/393565002/

"Gatekeepers No More: Colleges Must Learn a New Role," The Chronicle of Higher Education, September 14, 2015, https://www.chronicle.com/article/Gatekeepers-No-More-Colleges/232975

Patents

D. Boneh, R. DeMillo and R. Lipton , "Method of using transient faults to verify the security of a cryptosystem" , Patent Number 6,965,673

Invited Talks, Keynotes

Rich is a frequent speaker at conferences and events. Details are available upon request

Papers and Book Chapters

1. J. Gough and R. A. DeMillo, "Towards an Ostensive Grammar I" *Eighth Annual Meeting of the Association for Computational Linguistics* (July 1970), Columbus, Ohio.
2. R. A. DeMillo, "An Application of an Ostensive Grammar to the Analysis of Existential Predicates", *Proceedings of the Southeastern Conference on Linguistics* (October 1970), Atlanta, Georgia.
3. L. Chiaraviglio and R. A. DeMillo, "On the Applicative Nature of Assignment", Georgia Institute of Technology Report Number GIT-ICS-71-1 (1971).
4. R. A. DeMillo, *Formal Semantics and the Logical Structure of Programming Languages,* Ph.D. Thesis, 1972, Georgia Institute of Technology, Atlanta, Georgia.
5. R. A. DeMillo, "Parallelism and Non-Determinism in the Lattice of Programs", *Record of the Computer Science Conference,* (February 1973), Columbus, Ohio.
6. R. A. DeMillo, "Constructing and Verifying Courses of Action in Robots," *Proceedings of MSAC-73,* (February 1973), Milwaukee, Wisconsin.
7. R. A. DeMillo and R. A. Northouse, "Autonomous Computing: Perspectives and Models for Artificial Intelligence," *Proceedings MSAC-74,* (February 1974), Milwaukee, Wisconsin.
8. R. A. DeMillo and K. Vairavan, "Parallel Scheduling of Programs in a Restricted Model of Computation", *Proceedings Sixth ACM Symposium on Theory of Computing,* (May 1974), Seattle, Washington.
9. R. A. DeMillo, "A Lattice Theoretic Interpretation of a Theorem by Patil," University of Wisconsin-Milwaukee Technical Report No. 75-6 (1975)
10. R. A. DeMillo, S. C. Eisenstat and R. J. Lipton, "The Complexity of Control and Data Structures", *Proceedings Seventh Annual Symposium on Theory of Computing*, Albuquerque, New Mexico (May 1975), pp. 186-193.
11. R. A. DeMillo, S. Amoroso and M. Wolfe, "Primitives for Tactical Real-Time Control Languages based on Simula 67 II: Design and Implementation Considerations", CENTAC Report No. 58, US Army Electronics Command, Fort Monmouth, NJ (1975).
12. R. A. DeMillo, S. Amoroso and M. Wolfe, "Primitives for Tactical Real-Time Control Languages based on Simula 67 I: General Language Considerations", CENTAC Report No. 50, US Army Electronics Command, Fort Monmouth, NJ (1975).
13. R. A. DeMillo, "Nondefinability of Certain Semantic Properties of Programs", *Notre Dame Journal of Formal Logic*, Vol. 16, No. 4, (1975), pp. 583-590.
14. R. A. DeMillo, S. C. Eisenstat and R. J. Lipton, "Space-Time Tradeoffs in Structured Programming", *Proceedings 1976 Johns Hopkins Conference on Information Systems and Sciences*, Baltimore, Maryland, (March, 1976), pp. 240-245.
15. R. A. DeMillo, S. C. Eisenstat and R. J. Lipton, "Programming Language Studies I: The Power of Control and Data Structures" University of Wisconsin-Milwaukee Technical Report No. 76-13 (1976)
16. R. A. DeMillo, S. C. Eisenstat and R. J. Lipton, "Can Structured Programs be Efficient", *SIGPLAN Notices*, Vol. 11, No. 10, (October, 1976), pp. 10-18.
17. R. A. DeMillo, S. C. Eisenstat and R. J. Lipton, "Space and Time Hierarchies for Classes of Control and Data Structures", *Journal of the ACM*, Vol. 23, No. 4 (October, 1976), pp. 720-730.
18. R. A. DeMillo, S. C. Eisenstat, and R. J. Lipton, "Space-Time Tradeoffis in Structured Programming: Reducible Flowgraphs (Abstract Only), Computer Science Conference, 1976.

19. K. Vairavan and R. A. DeMillo, "On the Computational Complexity of a Generalized Scheduling Problem", *IEEE Transactions on Computers*, Vol. C-25, No. 10 (October, 1976), pp. 720-732. This paper has been reprinted under the same title in *Distributed Computing: Concepts and Implementations*, edited by Paul McEntire, John G. O'Reilly and Robert E. Larsen, published by IEEE Press (1984).

20. R. A. DeMillo, R. J. Lipton and A. J. Perlis, "Social Processes and Proofs of Theorems and Program", *6th ACM Symposium on Principles of Programming Languages* (January 1977) Santa Monica, California, pp. 245-262 [See main entry number [40] below].

21. R. A. DeMillo, K. Vairavan and E. Sycara-Cyranski, "A Study of Schedules as Models of Parallel Computation", *Journal of the ACM*, Vol. 24, No. 4 (October, 1977), pp. 544-565.

22. R. A. DeMillo, "Some Applications of Model Theory to the Metatheory of Program Schemata", *Notre Dame Journal of Formal Logic",* Vol. 18, No. 3, 1977, pp. 489-495.

23. R. A. DeMillo, S. C. Eisenstat, and R. J. Lipton, "Preserving Average Proximity in Arrays" *Communications of the ACM",* Vol. 23, No. 3, (March 1978), pp. 228-230.

24. R. A. DeMillo and R. J. Lipton, "A Constructive Generalization of the Borel-Cantelli Lemma with Applications to the Complexity of Infinite Strings", *Mathematical System Theory",* Vol, 13, 1979, pp. 95-104.

25. R. A. DeMillo, D. P. Dobkin and R. J. Lipton, "Combinatorial Inference", *Proceedings 1977 Allerton Conference on Communication, Control and Computing* [Also appears in R. DeMillo et al (editors), *Foundations of Secure Computation*, Academic Press, 1978, pp. 27-38.

26. R. A. DeMillo, D. P. Dobkin and R. J. Lipton, "Even Data Bases that Lie can be Compromised", *IEEE Transactions on Software Engineering",* Vol SE-4, No. 1 (January, 1978), pp. 71-74.

27. B. H. Barnes, G. I. Davida, R. A. DeMillo, L. H. Landweber, H. Stone, "Theory in the Computer Science and Engineering Curriculum", *IEEE Computer",* Vol. 18, No. 12 (December, 1977), pp. 106-108.

28. R. A. DeMillo, R. J. Lipton and L. G. McNeil, "Proprietary Software Protection" in R. A. DeMillo et al (editors), *Foundations of Secure Computation",* Academic Press, 1978, pp. 115-132.

29. R. A. DeMillo and D. P. Dobkin, "Foundations of Secure Computation", in R. A. DeMillo et al (editors), *Foundations of Secure Computation",* Academic Press, 1978, pp. 1-3.

30. R. A. DeMillo, S. C. Eisentat and R. J. Lipton, "On Small Universal Data Structures and Related Combinatorial Problems", *Proceedings 1978 Johns Hopkins Conference on Information Systems and Sciences",* March, 1978, Baltimore, Maryland, pp. 416-428.

31. R. A. DeMillo, R. J. Lipton and F. G. Sayward, "Program Mutation as a Tool for Managing Software Development", *Proceedings of the 32nd Annual Meeting of the American Society for Quality Control",* May 1978, Chicago, Illinois, pp. 326-348.

32. T. A. Budd, R. A. DeMillo, R. J. Lipton, and F. G. Sayward, "The Design of a Prototype Mutation System for Program Testing", *Proceedings 1978 National Computer Conference",* pp. 623-627.

33. R. A. DeMillo and R. J. Lipton, "A Probabilistic Remark on Algebraic Program Testing", *Information Processing Letters*, Vol. 7, No. 4 (June, 1978) pp. 193-195.

34. R. A. DeMillo, R. J. Lipton and F. G. Sayward, "Discussion of Software Testing Issues", in P. Wegner (editor) *Research Directions in Software Technology*", MIT Press (1978) pp. 408-413.

35. R. A. DeMillo, R. J. Lipton and F. G. Sayward, "Hints on Test Data Selection: Help for the Practicing Programmer", *Computer*, Vol. 11, No. 4 (April, 1978) pp. 34-43. This paper has been reprinted several times under the same title. It has recently appeared in Tutorial*: Software Testing and Validation Techniques* edited by Edward Miller and William Howden, IEEE Computer Society Press (1981).

36. R. A. DeMillo, R. J. Lipton and A. J. Perlis, "Response to Dijkstra's On a Political Pamphlet from the Middle Ages", *Software Engineering Notes*, Vol. 3, No. 2 (April, 1978) pp. 16-17.

37. R. A. DeMillo, R. J. Lipton and F. G. Sayward, "Program Mutation: A New Approach to Program Testing", in E. F. Miller (editor) *Software Testing, Volume 2: Invited Papers,* Infotech International, 1979, pp. 107-128. [Volume 1 on this work contains helpful analysis and bibliography].

38. R. A. DeMillo and R. E. Miller, "Implicit Computation by Synchronization Primitives", *Information Processing Letters,* Vol. 9, No. 1 (20 July 1979) pp. 35-38.

39. R. A. DeMillo and D. P. Dobkin, "Recent Progress in Secure Computation", *Proceedings 1978 IEEE COMPSAC* (November 1978) Chicago, Illinois.

40. R. A. DeMillo and R. J. Lipton, "Some Connections between Computational Complexity and Mathematical Logic", *Proceedings 11th ACM Symposium on Theory of Computing* (May 1979) Atlanta, Georgia, pp. 153-159.

41. R. A. DeMillo, R. J. Lipton and A. J. Perlis, "Social Processes and Proofs of Theorems and Program", *Communications of the ACM*, Vol. 22, No. 5 (May 1979) pp. 271-280. [See also correspondence in "ACM Forum", *Communications of the ACM*, vol. 22, No. 11 (November 1979); an earlier version of this paper was published in the proceedings of the *6th ACM Symposium on Principles of Programming Languages* (January 1977) Santa Monica, California, pp. 245-262; This paper has been reprinted under the same title many times. It has appeared in *The Mathematical Intelligencer*, January, 1981, the 1984 anthology *Mathematics: People Problems, Results*, edited by D. C. Campbell and J. C. Higgins, published by Wadsworth International, the 1987 anthology *Currents in the Philosophy of Mathematics* edited by Thomas Tomasczko, the 1998 revised version which appeared under the title *New Directions in the Philosophy of* and the 1993 anthology *Program Verification*, edited by Timothy R. Colburn, James H. Fetzer and Terry L. Rankin, published by Kluwer Academic Publishers.

42. R. A. DeMillo, S. C. Eisenstat and R. J. Lipton, "Space-Time Tradeoffs in Structured Programming: An Improved Combinatorial Embedding Theorem", *Journal of the ACM*, Vol. 27, No. 1 (January, 1980) pp. 123-127.

43. R. A. DeMillo and R. J. Lipton, "The Consistency of P=NP and Related Problems with Fragments of Number Theory", *Proceedings 12th ACM Symposium on Theory of Computing* (May 1980) Los Angeles, California, pp. 45-57.

44. R. A. DeMillo, "New Approaches to Program Testing", *IEEE Computer*, Vol. 12, No. 3 (March 1979) pp. 105-106.

45. R. A. DeMillo, "Data Base Security" in Issues *in Data Base Management,* H. Weber and A. Wasserman (eds.), North-Holland 1979, pp. 253-256.

46. R. A. DeMillo, R. J. Lipton and R. E. Miller, "Stochastic Synchronization," 1981 *Johns Hopkins Conference on Computer Systems and Sciences*, March 1981.

47. G. I. Davida, R. A. DeMillo, R. J. Lipton, "Sharing Cryptographic Keys," *Proceedings 1980 IEEE Symposium on Security and Privacy*, April 1980, Berkeley, California.

48. R. A. DeMillo and R. J. Lipton, "A System Architecture to Support A Verifiably Secure Multilevel Security System," *Proceedings 1980 IEEE Symposium on Security and Privacy*, April 1980, Berkeley, California.

49. T. A. Budd, R. A. DeMillo, R. J. Lipton and F. G. Sayward, "Theoretical and Empirical Results in Program Testing," *Proceedings Ninth ACM Symposium Principles of Programming Languages*, Las Vegas, Nev., January 1980, pp. 181-196.

50. R. A. DeMillo and F. G. Sayward, "Statistical Measures of Software Reliability," *Software Metrics*, edited by F.G. Sayward et al, MIT Press, 1981, pp. 185-202.

51. R. A. DeMillo and R. J. Lipton, "Software Project Forecasting," *Software Metrics*, edited by F.G. Sayward, et. al., MIT Press, 1981, pp. 77-94.

52. R. A. DeMillo, "Cryptographic Protocols," Presented at Meeting of American Mathematical Society, *Proceedings of Symposia in Applied Mathematics* (1981).

53. G. I. Davida, R. A. DeMillo and R. J. Lipton, "Achieving Secure Computers Through Distributed Computing", *Proceedings Third International Conference on Distributed Computing*, Paris, April 1981.

54. R. A. DeMillo, "Validating Computer Software: Two Views" *Transactions of the 1980 Annual Meeting of the American Nuclear Society*, Washington DC, November, 1980, pp. 251-252 (Invited Paper).

55. R. A. DeMillo, R. J. Lipton, and A. J. Perlis, "Social Processes and Proofs of Theorems and Programs," The *Mathematical Intelligencer*, January 1981. *Reprinted. See main entry number [39]*

56. R. A. DeMillo, N. A. Lynch, M. J. Merritt, "Cryptographic Protocols", *Proceedings, 14th ACM Symposium on Theory of Computing*, May, 1982, pp. 383-400.

57. R. A. DeMillo and M. J. Merritt, "Protocols for Data Security," *IEEE Computer*, Volume 16, Number 2, (February 1983), pp. 39-54

58. R. A. DeMillo and R. J. Martin, "Software Test and Evaluation Project: A Status Report", *NSIA National Conference on Software Test and Evaluation*, February 1-3, 1983, Washington, DC, pp. T1-T10

59. R. A. DeMillo, "Requirements for a Test and Evaluation Subenvironment of an Advanced Software Engineering Environment" Prepared by the Software Test and Evaluation Project, under Contract Number F33657-82-G-2083 to the Georgia Institute of Technology, Atlanta, Georgia 30332, April 1984

60. R. A. DeMillo, A. B. Marmor-Squires, S. T. Redwine, Jr., W. E. Riddle, "Software Engineering Environments for Mission Critical Applications - STARS Alternative Programmatic Approaches", IDA Paper #P-1788. Prepared for Office of the Under Secretary of Defense for Research and Engineering by Institute for Defense Analyses, August 1984

61. R. A. DeMillo, "Volume 2 - Software Test and Evaluation: State-of-the-Art Overview" OSD/DDT&E Software Test and Evaluation Project, Phases I and II, Final Report, submitted to the Office of the Secretary of Defense, Director Defense Test and Evaluation and the Office of the Naval Research ONR Contract Number N00014-79-C-0231, June 1983

62. R. A. DeMillo, R. J. Martin, "Volume 1 - Report and Recommendations" OSD/DDT&E Software Test and Evaluation Project, Phases I and II, Final Report, submitted to the Office of the Secretary of Defense, Director Defense Test and Evaluation and the Office of Naval Research ONR Contract Number N00014-79-C-0231, June 1983

63. K. Vairavan and R. A. DeMillo, "On the Computational Complexity of a Generalized Scheduling Problem," *Distributed Computing: Concepts and Implementations*, edited by Paul L. McEntire, John G. O'Reilly and Robert E. Larsen, published by the IEEE Press (1984). *Reprinted. See main entry number [18]*

64. R. A. DeMillo, R. A. Gagliano, R. J. Martin, and J. F. Passafiume, "Policy Recommendations for Software Test and Evaluation: System Level Test Issues", *Journal of Test and Evaluation*, January 1984, Vol. V, No. 1, pp 21-28

65. R. A. DeMillo, R. J. Lipton, and A. J. Perlis, "Social Processes and Proofs of Theorems and Programs," *Mathematics: People, Problems, Results*, edited by D. C. Campbell and J. C. Higgins, published by Wadsworth International (1984) *Reprinted. See main entry number [39]*

66. R. W. Bartlett and R. A. DeMillo, "Computer Litigation: What the Lawyer Expects and What the Expert Needs," *Computer Law: Institute of Legal Education,* July, 1986, Atlanta, GA, pp. 167-178.

67. R. A. DeMillo, "Functional Capabilities of a Test and Evaluation Subenvironment in an Advanced Software Engineering Environment" GIT-SERC-86/07.

68. R. A. DeMillo, E. H. Spafford, "The Mothra Software Testing Environment", *Proceedings 11th NASA Software Engineering Workshop*, NASA Goddard, December 3, 1986

69. E. W. Martin, R. A. DeMillo, "Operational Survivability in Gracefully Degrading Distributed Processing Systems," *IEEE Transactions on Software Engineering*, June 1986, Vol. SE-12, Number 2

70. R. A. DeMillo, et al "The Mothra Software Testing Environment System Documentation," Georgia Institute of Technology, Software Engineering Research Center, Atlanta, Georgia 30332, June 1987, GIT-SERC-87-10. (Second Revision published by The Software Engineering Research Center, Purdue University, January 1990)

71. R. A. DeMillo, D. S. Guindi, K. N. King & W. M. McCracken, "An Overview of the Mothra Software Testing Environment," Purdue University, Software Engineering Research Center, West Lafayette, Indiana 47907, August, 1987, SERC-TR-3-P

72. R. A. DeMillo, R. J. Lipton, and A. J. Perlis, "Social Processes and Proofs of Theorems and Programs," *Currents in the Philosophy of Mathematics* edited by Thomas Tomasczko (1987). *Reprinted. See main entry number [39]*

73. W. F. Applebee, R. A. DeMillo, D. S. Guindi, K. N. King, and W. M McCracken, "Using Mutation Analysis for Testing Ada Programs," *Proceedings Spring 1988 Ada Europe Conference*, Munich, FDR. (North-Holland, 1988, also appears as Software Engineering Research Center, Purdue University Technical Report SERC-TR-9-P

74. B. Choi, R. DeMillo, W. Du, and R. Stansifer, "Observing Reusable Ada Software Components - Techniques for Recording and Using Operational Histories," Purdue University, Software Engineering Research Center, West Lafayette, Indiana 47907, 1988, SERC-TR-18-P

75. R. A. DeMillo, D. S. Guindi, K. N. King, W. M. McCracken, and A. J. Offutt, "An Extended Overview of the Mothra Software Testing Environment," *Proceedings of the Second Workshop on Software Testing, Verification and Analysis*, Banff, Canada, July 1988, pp. 142-151

76. R. A. DeMillo and A. J. Offutt, "Experimental Results of Automatic Test Data Generation," *Proceedings of Portland Software Quality Conference*, September 1988

77. B. Choi, R. A. DeMillo, R. Stansifer, and W. Du, "Observation Packages for Reusable Ada Components," *Proceedings of Symposium on Empirical Foundations of Information Sciences and Systems* (October, 1988)

78. R. A. DeMillo, E. W. Krauser and A. P. Mathur, "Using the Hypercube for Reliable Testing of Large Software," Software Engineering Research Center, Research Report Number SERC-TR-24-P, August, 1988, Purdue University

79. H. Agrawal, R. DeMillo, and E. Spafford, "A Process State Model to Relate Testing and Debugging," Software Engineering Research Center, Research Report Number SERC-TR-27-P, September, 1988, Purdue University

80. R. A. DeMillo, "Test Adequacy and Program Mutation," *Proceedings 1989 International Conference on Software Engineering*, May 1989, Also appears as Software Engineering Research Center, Research Report SERC-TR-37-P, Purdue University

81. B. Choi, R. A. DeMillo, E. W. Krauser, R. J. Martin, A. P. Mathur, A. J Offutt, E. H. Spafford, "The Mothra Toolset," *Proceedings 22nd HICSS*, January 1989

82. R. A. DeMillo, "Software Testing for Critical Applications: A Position Paper," *Proceedings 13th IEEE Computer Software and Applications Conference*, Orlando, September, 1989, p. 521

83. H. Agrawal, R. A. DeMillo, R. Hathaway, E. W. Krauser, R. J. Martin, and A. P. Mathur, "The Design of Mutation Operators for C", 1989 (Submitted for Publication), also appears as "Design of Mutant Operators for the C Programming Language", Software Engineering Research Center Research Report SERC-TR-41-P, Purdue University

84. R. A. DeMillo and R. J. Lipton, "Software Windtunnels: Scale Models of Software Development Projects."

85. H. Agrawal, B. Choi, R. A. DeMillo, and A. Mathur, "CIT/CAT: Two Novel Methodologies for the Design of Software Testing Tools,", 1990

86. R. A. DeMillo, E. W. Krauser, and A. P. Mathur, "An Approach to Compiler-Integrated Software Testing," Software Engineering Research Center, Research Report SERC-TR-71-P, April 1990, Purdue University

87. H. Agrawal, R. A. DeMillo and E. H. Spafford, "An Execution Backtracking Approach to Program Debugging," *IEEE Software,* May 1991, p. 21-26

88. R. A. DeMillo and R. J. Lipton, "Defining Software by Continuous, Smooth Functions," *IEEE Transactions on Software Engineering,* Vol. SE-17, No. 4, April 1991, p 383

89. R. A. DeMillo, "Progress Toward Automating Software Testing," *Proceedings of the International Conference on Software Engineering,* Austin, Texas, May 1991, Also appears as Software Engineering Research Center Report Number SERC-TR-101-P, July, 1991, Purdue University

90. Richard DeMillo and Aditya Mathur, "On the Use of Software Artifacts to Evaluate the Effectiveness of Mutation Analysis for Detecting Errors in Production Software," *Thirteenth Minnowbrook Workshop on Software*

Engineering, (also Software Engineering Research Center Report Number SERC-TR-92-P, March, 1991, Purdue University)

91. R. A. DeMillo, E. W. Krauser, and A. P. Mathur, "An Overview of Compiler-Integrated Testing," *Proceedings of the 1991 Australian Software Engineering Conference,* Sydney, Australia, July 1991

92. R. A. DeMillo and A. J. Offutt, "Constraint-Based Test Data Generation," *IEEE Transactions on Software Engineering,*, Vol. SE-17, Number 9, September, l991, pp. 900-910

93. Hiralal Agrawal, Richard A DeMillo and Eugene H. Spafford, "Dynamic Slicing in the Presence of Pointers and Records," *Proceedings Fifth Symposium on Testing Analysis and Verification,* October, 1991, Victoria BC, pp. 60-73. (also appears as: Hiralal Agrawal and Richard DeMillo, "Dynamic Slicing in the Presence of Unconstrained Pointers," Software Engineering Research Center Report Number SERC-TR-93-P, March, 1991, Purdue University)

94. R. A. DeMillo, E. W. Krauser, and A. P Mathur, "Compiler Support for Program Testing on MIMD Architecture, *Proceedings Ninth Annual Pacific Northwest Software Quality Conference*, October, 1991, Portland, Oregon

95. R. A. DeMillo and A. J Offutt, "Experimental Results from an Automatic Test Data Generator" *ACM Transactions on Software Engineering and Methods.* Vol. 2 No. 2, April 1993, pp. 109-127

96. R. A. DeMillo, M. Furst, and R. J. Lipton, "Competitive Strategies for k Servers"

97. H. Agrawal, R. A. DeMillo and E. H. Spafford, "Debugging with Dynamic Slicing and Backtracking," *Software Practice & Experience*, June 1993, Vol. 23 No. 6, pp. 589-616

98. R. A. DeMillo, "A Defense of Incremental Research," *International Perspectives on Software Engineering,* June, 1993, Vol. 1, No. 2, pp. 33-36

99. R. A. DeMillo, R. J. Lipton, and A. J. Perlis, "Social Processes and Proofs of Theorems and Programs," *Program Verification* , edited by Timothy R. Colburn, James H. Fetzer, and Terry L. Rankin and published by Kluwer Academic Publishers (1993).*Reprinted. See main entry number [39]*

100. R. A. DeMillo, T-C Li and A. P. Mathur, "A Two Dimensional Scheme to Evaluate the Adequacy o f Fault Tolerance Testing," In Third IEEE International Workshop on Integrating Error Models with Fault Injection, pp. 54-56, Annapolis, MD, April, 1994

101. R. A. DeMillo, A. P. Mathur, and E. W. Wong, "Some Critical Remarks on a Hierarchy of Fault Detecting Abilities for Program Testing," IEEE Transactions on Software Engineering, 1995

102. R. A. DeMillo, "A Simple Architectural Rule for Conservatively Allocating Software Reliability Requirements,"

103. R. A. DeMillo, "Testability in Software Architectures: Some Definitional Suggestions"

104. R. A. DeMillo and M. Young, "Non-Functional Aspects of Software Architecture Design", Proceedings Workshop on Software Architectures, 17th International Conference on Software Engineering, Seattle, Washington, April 1995, pp. 72-79

105. R. A. DeMillo, "Scalability in Software Architectures"

106. R. A. DeMillo and M. Young, "Quantitative Aspects of Software Architecture" Proceedings of the 15th Annual Software Technology Conference, Salt Lake City, Utah, April, 1995

107. R. A. DeMillo and D. I. Hmeljak, "C_{pk} Calibration of the Capability Maturity Model"

108. R. A. DeMillo and R. J. Lipton, "A Gang of Ten Problems in Formal Methods" (unpublished manuscript), 1994 *An earlier version of this paper was presented by the first author at the 1990 ACM Symposium on Test, Analysis and Verification, Victoria, BC*

109. A. Apostolico, G-F. Bilardi, F. Bombi and R. A. DeMillo, "An International Masters Program in Software Engineering: Experience and Prospects" Proceedings 11th Data Engineering Conference, Taipei, Taiwan, March 1995

110. R. A. DeMillo, T-C Li, A. P. Mathur, "Using a Hierarchical Failure Mode Set to Assess the Adequacy of Test for Fault-Tolerance," Fourth IEEE International Workshop on Evaluation Techniques for Dependable Systems, 1995

111. R. A. DeMillo, H. Pan, and E. H. Spafford, "Critical Slicing" Proceedings 1996 ACM International Symposium on Software Test and Analysis, San Diego, California, pp. 121-134, January 1996

112. R. A. DeMillo, "Mission-Critical Applications, Commercial Value and Software Quality", ACM Symposium on Strategic Research Directions (June 1996) Boston, Massachusetts.

113. D. Boneh, R. DeMillo and R. J. Lipton, "Encrypted Quantum Measurement" (unpublished manuscript, 1996)

114. L. Osterweil, L. Clarke, R. A. DeMillo, S. F. Feldman, W.McKeeman, E, Miller and J. Salasin, "Strategic Directions in Computing: Software Quality", Symposium on Strategic Research Directions (June 1996) Boston, Massachusetts.

115. R. DeMillo and R. J. Lipton, "Critique of Formal Verification: Alan Perlis and the Seeds of Method and Doubt", in *In the Beginning: Personal Recollections of Software Pioneers* (R. L. Glass, editor) IEEE Computer Society Press (to appear)

116. D. Boneh, R. DeMillo and R. J. Lipton, "On the Importance of Checking Computations" *Eurocrypt 97*, Springer-Verlag, Heidelberg, May 1997

117. R. DeMillo, H. Pan and E. Spafford, "Failure and Fault Analysis for Software Debugging," *Proceedings IEEE COMPSAC*, 1997.

118. R. DeMillo, "The Internet as a Telephone Network", *Educom Review,* Jan/Feb 1998, pp. 12-16.

119. R. A. DeMillo, R. J. Lipton, and A. J. Perlis, "Social Processes and Proofs of Theorems and Programs," *New Directions in the Philosophy of Mathematics* edited by Thomas Tomasczko (Revised and Expanded Edition, 1998), Princeton University Press, pp. 267-286 *Reprinted. See main entry number [40]*

120. D. Boneh, R. A. DeMillo and R. J. Lipton, "On the Importance of Eliminating Errors in Cryptographic Computations, *Journal of Cryptography 14 (2001) 2, 101-119.* See main entry [115]. This paper has been cited many times. It resulted in a revision to the Open SSL Toolkit (rev 0.9.7) requiring a check of the RSA-CRT result.

121. R. A. DeMillo and R. J. Lipton, "Social Processes and Proofs: A Quarter-Century Perspective," Presented to the Royal Society of London, October, 2004.

122. R. C. Basole and R. A DeMillo, "Information Technology" in *Enterprise Transformation* (edited by W. C. Rouse) Wiley, 2006

123. Richard A. DeMillo, "Keeping Technology Promises," *Communications of the ACM*, November 2012 (Volume 55, No. 11): 37-40.

124. P. M. A. Baker, K. R. Bujak, and R. A. DeMillo, "The Evolving University: Disruptive Change and Institutional Innovation," *Procedia Computer Science,* 14, pp. 330-335.

125. Richard A. DeMillo, "Unbundling Higher Education," in *MOOCs and Open Education Around the World* (edited by Curtis J. Bonk, Mimi Miyoung Lee, Thomas C. Reeves, and Thomas Reynolds) Routledge, 2015.

126. Rafael L. Bras and Richard A. DeMillo, "Leadership Challenges in Higher Education's Digital Future," in *Challenges in Higher Education Leadership,* (edited by James Soto Anthony, Ana Marie Cauce, and Donna Shalala), Routeledge, 2017.

127. DeMillo, Richard and Kadel, Robert and Marks, Marilyn, What Voters are Asked to Verify Affects Ballot Verification: A Quantitative Analysis of Voters' Memories of Their Ballots (November 23, 2018). Available at SSRN: https://ssrn.com/abstract=3292208 or http://dx.doi.org/10.2139/ssrn.3292208

128. Appel, Andrew and DeMillo, Richard and Stark, Philip, Ballot-Marking Devices (BMDs) Cannot Assure the Will of the Voters (April 21, 2019). Available at SSRN: https://ssrn.com/abstract=3375755

EXHIBIT

2

Exhibit 2

POLITICO

Popular e-poll book's default password is '1234'

By Eric Geller

12/13/2019 12:35 PM EST

Tablets that election officials in 25 states and Washington, D.C., use to check in voters are configured with one of the world's worst passwords, according to documents shared with POLITICO.

The manual for the KnowInk Poll Pad informs election workers that the device's default password is "1234," an exceptionally weak security measure that makes the devices easy prey for hackers looking to disrupt voting in key precincts or sow chaos en masse.

The Poll Pad's training guide was included among records provided by the Carroll County, Ga., election office to the watchdog group American Oversight, which shared the records with POLITICO.

"I do hope this password is going to change for the election, since it's been out there for the demos/training and sent thru email," Cobb County, Ga., elections director Janine Eveler wrote in an email to fellow county election officials included in the records.

"1234" is one of the world's most commonly used passwords — it ranked 15th on a list published in April by the U.K. National Cyber Security Centre.

St. Louis-based KnowInk describes the Poll Pad as "the nation's leading electronic poll book." It consists of an Apple iPad running custom software that stores voter registration data and lets poll workers look up and check in voters.

"My concern is that this represents the tip of an iceberg," said Dan Wallach, a computer science professor and voting security expert at Rice University. "If they got something this obvious incorrect, what does that say about the rest of their security engineering practices?"

KnowInk did not respond to requests for comment.

The Cybersecurity and Infrastructure Security Agency, which offers security advice and assistance to local election officials, did not provide a comment when asked whether it was concerned about KnowInk's choice of default password or whether it had communicated with the company about the issue.

E-poll books have proliferated as election offices seek to minimize the cost and hassle associated with paper voter records, but they present serious cybersecurity risks: many models — including the Poll Pad — can connect directly to the internet, exposing them to malware, and federal security guidelines do not cover e-poll books.

"Our voting systems are critical infrastructure that needs to be protected with vigilance," said Austin Evers, the executive director of American Oversight. "When we see documents indicating election officials potentially left voting machines open to even the most unsophisticated bad actors, it should be a wake-up call for everyone."

Eveler did not respond to emails asking if she had changed her Poll Pads' passwords, and the other county officials she emailed either did not respond or declined to answer.

Georgia Secretary of State Brad Raffensperger's office also did not respond to a request for comment.

The Poll Pad itself isn't the only KnowInk product that uses a simple default password. The product's management software, which is used to load voter data onto the tablets, uses the default password "know."

To view online:
https://subscriber.politicopro.com/cybersecurity/article/2019/12/popular-e-poll-books-default-password-is-1234-1847513

EXHIBIT L

IN THE UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF GEORGIA ATLANTA DIVISION

DONNA CURLING, et al. **Plaintiff,** **vs.** **BRAD RAFFENSPERGER, et al.** **Defendant.**	**CIVIL ACTION FILE NO.: 1:17-cv-2989-AT**

SUPPLEMENTAL DECLARATION OF RHONDA J. MARTIN

RHONDA J. MARTIN declares, under penalty of perjury, pursuant to 28 U.S.C. § 1746, that the following is true and correct:

1. I have personal knowledge of all facts stated in this declaration, and if called to testify, I could and would testify competently thereto.
2. I am a Fulton County voter and have a practice of voting in all elections for which I am eligible.
3. I am Executive Secretary of the Qatar Computing Research Institute Scientific Advisory Committee and a member of the Coalition for Good Governance. I am active in the activities involving citizen oversight of elections in which Coalition for Good Governance is engaged.
4. On November 5, 2019, I spent a total of approximately 3.5 hours at the Shelton Elementary School in Dallas, Georgia; the Watson Government

Complex in Dallas, Georgia; and the Cartersville Civic Center in Cartersville, Georgia observing (as a member of the public) the pilot use of the new Dominion Voting System in municipal elections. On December 3, 2019, I spent a total of approximately 2.5 hours at the Northside Baptist Church Gym in Valdosta, Georgia, as a poll watcher observing the pilot use of the Dominion Voting System in run-off elections.

Pollbook Issues

5. On November 5, 2019, around 1:15pm the poll manager at Shelton Elementary School got a call that there was some sort of "state-wide problem" with the epollbooks. She was told to have voters complete the paper application/oath before having them check in at the PollPad electronic pollbook stations. She hadn't noticed any problems with the epollbook check-in process at this precinct but was still required to add this step to the check-in process. Later in the afternoon, at the Cartersville Civic Center, a poll watcher from the Democratic Party told me that when the lines were long, the poll manager decided to speed things up by not having voters sign the epollbooks since that was redundant with the paper process they had already completed. One of the workers at an epollbook station seemed tired of the whole process. When a voter gave

her a new driver's license that had a green tint, she looked at Kevin Rayburn and said "We'll see if this works," clearly expecting it not to work based on earlier problems that had been experienced. It took some time but eventually it processed appropriately.

6. I could not learn the source of the problem that caused the polling places to change their procedures mid-day based on communications from the Secretary of State's office, but the poll workers expressed confusion and frustration with the new procedure. It was clear to me that despite three weeks of early voting, PollPad pollbook procedures were still buggy on Election Day, underscoring my fears of the impracticality of statewide system conversion by the beginning of Presidential Primary Early Voting on March 2, 2020.

Ballot Secrecy

7. In all locations, there were "privacy screens" around each ballot marking device/printer station, but they were ineffective at protecting ballot secrecy because the BMD screens are very large, bright, and angled so that people in the room (other voters, press, poll watchers, or poll workers) can see the displayed contents across the room while the voter is voting. I had to make a point of looking away to avoid violating the privacy that voters are entitled to.

8. Also, the machines default to the large font display setting thereby requiring voters to scroll to see the entire text of the referendum under consideration. To avoid the confusion of scrolling, poll workers at the Shelton Elementary School, reset the font size on the BMDs to "normal" each time a voter finished voting.

9. At the Watson Government Complex, after completing check in, voters entered a relatively small partitioned room with fifteen ballot marking device/printer stations and one scanner. Although turnout was light and there were generally only two to three voters present at any one time, it felt very crowded and was virtually impossible for people not to see other people's votes, even with the privacy screens.

10. At the Cartersville Civic Center, one voter commented that curtains were needed to protect the privacy of the voters. Others that I talked with later were quite uneasy about the loss of ballot secrecy inherent in the machine set up. Unfortunately, the suggestion of privacy curtains is not likely a workable solution as it is my understanding that Georgia law and basic security practices require that the machines, with their vulnerable electronics, remain in public and poll worker view at all times during the voting process to discourage tampering.

11. The video of Georgia Elections Director, Chris Harvey demonstrating the use of the BMDs found at https://www.fastcompany.com/90441559/two-experts-quit-election-accountability-group-over-claims-it-has-been-endorsing-untrustworthy-machines, clearly illustrates the ballot secrecy issues, and how a voter's choices can be inadvertently highlighted and seen by others if the voter exercises her ability to change font size and contrast to increase readability (00:30).

12. I find this loss of ballot secrecy very concerning and yet one more factor that would cause me to avoid voting on a Dominion BMD. I am very uncomfortable with effectively disclosing every choice I make when voting to friends, neighbors, or others in the polling place.

Voter Verification of Ballot Summary Printouts

13. On November 5, in each of the locations, it was clear that voters did not realize the importance of checking their printed ballot summaries for correctness prior to inserting them in the scanner. In general, voters appeared to be focused on trying to figure out what the next step in the process was and where in the polling place they were supposed to go next.

14. Prompting by poll workers did increase the number of people that looked at their printed ballot summaries before casting them, although it is impossible to know whether voters accurately confirmed the contents.

15.. In the video of Georgia Elections Director, Chris Harvey demonstrating the use of the BMDs found at https://www.fastcompany.com/90441559/two-experts-quit-election-accountability-group-over-claims-it-has-been-endorsing-untrustworthy-machines, he states that "the voter then is going to be charged with reviewing and confirming their ballot choices" (2:10).

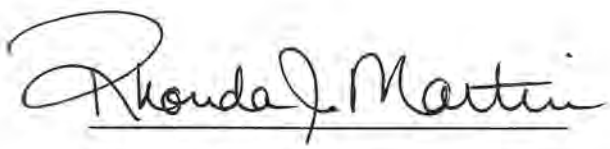
16. In my opinion based on my observations and my personal experience, Mr. Harvey and the State are "charging the voter" with a responsibility that is an unfair burden on the voter and unrealistic. As a voter, I should not be responsible for determining whether the BMD is properly functioning in recording my vote on the paper ballot summary before I cast my vote, particularly since that vote is encoded in an encrypted QR code that I cannot interpret.

17. I understand that the readable text on all ballot summary printouts must be accurately reviewed by voters (and errors corrected) before the ballot summaries can be considered reliable source documents for post-election audits. This is a burden that would be virtually impossible for me to meet

for a long complex ballot, without my bringing a pre-marked ballot sample to the polls to reference when determining the accuracy of my ballot summary printout prior to casting my votes.

18. Based on my observations and my own capabilities, the State's expectation that all voters conduct reliable testing of the BMD/printer combination's accuracy prior to casting their ballots seems like an outlandish and irrational demand. Voters come to the polls to vote and that is, and should be, their only concern.

Executed on this date, December 16, 2019.



Rhonda J. Martin

EXHIBIT M

IN THE UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF GEORGIA ATLANTA DIVISION

DONNA CURLING, et al. **Plaintiff,** **vs.** **BRAD RAFFENSPERGER, et al.** **Defendant.**	)	**CIVIL ACTION FILE NO.: 1:17-cv-2989-AT**

DECLARATION OF ELIZABETH THROOP

Elizabeth Throop declares, under penalty of perjury, pursuant to 28 U.S.C. §1746, that the following is true and correct:

1. My name is Elizabeth Throop
2. I have personal knowledge of all facts stated in this declaration, and if called to testify, I could and would testify competently thereto.
3. I am a registered voter in DeKalb County. I am a supporter of Coalition for Good Governance and an active volunteer in supporting its voter education and election security efforts.

4. During the November 5, 2019 pilot elections and the related December 3, 2019 runoffs, I spent approximately 34 hours observing polling places in Paulding, Carroll, and Lowndes counties, including:

   Oct 14 – Watson Govt Center, Dallas, Paulding Co, 5¾ hours

   Oct 14 – Hiram Event Center, Paulding Co., 15 minutes

   Oct 17 – Hiram, Paulding Co., 2½ hours

   Oct 22 – Carrollton Admin Building lower level, Carroll Co., 6½ hours

   Oct 30 – Powell Park Rec, Carroll Co., 3½ hours

   Nov 5 – Carroll Co. Lakeside Rec Center, 3 hours

   Nov 5 – Carroll Co. Carroll County Admin Bldg, 1½ hours

   Nov 5 – Carroll Co. UWG Food Service, 1½ hours

   Dec 3 – Lowndes Co. Rainwater Conference Center, 2 ½ hours

   Dec 3 – Lowndes Co. Trinity Presbyterian Church, 1 hour

   Dec 3 – Lowndes Co. Valdosta State University, 6 hours

Electronic Pollbooks

5. I am greatly concerned about the reliability of Poll Pad equipment, based on my observations of problems with their use during early and regular voting. Poll Pads serve five vital functions, and if they are slow or any

feature is not working, they can form a "bottleneck" that slows down the entire voting process. Those functions are

– poll book lookup based on their reading of drivers license or other methods;

– ballot style determination based on poll book data;

– updating of poll book to reflect that voter has checked in;

– collection of voter signature for signature verification;

– formatting of ballot access cards based on precinct.

6. Based on my observations of Poll Pad performance, I would vote absentee – even with the extra work, uncertainty of timely delivery, risk of having my ballot rejected for signature mismatch – rather than risk voting in person.

7. On Election Day, Nov 5, 2019, I observed problems at Lakeside Rec Center, Carroll County, in which Poll Pads were unable to format access cards between 7:40 am and 10 am. I believe this incident was either mischaracterized by the SOS or omitted from incident reports. (Executive-Summary-Initial-Findings-Pilots-11-14-19) (Exhibit 1)

8. In that summary of the pilots the Secretary of State says that on Election Day November 5, *"Some Poll Pads were not able to produce Voter Cards to activate the BMDs … The issue was discovered upon the opening of the polls and was reported from Bartow, Carroll, Cobb, and Paulding by*

approximately 7:20 am … By 7:40 am the SOS office directed that KnowInk and Dominion do a universal fix quickly by loading that dataset through a WiFi connection. That was executed and the Poll Pads then began to function properly by approximately 8:20 am." [p. 4]

9. In fact, I observed Poll Pads at Lakeside Rec in Carroll County being only partially functional between 7:40 and 10 am that day. On Election Day, I arrived at Lakeside Rec Center at 7:40 am. I observed voters filling out paper certificates. There were two Poll Pads, and they were being used to look up voters in the data base. But the Poll Pads were not being used to collect signatures or format access cards.

10. Instead, Poll Manager Doug Sharp was using his own access card and password to give each voter access to a BMD. Sharp explained to me that there was a problem with the Poll Pads, and that he feels for counties that will use this system for the first time in a high turnout situation.

11. He said "You've got to plug in one wire before another and if you get any one of them out of sequence it won't work properly."

12. He said he hoped that by 9:00 am they could use Poll Pads for certificates, i.e. to collect signatures and for ballot-style lookup. Sharp said, "The data is there – it just won't format the card properly." Later

Sharp said that the data was all loaded on the Poll Pads but they lacked an access code for poll workers to be able to access it.

13. I watched two poll workers pulling out the card-swipe attachments from the Poll Pads and reinserting them. Poll workers were preoccupied with this problem and they repeatedly leafed through what appeared to be a manual for the Poll Pads. Luckily, voting was extremely slow so people were still able to be checked in and vote. It was clear to any observer that in a high turnout election, such problems would result in long lines, frustrated voters and voters being unable to wait in the polling place for resolution.

14. Around 8:30 am a Dominion worker arrived and spoke to Manager Sharp. The rep told me that poll workers hadn't understood that the Poll Pads can read the Driver License data, so he explained that to them. He told me that the SOS was trying to fix the access card problem from a remote location.

15. At 10 am a woman with a Poll Pad name badge, "Chrissy," arrived. She disconnected each Poll Pad, one at a time, and then carried them back behind the information display screen and reprogrammed them. She, Manager Doug Sharp, and a poll worker I recognize from the downtown election office talked about hotspots. Chrissy and the downtown poll

worker left about 10:15. Soon I witnessed, for the first time that day, voters signing in on the Poll Pad.

16. Whatever the problem was between 8:20 am (the time the SOS said it had been fixed) and 10 am (the time the Poll Pad rep came to fix it), it was not successfully fixed at Lakeside Rec before 10 am.

17. While poor Wifi access at the rec center may have been a factor in the reset from the central office, it was apparent to me that neither the poll manager or the Dominion representative were able to identify this issue causing the problem. My general impression is that these devices have too many moving parts for non-specialists to rely upon them in a timely, high-stress situation like a polling place, particularly without a reliable back up paper pollbook to use as a default when problems arise.

18. During early voting on October 30 I observed problems using Poll Pads at Powell Park Rec Center in Carroll County between 12:30 and 4:15. That polling place had two check in stations with Poll Pads along with what looked like conventional computers. Voters were filling out paper certificates, and workers were using the conventional computers to look up voter data – then using Poll Pads to format access cards.

19. I had seen this unusual setup in my observations at Carroll County Administration Building on October 22. That day, a poll worker

explained to me that there was a problem with Poll Pads not being able to look up voter addresses correctly. Because early voting involves multiple ballot styles per polling place, one worker was looking up the precinct of a voter on conventional computer, recording a unique number of their paper certificate, and handing the paper off to a second worker. The second worker was formatting the voter's access card using a Poll Pad. I was told this was a temporary fix because of a problem with ElectionNet.

20. Voting was extremely light at Powell Park, and some voters were able to use this ad-hoc setup successfully. But a man who identified himself as "the tech guy" would occasionally have to walk over to the conventional computers and type in things in order for the conventional computers to function properly. I saw the tech guy and Poll Manager Meeks spend over ten minutes looking up one woman. This type of delay in processing voters would result in very long lines and discouraged voters in a more typical election turnout.

21. Afterwards, the "tech guy" went outside. When he came back, he walked around different areas of the room, waving his phone around and holding a small cardboard box in his other hand. It seemed like the box might have a signal booster in it. Meeks asked the "tech guy" whether the rain might be disrupting the Wi-Fi signal. In fact, there was extremely heavy

rain that afternoon. The tech guy left the cardboard box near the check-in stations.

22. This problem at Powell Park helped me form my general impression that Poll Pads have too many moving parts, including internet connectivity, for non-specialists to rely upon in a timely, high-stress situation like a polling place.

23. Even if Wifi were a secure method of handling data, the signals seem to come and go based on many variables, from weather, to competing traffic, to room configuration – so they don't seem like a reliable or secure part of a voting system.

24. I didn't see anyone being unable to vote due to the lack of reliability of Poll Pads, during either early voting or Election Day. In all cases, polling places were very heavily staffed and equipped in relation to the number of voters. But my impression was that either of the two separate problems I saw with these devices (inability to look up voters on Poll Pads during early voting and inability to format access cards during Election Day) could have significantly slowed down voter lines in a high-turnout election.

25. I understand that counties allow voters the convenience of voting at any polling place that's open during early voting. I understand that such a

setup could, theoretically, make it possible for someone to vote twice unless these polling locations shared voter status with each other via telecommunication. I worry that this convenience comes at a cost: connecting voting equipment to the internet via an unreliable and insecure Wifi network.

26. What I don't understand is why Poll Pads are connected to the internet via Wifi or other means during Election Day. On that day, voters are voting in their home precincts and the voter database is "dumb" – meaning it is isolated from any updates or revisions such as new registrations or changes of address. Poll workers can track who has or hasn't voted in their precinct. They can share this data between other workstations in their polling place via a LAN, or even assign voters to a Poll Pad station based on first letter of last name, as it was always done with paper poll books. I feel strongly that this should be rigorously reviewed by the State's security experts.

27. In a September 17th news report, Tess Hammock, spokeswoman for the secretary of state's office, stated about Poll Pads, "They're small standalone electronic devices" … "They're not connected to the Internet and are password-protected. So unless you have that password, you couldn't get into them."

28. Yet on it was just reported by POLITICO, American Oversight, and Georgia Public Broadcasting that Georgia used the PollPad password of "1234."

(https://twitter.com/stphnfwlr/status/1205629351850631168?s=20), which seems to belie the Secretary's claims about polling place security.

29. Based on my observations on the polling places it is my strong opinion that the risks of pollbook failure, malfunction, "bugs," and insufficient poll worker training mandate the need for a back-up default paper pollbook that can be used as the official reference if the Poll Pad information is not available. Except at Lakeside Rec on Election day, I saw poll workers relying on alternate electronic records when Poll Pads malfunctioned. At Lakeside Rec on Election Day, they may have been using paper records during the Poll Pad malfunction. I asked a WCU poll worker on December 3 if she had a paper printout of the poll book, and she said it was at the polling place but locked away. This over-reliance on electronic records seems to create an unacceptable risk for 2020 high turnout elections

Voter Verification of Ballots

30. Paper printouts from BMDs have type that is so small and crowded that it presents legibility issues. I was able to obtain a sample and determined

that the type is slightly over 10 points, with just 9.6 points between lines of type. This is about 80% of normal space between lines.

31. It would be difficult burden for myself as a voter to try to recall all the ballot content of a November, or even a primary, ballot and to accurately check whether my vote had been correctly recorded on a BMD. It would be especially hard because I wouldn't be able to compare the document to an original. In the case of BMDs, the original touchscreen goes blank when the printout emerges. The cramped arrangement of the type would make this even more challenging.

32. A member of the SAFE Commission remarked, "*If we provide the voter with a paper ballot of what they've done and they don't take the time to look at that and verify, there's really nothing we can do. That's the voter's responsibility."*(SAFE Commission transcript 12.12_.18_.pdf) (Page 188*)* (Exhibit 2) I think ballot verification is more than a matter of being responsible, and I think it's an unreasonable burden to ask voters to verify something that is hard to recall from text that is hard to read.

33. I spoke to one voter who told me he had been told to check his ballot, which he did – but that he only saw a big QR code on it. Eventually he noticed "fine print" below the code and managed to read what it said. Another voter and she said she just saw a "thing" on it and gestured the

shape of a square about the size of the QR code. When I told her there was, in fact, type printed below the QR and she seemed surprised. Three other people assured me they had looked at their printouts without understanding that there was anything more on them than QR codes, which they referred to as a "scan box," "icon," and a "barcode," while each made gestures with their hands. One of the three suddenly lowered her voice when she told me she has difficulty seeing, even with glasses. Apparently none of these voters realized there was type on the printout.

Ballot Secrecy

34. While type on printouts is small and hard to read, type and graphic elements on BMDs are often large – compromising privacy. When a voter makes a choice, an area the entire width of the screen turns dark, then turns white. If a voter presses the second candidate in a race, the second band is highlighted. It's not necessary for a curious person to read the type on the screen if they know the order of the candidates, based on whether the first, second, or third band is highlighted. (Composite image showing before, during, and after depressing a choice on a Dominion ICX touchscreen. From video shot by Joy Wasson 10/10/2019 at Fulton County's demonstration of election equipment at 279 Logan St., SE Atlanta 30312) (Exhibit 3)

35. On October 22 I visited the Carrollton County Admin Building to observe voting. The poll manager, Carolyn Driver, told me I could not be in the voting room because I would be in the way of voters, and because I could see the voters' choices on screen. I pointed out that a poll worker was in stationed voting room and could see the screens and choices just as well as I could. Driver affirmed I couldn't look at what poll worker could look at on the BMD screens. I stayed, but stood outside of the room containing the Ballot Marking Devices, which inhibited my rights to observe the conduct of the election.

36. Carrollton County Supervisor Rigby explained to me that the scanner holds a digital image of each ballot, and showed me the memory cards in the scanner where the scans are stored. Apparently this scanning of each paper printout is Dominion's "Auditmark" feature, and it adds a time stamp to each image. I understand this to mean that at a slow polling place, it would be easy even for a non-technically-sophisticated election worker to associate a timestamp with a voter's check-in time and be able to deduce whose ballot printout they were viewing in the Auditmark database.

37. At Carrollton Admin, one voter explicitly expressed a privacy concern. She said she thought the BMDs should be rotated around to face the back wall, because she didn't like the poll watchers seeing her voting choices.

38. During the runoff at Rainwater Conference Center, I observed a man and woman, presumably a couple, check in and vote on BMDs that were side by side, divided by a privacy screen. The man finished ahead of the woman, then took a single step backward and to his side and looked at her touchscreen. Just then, a poll worker called to him to come deposit his printout in the scanner. While this man's actions may have been entirely innocent, it dramatized to me how a voter such as the woman might fear for her vote secrecy.

39. Some privacy issues seemed to arise from poor polling place layout. For instance at Lakeside Rec the BMDs were positioned near a window that faces an interior hallway, allowing a person in the hallway to view or photograph BMD activity. (Exhibit 3) In contrast, on Election Day Carrollton Admin moved into a different room and situated BMD stations perpendicular to where poll workers were sitting. While this arrangement helped maintain voter privacy, it would have made it difficult for waiting voters to see when a BMD were free for their use.

Executed on this date, December 15, 2019.

Elizabeth Throop

EXHIBIT

1

Executive Summary

Initial Findings: Pilot Counties Municipal Elections 2019

New Georgia Statewide Voting System

Overview

The intent of conducting pilots in municipal elections is to place the new equipment into real election conditions to evaluate the equipment, the processes and importantly the people interacting with the new verifiable paper trail voting system.

As the office of Secretary of State has been working with the new system, we have seen that it isn't simply changing one type of mechanism, a Direct Recording Electronic (DRE) voting, machine for another machine, the Ballot Marking Device (BMD). The new paper ballot voting system fundamentally changes the way that the state of Georgia has conducted voting for nearly two decades.

With that in mind, the implementation team understood that piloting the new system in real world conditions, with the introduction of poll workers, polling places, and most importantly voters, would be vital to bring potential issues to the forefront.

With that in mind, we picked nine counties to do the initial pilots:
Bacon, Bartow, Carroll, Catoosa, Decatur, Evans, Lowndes, Paulding, and Treutlen. All elections officials were brought in for three days of training to our Center For Elections with Dominion and SOS Staff. Bacon, Evans, and Treutlen ended up having no municipal elections, so the remaining six counties conducted their November elections on the new system. Cobb County volunteered to conduct a pilot election with the new system, except using hand-marked paper ballots instead of ballot marking devices. That pilot still included the Poll Pad, Polling Place Scanner, and new election management system. The Secretary of State's office is extremely grateful to the counties who volunteered to be the first to test this new system. Their work and lessons learned is irreplaceably valuable as the State continues this implementation.

Initial Findings

There were 27,482 votes cast in the Municipal (and County) elections in the six pilot counties. That means there were 27,482 interactions by voters with the new voting machines that were completed successfully.

Here are the breakouts of ballots cast:

County	Votes Cast	Registered	Percent Turnout
Bartow	1,989	13,708	14.5%
Carroll	3,455	25,527	13.5%
Catoosa	4,614	47,840	9.6%
Decatur	1,047	6,974	15.0%
Lowndes	9,495	71,017	13.4%
Paulding	6,882	107,021	6.4%

Here are the breakouts of the deployment of equipment:

County	Advanced		Election Day	
	BMD	Polling Place Scanner	BMD	Polling Place Scanner
Bartow	27	4	180	26
Carroll	12	3	20	12
Catoosa	14	2	48	11
Decatur	25	2	169	10
Lowndes	10	1	22	2
Paulding	21	5	28	5
Totals	109	17	467	66

So overall in service there were 576 BMDs and 83 Polling Place Scanners deployed.

As you will see in the subsequent appendices there were 45 total “incidents” reported. Some of those were not problems, they were reports of the system functioning properly, but it being new, and wanting to be thorough, the poll workers called them into the technicians from Dominion.

By that measure, we had 45 incidents out of 27,482 votes or an incident rate of 0.164%. There were 4 touchscreens out of 576 (0.69%) and 1 scanner out of 83 (1.2%) were taken from service out of an abundance of caution. Further, nearly all issues were caused by human error or interaction which can be mitigated through training or identified through testing.

APPENDIX A
Multiple County

PollPad
Each County, with the exception of Catoosa, had an issue upon opening of polls with some PollPads. Some PollPads were not able to produce Voter Cards to activate the BMDs. The process would start and the voter could be identified as being in the right place. However, the screen would ask the voter to pick a party. Obviously, as a municipal or county election, the elections are non-partisan, so the work-flow would hit a dead end. The issue was discovered upon the opening of the polls and was reported from Bartow, Carroll, Cobb, and Paulding by approximately 7:20am. SOS office requested that Dominion contact their technicians on site in the remaining counties and discovered the issue was in Decatur and Lowndes as well.

The Center For Elections identified the issue was there was an additional field within the dataset erroneously. The issue could be remedied be reloading the final dataset with the field removed. By 7:40am the SOS office directed that KnowInk and Dominion do a universal fix quickly by loading that dataset through a WiFi connection. That was executed and the PollPads then began to function properly by approximately 8:20am.

Below are the collected reports:

Time	Location	Equipment	Issue	Resolved	Resolution Notes
	Bartow	PollPads	At least one working at each location		
724	Carroll	PollPads	Bonner-pollpads not able to create cards, also not working at other county admin. Greg contacted KnowInk person	Resolved	
802	Carroll	PollPads	pollpads to syncing-unable to process voters	Resolved	

	Decatur	PollPads	Some working, some did not		
733	Lowndes	PollPads	Gabe reported the pollpads are not working, called Rokey, it is the same issue they saw in the warehouse	Resolved	
800	Lowndes	PollPads	Lowndes- Gabe reported that they are not able to process voters through the pollpad, said we can turn on Wi-Fi	Resolved	
807	Lowndes	PollPads	per Gabe, one tech going around to update pollpads does not work	Resolved	
717	Paulding	PollPads	Pollpads not working at Diane Wright- unable to scan unable to look up manually, they have a line and people are leaving. Left message for Rokey	Resolved	

APPENDIX B
Bartow County

Time	County	Equipment	Issue	Resolved	Resolution Notes
620	Bartow	Touchscreen	Touchscreen staying in landscape mode	Resolved	
945	Bartow	PPS	Scanner was needing to have some ballots, not all, inserted multiple times to read ballot AAFAJJJ0050, scanner is reading ballots	Resolved	
1043	Bartow	Touchscreen	Cartersville West- Touchscreen rebooted while voter was at the touchscreen, voter was able to vote normally once machine rebooted and pollworker got machine	Resolved	picked up an incident report, pollworker was able to reactivate machine, voter was able to reuse card without issue, no further issues reported on this

			back to voting screen		machine.
1500	Bartow	Touchscreen	Cartersville West- Machine rebooted, stuck at the boot loader screen, power cycled machine, operating normally at this time	Resolved	
1735	Bartow	Touchscreen	Catersville West- machine rebooted stuck at boot loader screen, cycled power on machine. 2nd time this happened on this machine		
1820	Bartow	Touchscreen	Cartersville -East machine froze, rebooted battery and machine returned to normal operation SN:1907020644	Resolved	
		PollPads			pollpad check in - trouble reading drivers licenses. Strong

					florecent light above PP. Did partial manual check in
		PPS			After use, it is helpful to submit ballot face down (fold down)
1850	Bartow	Touchscreen	Cartersville East touchscreen down, rebooted and stuck on a black screen.	Resolved	

APPENDIX C
Carroll County

Time	County	Equipment	Issue	Resolved	Resolution Notes
845	Carroll	PPS	precinct scanner jammed, cleared jam, ICP would not accept ballots, scanner replaced, voting normal	Resolved	
1246	Carroll	Touchscreen	Machine rebooted, stuck at the boot loader	Resolved	

			screen, power cycled machine, operating normally at this time		
1320	Carroll	Touchscreen	Bonner-swapping out 2 touchscreen because they have rebooted multiple times	Resolved	tech swapping out machines
1545	Carroll	Touchscreen	machine battery symbol dissapeared from machine, machine still functioning normal. Tech keeping watch on machine for any changes	Resolved	county admin location
1545	Carroll	Touchscreen	voter stuck drivers license into machine, machine went to a black screen, rebooting machine, black screen has happened multiple times on this machine.	Resolved	bonner-rover onsite, same location has had an issue on 4 of 6 total machines, 2 machines rebooted and where replaced and then 1 of the replacement machines rebooted as

					well.bonner down to 3 touchscreen , tabernacle church had machine rebooted also
1545	Carroll	Touchscreen	rebooted machine but it will not power back on. Recommended to remove power, remove battery, let machine sit for 2 minutes, replug battery, once machine is at the start screen plug in power and resume normal operation	Resolved	university of west GA- machine replaced, machine rebooted normally but they are replacing the machine

Time	County	Equipment	Issue	Resolved	Resolution
745	Catoosa	Touchscreen	lakeview printer jam, printed ballot information on one page and barcode on second page, ballot being spoiled and voter remaking ballot		Log files will be collected Thurs/Fri and sent to Dominion engineering
1010	Catoosa	Touchscreen	power not attached correctly-reattached power correctly and touchscreen is working normally	Resolved	
1040	Catoosa	Touchscreen	Ringgold Freedom Center-voter went to touchscreen, before printing ballot the screen went blank, Voter was able to use same voter card and cast a ballot successfully without re-creating voter access card, tech	Resolved	number mismatch on touchscreen compared to scanner and voter registration numbers. Tonya is aware of the situation. Machine escalated to Engineering and we will need to pull the log files from machine.

			mentioned touchscreen number increased by 2 ballot printed, scanner and voter count numbers match.		
1100	Catoosa	Touchscreen	Fort Oglethorpe City: machine keeps going black, tech going onsite to check the power connections. Taking machine out of service and will use remaining machines at that location	Resolved	
1327	Catoosa	Touchscreen	West Side location: pollworker added paper to the printer and they received a message on the screen about the change	Resolved	recycled power to the touchscreen and printer and everything worked normal, suspect they hit the prompt to not use the USB device and did not reboot the touchscreen and the printer both

					causing the issue.
1340	Catoosa	Touchscreen	West side location: pollworker smart card are not reading in the tech is creating a new pollworker card. Having this issue on 2 of 4 machines, tech taking pollworker card to site	Resolved	recycled power to the touchscreen and printer and everything worked normal, suspect they hit the prompt to not use the USB device and did not reboot the touchscreen and the printer both causing the issue.
1850	Catoosa	Touchscreen	Oglethorpe touchscreen rebooted and went to a black screen	Resolved	

APPENDIX E
Decatur County

Time	County	Equipment	Issue	Resolved	Resolution Notes
630	Decatur	Electrical			power issues at the coliseum, finding live outlets for use
2020	Decatur	CSD			Question about CSD procedure to verify he was doing it correctly

APPENDIX F
Lowndes County

Time	County	Equipment	Issue	Resolved	Resolution Notes
825	Lowndes	Touchscreen	precinct 6 touchscreen not showing charging, asked to verify unit is plugged in, UPS is showing correctly and the power is plugged in on the touchscreen		
1355	Lowndes	Touchscreen	USB change message on 1 machine, checking to make sure the site is checking the check box to use the USB device and	Resolved	

			hitting always on the message.		
1745	Lowndes	Touchscreen	Precinct 4- touchscreen frozen, tech went onsite and power cycled the machine, pulled the battery then replugged the battery and machine returned to normal operation		
1820	Lowndes	Touchscreen	Naylor- 3 machines at one end of the building and when the voter prints it causes the other 2 touchscreens to show a usb change message. the same thing happens in the same building but at a different outlet in the building, same thing where a voter prints		

			on 1 touchscreen and the other 2 show the USB change message		
2045	Lowndes	Reporting			questions about Results Tally Reporting and getting results loaded correctly. Scanner cards were created for only 1 scanner so everything scanned on second scananer weren't recognized
2110	Lowndes	PPS			tech created one set of cards for multiple scanners creating an issue where the county can not load the cards this happened at multiple polling locations. The plan is to create CSD scanners and run the ballots tonight through the

					CSD to get results

APPENDIX G
Paulding County

Time	County	Equipment	Issue	Resolved	Resolution Notes
640	Paulding	Touchscreen	PW card not working on all machines, borrowed PW card from another precinct to		

			get all machines up and running		
700	Paulding	PPS	time not changed- Church at the Ridge	Resolved	
1410	Paulding	Accessible session	Poplar Springs Batist Chruch, headset unable to hear audio, pollworker created the card for the accessible voter incorrectly	Resolved	
1505	Paulding	Touchscreen	Watson Precinct- touchscreen needed to be reboot, it wasn't reading smart cards and when it came back on had message that the reader was detached, rebooted machine again and normal operation continued	Resolved	
1945	Paulding	CSD			when scanning results not all results were loading into Results Tally

					Reporting module, ended up re-scanning the 81 ballots and they transferred into module normally

APPENDIX H
Next Steps

- As of Friday, November 8, Dominion has obtained log records from any equipment with reported issues.
- Log files being examined by Dominion engineering

- For Cobb hand-marked pilot, anecdotal accounts of voters given incorrect ballots. Need to compare reporting at precinct level to voter check-ins.
- County Debrief to GA SOS Office, Dominion, and KnowInk scheduled.
- Prepare for runoffs in Valdosta Mayor race, Smyrna Mayor race, and Smyrna Ward 2 with information obtained from first pilot.

EXHIBIT

2

Excerpt of SAFE Commission Transcript 12.12.18 (https://sos.ga.gov/admin/uploads/safecommissiontranscript12.12_.18_.pdf)

your point.

JUDGE MCCOY: Absolutely. And I don't know whether everybody in my county just trusts me or -- but nobody shows up to these public things and then you hear these stories about the distrust and, you know, that makes you wonder if -- if -- if there's so much distrust, why are the people -- the voters not showing up to observe what we're doing pre-election and postelection?

REPRESENTATIVE FLEMING: Okay. Madam Secretary?

SECRETARY CRITTENDEN: I had a question, Dr. Lee. Under -- I know there's been a lot of discussion about ballot-marking devices, but I just want to clarify: With a ballot-marking device, there are systems that still produce a piece of paper; correct?

DR. LEE: Yes.

SECRETARY CRITTENDEN: And then the voter can look at the piece of paper and see if it accurately reflects how they voted --

AUDIENCE MEMBERS: No.

SECRETARY CRITTENDEN: -- and then that would be auditable. No?

DR. LEE: So --

SECRETARY CRITTENDEN: Because you said there are no papers --

DR. LEE: No, so -- so, I mean, I think you're

correct. So I think if the ballot-marking devices print -- prints out a paper ballot. So -- so, in order for that to be auditable, it depends on several conditions; right?

One is that it has to clearly print out every single vote as the voter has -- has cast; right? And then we also have to rely on the fact that the voter -- the voter also has to verify every single vote on the paper ballot.

And so, to me, one of the major discomforts that I had with this kind of solution is that there's no proof, there's no sort of a study that suggests that the majority of the voters would do that.

So that's the major concern, is that -- the point is that if the voter believes their printout does not really accurately reflect the vote, what's the point of auditing? You could be auditing the wrong -- kind of wrong votes.

Because, you know, if the printout has been wrong, has not been verified by voters, your audit doesn't mean anything. So that's my main concern. I mean, so that's the major -- I mean, as -- as I said in my report, that's the major difference, is between paper hand-marked ballot versus printout ballot.

Because, you know, a hand-marked ballot -- I mean, as -- as -- as those of us who have taken a standardized test, you -- you mark and you -- you verify and then you pass basically, because you actually -- the -- the act of hand

forcing yourself to hand-mark forces you to verify, Hey, that's me, my vote.

So -- so that's really the subtle difference, but it's very critical. So my point is that, when you audit, you want to audit based on data that's already accurate. Otherwise, you'll -- your auditing result will not be accurate.

SECRETARY CRITTENDEN: Okay. Thank you.

REPRESENTATIVE FLEMING: Judge?

JUDGE MCCOY: If we provide the voter with a paper ballot of what they've done and they don't take the time to look at that and verify, there's really nothing we can do. That's the voter's responsibility. If we provide them with -- with a receipt or with paper as to what they've done and, if they don't want to take the time to do that and just drop it in the box, we -- we can't help that.

AUDIENCE MEMBERS: No, no, no.

REPRESENTATIVE FLEMING: All right. Hold -- hold on. Stop. Now, you've been pretty good so far, but I do -- I want to stress to you this is not the last meeting that we'll have; there will be other chances for public input, but I do not want to end up having to ask someone to leave this room.

So I'm going to ask you -- once again, this discussion that's taking place now is among the members on the panel,

and I'm going to ask you to be respectful toward their discussion just like they listened to you when you had your chance to talk and they didn't interrupt you. Okay?

Nobody made catcalls, nobody hollered no on this panel when you were having the discussion that you had with us, so I want you -- to ask to have the same respect up here. Okay? Thank you very much. John?

MR. MONDS: I want to make a comment on the lack of confidence and -- versus distrust or -- the being a difference. For example, just as a layperson, you know, I've never really had confidence in the system that we have right now.

And -- but I do -- I do trust my election officials, you know, locally, and I think they do a wonderful job. But there's just something about not having that -- that -- that paper, you know, trail after I vote that just makes me question, you know, whether my vote is recorded accurately.

And -- and I think, from a lot of what we've heard, there's a lot of people, you know, with that sentiment that -- they're not necessarily saying that there's something wrong, that it's not being done, but it's just not really feeling confident in knowing.

So I think, from what I have definitely learned, we do need a new system. I -- I think we can concur on that, you know. And -- and, what it entails definitely some type of

hand-marked paper ballot, and we spoke in a previous meeting about being able to accommodate those who are disabled and making sure, whatever the system is, has to -- to be able to accommodate everyone.

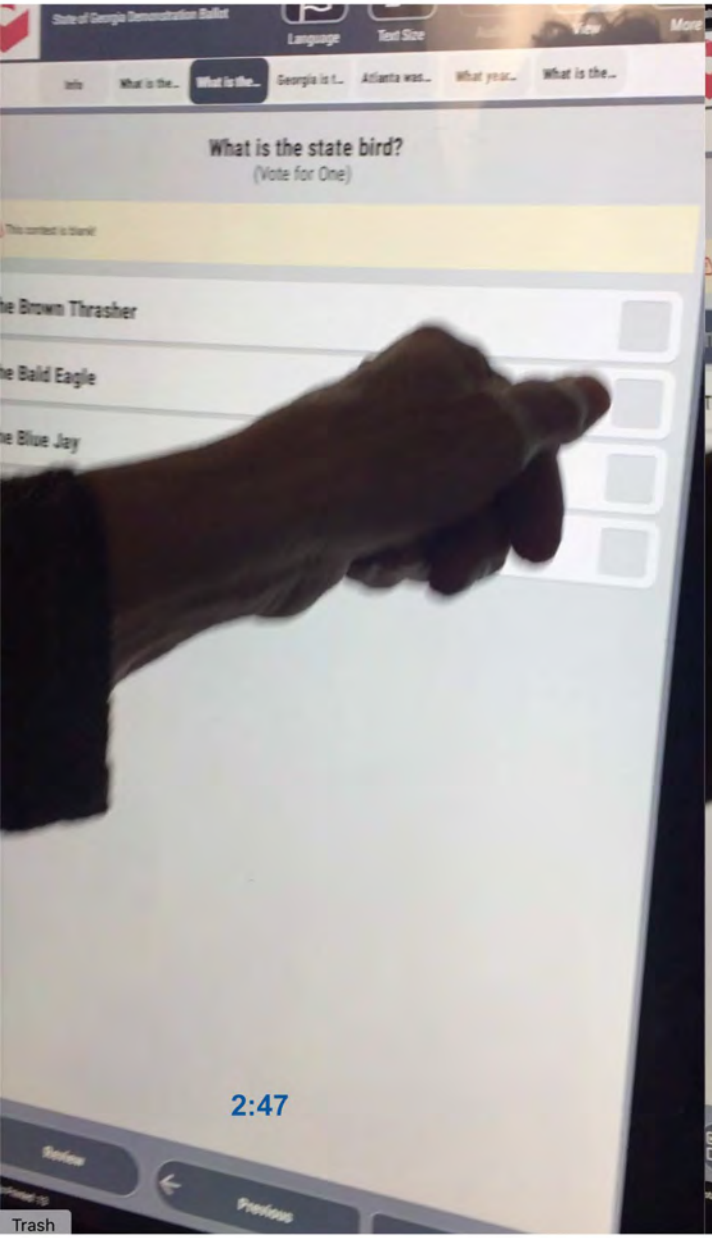
So, you know, what that entails, I guess we have to, you know, get in -- in the details of that, but a new system, hand-marked paper ballots -- and -- and then the audit process. It was very interesting, with the discussion that was had earlier about, you know, how do you go about and what level of audit do you include.

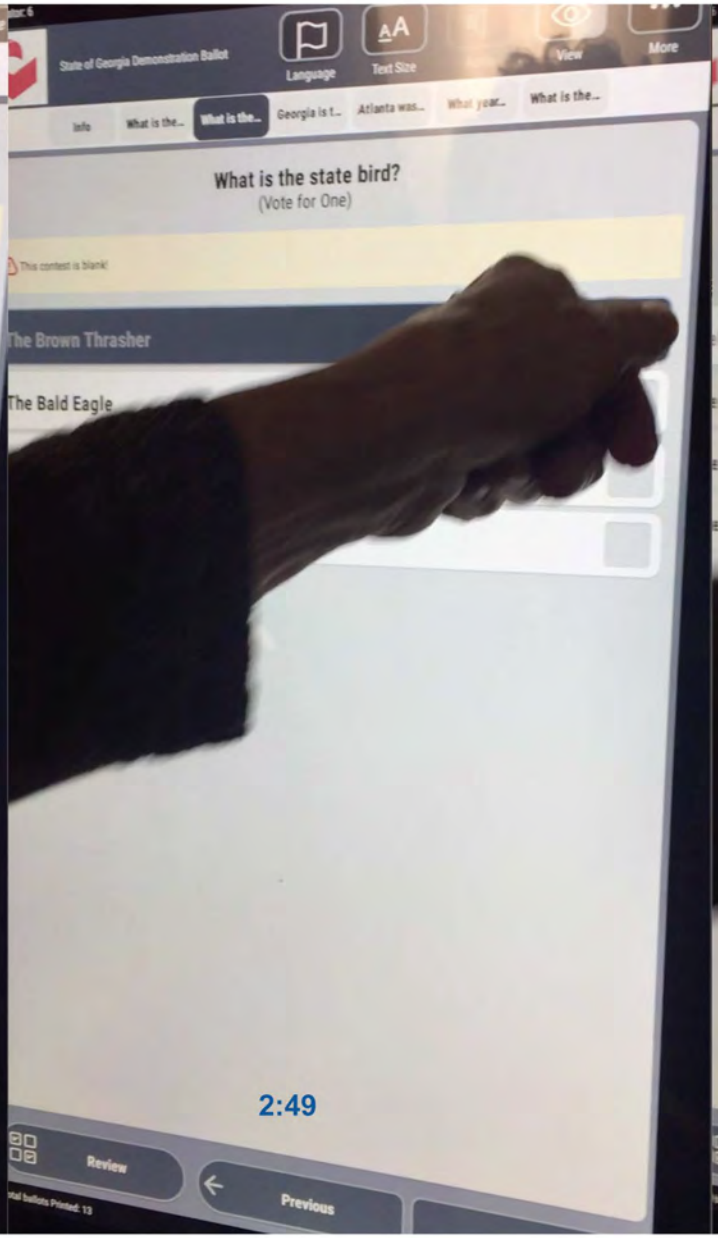
So, you know, there's definitely more, I guess, information that I would need, you know, to try to find out -- we know that, you know, a large number of states are doing this type of audit, and then there's some new things out there that states are trying and, you know, we just have to -- you know, personally, I have to look at that a little bit closer to say, Hey, you know, what -- what's going to be best for Georgia?

REPRESENTATIVE FLEMING: The -- the other -- one of the questions that I -- I mentioned to you probably goes without saying that is needed, and that's voter-education training and whatnot. I would envision that I certainly would make the argument to my colleagues in the legislature that there be a budget just like there was last time for whatever system that we go to for training.

EXHIBIT

3


What is the state bird?
(Vote for One)
2:47


What is the state bird?
(Vote for One)
The Brown Thrasher
The Bald Eagle
2:49

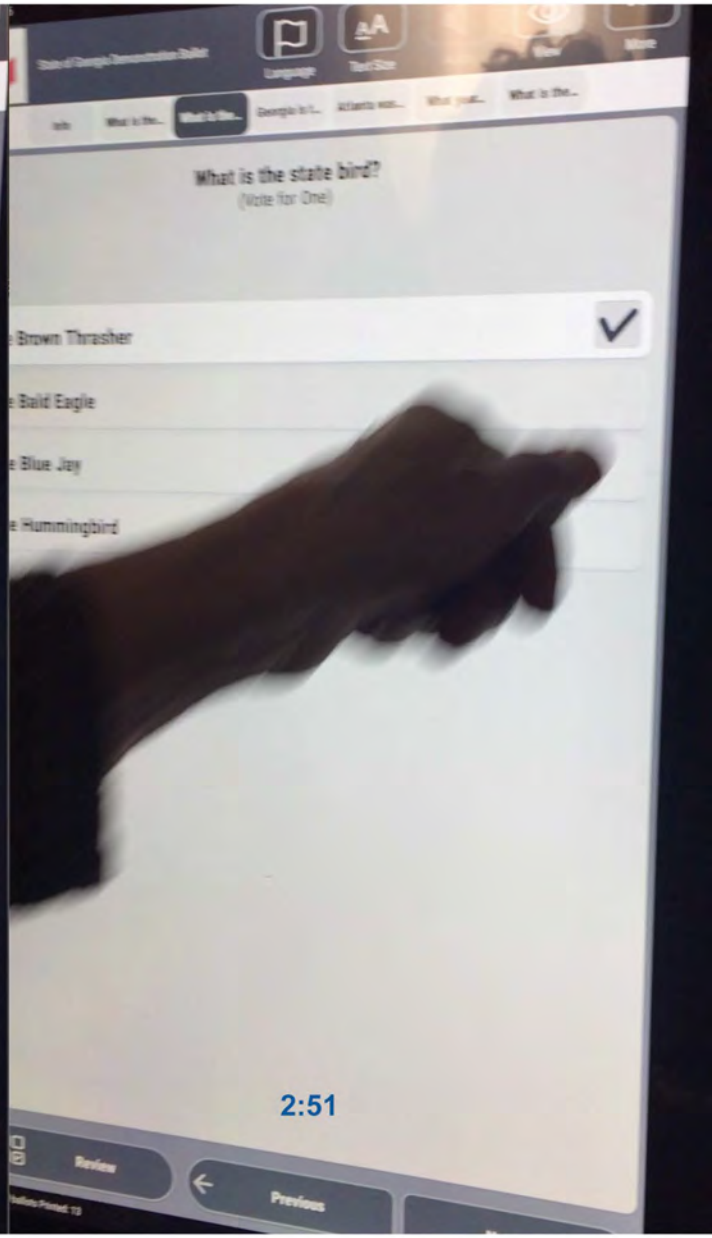

What is the state bird?
(Vote for One)
2:51

EXHIBIT N

IN THE UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF GEORGIA ATLANTA DIVISION

DONNA CURLING, et al. **Plaintiff,** **vs.** **BRAD RAFFENSPERGER, et al.** **Defendant.**	**CIVIL ACTION FILE NO.: 1:17-cv-2989-AT**

DECLARATION OF AILEEN NAKAMURA

AILEEN NAKAMURA declares, under penalty of perjury, pursuant to 28 U.S.C. §1746, that the following is true and correct:

1. My name is Aileen Nakamura.
2. I have personal knowledge of all facts stated in this declaration, and if called to testify, I could and would testify competently thereto.
3. I am a registered voter residing in Sandy Springs in Fulton County. I am a member of Coalition for Good Governance and an active volunteer in supporting its voter education and election security efforts.
4. I managed Coalition for Good Governance's volunteer efforts for citizen oversight of elections during the November 5 and December 3, 2019 elections, organizing authorized poll watchers and poll observers (members

of the public) to observe and document the conduct of those elections in various polling places in the pilot counties of Bartow, Carroll, Catoosa, Cobb, Lowndes, and Paulding counties. Approximately 30 observers visited over 50 polling places (some locations were visited multiple times) for observation for a total of approximately 185 total hours. These significant and diverse observations permitted the Coalition Plaintiffs to better understand the challenges of the upcoming system transition. Observations of a few other volunteers were also submitted to the Court as declarations.

5. During the November 5, 2019 pilot county elections and the related December 3, 2019 municipal runoffs, I spent approximately 18 hours observing at 7 polling places during early voting and on Election Day, and another 7 hours serving as a Poll Watcher for a mayoral candidate during the municipal runoffs at 2 polling places, all of which were pilot county polling places for either the Dominion BMD System or the hand-marked paper ballot system. The dates and times that I observed were:

1) 10/14/19: Hiram Events Place, Paulding County, 8:10am – 11:30am.
2) 10/24/19: Cobb County Elections Office, Cobb County, 8:30 – 11:30am.
3) 10/28/19: Emerson City Hall, Bartow County, 7:55am – 10:30am.
4) 10/28/19: Cartersville Civic Center, Bartow County, 11:20am – 2:40pm.
5) 11/5/19: White Oak Park, Dallas, Paulding County, 10:30am – 12:30am
6) 11/5/19: Church at the Ridge, Hiram, Paulding County, 1pm – 2:40pm
7) 11/5/19: George Ford Center, Powder Springs, Cobb, 3pm – 3:30pm
8) 11/5/19: Ron Anderson Center, Powder Springs, Cobb, 3:45pm – 4pm
9) 11/5/19: Smyrna Community Center, Cobb County, 4:30pm – 5:30pm
10) 12/3/19: Smyrna Community Center, Cobb County, 8:30am – 1pm
11) 12/3/19: Cobb County Fire Station #3, Cobb County, 2:40pm – 5:40pm

6. As a result of my observations, I am greatly concerned about several issues having to do with the new Dominion Voting System. They include:

Violation of Right to Ballot Secrecy

7. The oversized BMD screen (approx. 22 inches high x 14 inches wide, or about a 25 inch screen) sits upright as a voter touches the screen to select their choices. The type font is also oversized so voters can easily read the words, and candidate's name or "Yes" or "No" answers (for referendums) are on their own separate line for the voter to tap and choose.

8. When a voter taps a line, the entire width of the line lights up, making it very easy for someone standing at an angle behind the voter, even if they are 20-30 feet away, to observe which line the voter selected.

9. I saw this happen multiple times at many precincts, and it was clear to me that poll workers, who often had to "hover" behind voters because the new voting system is not intuitive and many needed assistance with the machines or printers, could see voters' choices, and even other voters waiting in line or observers like myself could view voters' screens quite easily.

10. While in Dallas in Paulding County, I observed one elderly woman enter the polling place walking very slowly with a cane. She was offered a chair so she could sit while voting, but the fact that she was seated made her selections on the BMD visible to almost everyone in the polling place. This

made me extremely uncomfortable and concerned about other voters with disabilities or mobility issues.

11. While observing in Cartersville in Bartow County, one voter, who had already voted and was sitting next to me while watching and waiting on her husband, quietly exclaimed to no one in particular, "Why is the screen so big and upright? On the old machines you couldn't see others' choices!"

12. After seeing these BMDs in multiple locations, I am concerned that there was no configuration of polling place or equipment I observed to provide a private way for voters to vote on the machines while also allowing for poll workers and the public to observe voting. It is also my understanding that any changes in BMD screen cradles or frames or privacy screen protectors would require EAC certification as components of the voting system, so will not provide a near-term solution.

13. Since I live in an area where there is much partisan animosity, (in 2008, my mailbox was bashed in when I put up a candidate sign in my yard,) and because I am familiar with the way voting machines would be set up in my precinct, this lack of privacy would keep me from voting in person if my only choice is to vote on a BMD.

14. I attended the November 14th meeting of the Fulton Board of Registrations and Elections, and took a 'mock-up' which I made of the actual size of the

BMD screen to show and tell the Board members what I had observed, and that no solutions had been proposed yet. One Board member approached me after the meeting and told me, "Your mock-up freaked me out – I could read EVERYTHING." (She was about 30 ft. away from where I spoke and demonstrated.)

KnowInk PollPad and WiFi Problems

15. On the first day of early voting, at The Events Place in Hiram, Paulding County, I was immediately concerned when I heard a building maintenance person ask the poll workers if the WiFi was working well, and if they were on the "Secure Network." "Yes," said the poll workers, "We have the password."

16. Since the Secretary of State's office is famous for telling all of the poll workers and the public that our voting system is ***not connected to the internet,*** I asked if the pollbooks used WiFi. The answer was, "Yes, but it's secure WiFi." Since I have a degree in computer science, I am aware that there is no such thing as a totally secure network and that this poses a significant security threat. A 'password' does ***not*** make a network "secure."

17. When the first two voters arrived at the Hiram location, it almost caused chaos when one of the two laptops they were using in addition to the PollPads, could not print out the 'certificates' for voters. After some phone

calls and moving from one laptop to another and back, it was discovered that the "printer needs to be on the ElectionNet system in order for it to print out."

18. On Election Day, I drove out to Paulding County again when I heard that one polling place was having problems with their PollPads. By the time I arrived at the White Oak Park location around 10:30, I was told the issue had been resolved when someone brought them a WiFi router. Celeste, the poll manager, told me that they "had not been made aware that they needed WiFi in order for the PollPads to work."

19. I told Celeste that I was under the impression that the PollPads only needed Bluetooth, and her explanation was that WiFi was needed in order for Bluetooth to work. Although I didn't think WiFi was needed for Bluetooth, I did not want to question her so I asked her how voters had been handled while the PollPads were inoperable. She said that they could have used provisional ballots, but the voters hadn't wanted to stick around to fill them out and then have to cure them at the elections office, so all of them said they would "come back later." There was apparently no paper pollbook back up or appropriate voter registration record to work around this malfunction.

20. One problem I could not stop thinking about is, if WiFi is really ***necessary*** for the check-in procedures to work, how will this be handled in some of the

rural communities, where there is no guarantee of WiFi availability? Especially when many poll managers seem to not have been trained on these requirements?

21. Later on Election Day, while observing at the Church at the Ridge in Hiram, Paulding County, the poll manager received a text from "the office," that there were "state-level problems for the check-in system and they want every polling place to do manual check-ins." There was much discussion between the poll manager and poll workers about what a "pain" it would be to have voters fill out the manual paper certificates first, and they didn't see why they had to since they were not experiencing any problems with the PollPads at this location. The poll manager then sent a text back to "the office" to see if the paper check-ins were necessary since there were no issues with their PollPads. About 10 minutes later, since she received no response, this polling place did ***not*** start using the paper certificates.

22. I did not know what the "state-level problems for the check-in system" were, but felt very uncomfortable that directions had been sent out via text, and that when a polling place asked for clarification, none was given. I had been hearing from other observers that there were some PollPad issues at various locations, and this exchange (or lack of) showed me how hard it is for the Secretary of State's office and Elections Directors to anticipate and

prepare for all types of problems, and how easily instructions can be miscommunicated, misinterpreted, missed entirely, or even ignored – which poses a huge problem especially on Election Day when there are so many precincts open for just 12 hours.

23. Also on Election Day, my last stop was the Smyrna Community Center in Cobb County, where hand-marked paper ballots were being utilized with KnowInk PollPad check-in and Dominion scanners. There, I quickly noticed that 4 PollPads were ***not*** enough. By 4:30pm, the line grew from about 20 people in line to about 50 people outside the gym which was the polling place, and while the actual time it took for people to mark their paper ballot and scan it only took about 30 seconds, the check-in process took 1.5 to 3 minutes on average, and was a huge bottleneck.

24. Later, I was shocked to find out that the number of PollPads ordered for the entire state only allows for an average of 1 to 2 PollPads per precinct on Election Day. However, at ***all*** of the precincts I have observed at, there were anywhere from 2 to 5 PollPads, perhaps creating an illusion that there will be more than enough check-in equipment available in 2020.

25. Based on my personal observations and discussions with poll workers, I am very concerned about the State's ability to process voters with the new pollbook system at a reasonable pace during the high turnout 2020 elections.

I believe that a contingency plan should be put in place quickly to anticipate major start-up problems in March.

Ballot Scanner Problems

26. On the first day of expanded early voting (first day the Civic Center polling place was open) in Cartersville, Bartow County, I witnessed a ballot scanner stop working after scanning just 7 printed ballot summaries. The poll workers went straight to work assuming it was a paper jam, and opened the top of the scanner as some were trained to do. However, when the voter's printed summary was removed from the scanner, they could see that the paper was still in great condition (and therefore they could all read what was printed, violating secrecy of the ballot,) and it had not 'jammed.'

27. It was clear the poll workers did not know what to do at this point, and after a few phone calls to the Elections Supervisor, they asked the two voters who were waiting on the scanner (and one voter's wife who had already finished the process) if they could wait for a while. Joe Kirk, the Elections Supervisor, came and they removed the top of the scanner again. This time, Mr. Kirk asked one of the poll workers to cancel the 'ballot' that was in the scanner and have the voter re-do his vote and print another summary. When a poll worker took the voter's printout to the check-in table, his wife, who was sitting next to me, exclaimed, "So much for ballot secrecy!"

28. After much commotion and almost 40 minutes of waiting, the two voters were asked to place their paper summaries into the "Emergency Slot" of the scanner. I could not help but wonder what would have happened if this polling place had had the amount of turnout they experienced in 2018 – one of the poll workers had told me earlier that during the gubernatorial election, the line was "crazy" – it went out the door and was snaked around the hallways and doubled around inside the large auditorium.

29. When Mr. Kirk left saying he would return "with instructions," one of the poll workers, Sylvia, who is usually a poll manager at another precinct, said that she would ***have*** to have **two** scanners at her precinct in case something like this happened in March 2020. She said to her co-workers, "Voters don't feel confident if their vote is just put in the emergency slot and not counted."

30. Mr. Kirk later returned with 3 technicians, all presumably from Dominion. The scanner was finally fixed and a voter was able to have their printout scanned. It had taken 1 hr. 50 min. for the problem to be fixed, but only because the technicians knew what to do and they happened to be in the vicinity. My immediate thought was that very few precincts are going to have the technical know-how or the availability of Dominion technicians so close by in 2020 – how will debugging issues like this be solved then?

31. During the Dec. 5th mayoral run-off in Smyrna, I also observed a scanner which was "finicky." I had heard from many other observers that on Election Day, the scanners at their precincts would reject printouts if they were not placed into the scanner a certain way, for instance, "face up, bottom first."

32. The scanner at the Cobb County Fire Station #3 seemed to have this type of problem, where voters' printouts would be spit out and they would have to re-insert their printouts until the scanner accepted the ballot. While this seems like a minor problem, I did notice that every time this happened it would create a bottleneck at the scanner, even though the actual voting time using hand-marked paper ballots was remarkably faster than when using BMDs.

Voters Not Verifying their Printouts

33. During all of my time spent at BMD polling places, perhaps my most shocking observation was that the vast majority of voters did ***not*** even look at their ballot printout once it was produced. At the White Oak Park location, of the voters I carefully observed, only 3 out of 31 voters even ***glanced*** at their printouts – only 1 appeared to carefully read what was on it.

34. All of the other voters seemed to assume that the printer would print out whatever they had chosen – I saw parents give their printouts directly from the printer to their children to carry; elderly people just hold their printout

while looking to see what station they needed to go next; people who were more interested in making sure they retrieved their SmartCard from the BMD and so did not think to look at the printout; and others who seemed frustrated with the BMD experience and wanted to figure out how to be done, never once looking at the printout but heading to the exit.

35. Another issue with the printout is that even for people who DID look at them, the type size on the paper is so small that many would have not been able to read it without reading glasses, or missed it entirely.

36. At the Cartersville Civic Center location, there was a table with a magnifying glass on it, and one poll worker explained that they provided the table because, "The print is too tiny." However, perhaps because of the issues they had with the scanner, none of the poll workers reminded people to look at their printout or to use the magnifying glass if they needed it.

37. Even at locations where the poll worker standing by the scanner remembered to ask, "Did you check your ballot?," I observed people just glancing at their printout (and not clearly reading it,) or otherwise nodding as in "Yes," even if they had ***not*** looked at their ballot.

38. These municipal elections had very simple short ballots generally with less than two races. Given that voters did not routinely verify a simple ballot printout, it seems very unlikely that voters will attempt to memorize and

verify the accuracy of a long general election ballot printout that may have dozens of candidates and races. Without virtually all voters accurately confirming the machine marked printed ballot summaries, the ballot cards are unreliable source documents for tallying or auditing.

39. I am a politically active person and generally have personally met almost all the candidates I intend to vote for offices of state, county or municipal government. I study the ballots and the candidates and have a higher level of interest and awareness of the ballot choices and a higher level of formal education than most voters. Yet I would be intimidated to attempt to try to rely on my memory in the stress of a crowded polling place, probably with many people waiting in line, to verify that my ballot summary text with numerous races was accurately printed by the machine.

40. I feel strongly that it should not be my burden or duty as a voter to determine whether the machine is operating properly as part of the act of voting. If voter verification of the machine's accuracy of the ballot summary printout is a necessary element of assuring a valid election in Georgia, I do not believe that I nor most voters can live up to that expectation.

Inadequate Poll Worker Training

41. From my poll observations and conversations with poll workers, I feel that training was insufficient overall. On the first day of early voting, in Hiram,

Paulding County, one poll worker told me that they had "only received the equipment about a week ago so we've been scrambling," and I watched as the poll manager, along with a poll worker, was trained on how to use the PollPad by another poll worker.

42. The same thing happened in Bartow County at the Cartersville Civic Center on the first day of expanded early voting – one of the poll workers told me, "This is my first time working on PollPads and I'm still being trained on it."

43. Another poll manager whom I spoke to on Election Day at the George Ford Center in Powder Springs in Cobb County, (where they used hand-marked paper ballots so the majority of the training they received was solely on the PollPads and Ballot Scanners,) said the 8 hours of training they received was "definitely not enough," when there were 60 people being trained and only 1 or 2 machines for all of them. "In fact," he said, he had chosen to "take another hour of one-on-one training" so he could get some hands-on time with the equipment, and he still felt that wasn't enough.

Scaling and Implementing in Every Precinct in March 2020

44. Based on my observations of the ***very*** small municipal elections in Paulding and Bartow counties that I witnessed, I am truly concerned about the ability of the entire state of Georgia being able to implement the Dominion Voting System in its entirety by March 2020.

45. Despite the Secretary of States' assurances that the pilot program went "very well," during the third week of early voting, Joe Kirk, Election Supervisor of Bartow County told me that he had "hoped that there would be more voters, but there really hasn't been enough to really see them interacting with the new machines to tell how it was going."

46. Indeed, all of the municipal races in the BMD pilot counties were so small or uncontested, that the actual number of people who voted using the BMDs, in the six pilot counties, from my calculations, is less than 1% of the number of people (2.5 million) estimated to vote in March 2020, and less than 0.5% of the number of people (based on the Secretary of State's office estimate of 5.3 million[1]) estimated to vote in the 2020 General Election.

47. In other words, I believe the "pilot program" did not use a large enough sample to be truly called a "pilot" – to try to scale how elections will go based on a test sample of less than 1% of the estimated turnout, especially when there were ***so many*** failures and problems, seems irresponsible at best.

48. In addition, I believe many of the problems that were encountered in the pilot counties were due to voters and poll workers using brand new equipment which had not been adequately tested for the PollPads, BMDs, and Ballot Scanners.

[1] https://www.nytimes.com/aponline/2019/12/11/us/ap-us-georgia-election-2020.html

49. The PollPad and Scanner problems I observed could likely have been prevented had there been a more extensive and thorough testing and debugging program for each piece of equipment. The Secretary of State's website touts that "Raffensperger's office has already taken delivery, tested and accepted more than 10,000 of the new touchscreens and half of the new scanners ordered[2]," but there is no information as to what type of testing occurs, and the testing is not open to the public.

50. With about 80,000 new pieces of equipment (PollPads, BMDs, Printers, Scanners, and Back-up Batteries,) I have serious concerns that if the testing is anything similar to what was done before the pilot programs, there will be a completely unacceptable number of equipment failures in 2020 if one extrapolates on the number of failures observed in the pilot precincts to the number of precincts that will be used in 2020.

51. Given that there are potentially 80,000 pieces of equipment that can fail, and given that only a miniscule number of them have now actually been used in an election, my biggest concern is that there will be so many failures that poll workers are not trained to fix during the 2020 elections that technicians will not be able to keep up. The problem is exacerbated by

[2] https://sos.ga.gov/index.php/elections/new_voting_system_performs_well_in_pilot_counties_deliveries_on_schedule

having no serious contingency default plans for any of the vulnerable functions.

52. In addition to my personal observations, I have kept abreast of the news stories about the purchase and implementation process such as the "Election Day Round Up News Articles" (Exhibit 1) which focused on early reports of the Election Day problems with pollbooks. Other such news reports I helped gather explaining the various start-up problems encountered have been previously filed (Doc. 675-2). The information in the news reports is consistent with my experiences as a poll observer. The sheer number of problems encountered in such a small and overstaffed pilot election project does not bode well for a secure or smooth March primary, in my opinion. This information makes me nervous about what voting method my family should choose next year to have the best chance of our votes being accurately counted.

53. There is considerable public information on the equipment delivery slippage which is contained in Exhibit 2 prepared by another organization. I have been reviewing these news reports during this decision and attempted transition and personally believe that the goals for March implementation are too aggressive to avoid major disenfranchisement. This information is consistent with discussions I had with pollworkers in my polling place

observations, and is another basis for my concern about whether my votes will be received and counted in a valid manner.

54. In summary, the best reason I have heard on why Georgia should ***not*** use the new Dominion Voting System for the huge 2020 elections is this: "It's like Walmart installing a brand-new register system on Black Friday in all stores simultaneously."

Executed on this date, December 16th, 2019.

Aileen Nakamura

EXHIBIT

1

DOMINION ELECTION DAY NOV. 2019 ROUNDUP

MAJOR HEADLINES

Georgia SOS

Georgia Secretary of State Press Office: “New Voting System Performs Well in Pilot Counties, Deliveries on Schedule”

Georgia

AJC: “Problem with New Election Equipment Delays Voting in Georgia Counties”

Valdosta Daily Times: “Be Open Regarding Voting Machine Snafus”

Georgia Recorder: “Georgia’s New Voting Machines Buggy in Tuesday’s Election Debut”

Cherokee Tribune: “Paulding Overcomes Machine Glitches in Elections of Hiram and Dallas Mayors and Council Members”

WRBL Columbus: “Georgia’s New Voting Machines Experience Some Bumps During Test Runs”

West Georgia Neighbor: “Glitches Do Not Slow Bartow Voters from Approving Earlier Alcohol Sales and Keeping Familiar Names in Office”

AP: Georgia Tests New Voting System Before Ambitious 2020 Switch

GBP: Georgia Completes Pilot of New Paper Ballot-Based Voting Machines

Georgia HMPB

Cherokee Tribune: “Paper-Ballot Pilot, New Machines a Success in Cobb”

11Alive: “It Enhances The Voter’s Trust’: In Election Day Experiment, Four Cobb County Cities Are Using Paper Ballots”

Pennsylvania

Standard Speaker: “Glitch in New Voting System in Carbon County Impacts Results”

York Daily Record: “York County Struggles With New Voting Machines, Results Remain Incomplete”

York Daily Record: "Tuesday's Voting Woes Expose Danger That Pennsylvania is Not Ready for 2020 Election

Ohio

Dayton Daily News: “New Voting Equipment Leads to Problems in Greene County”

Dayton Daily News: “Election Results Slow, Then Change in Greene County”

Daily Record: “Wayne Co. Polling Stations Face ‘Growing Pains’ with New Machines”

Indiana

South Bend Tribune: New Voting Machines Cause Some Snags, Delays in St. Joseph County Elections

National

Bloomberg: “Expensive, Glitchy Voting Machines Expose 2020 Hacking Risks”

Salon: How the 2019 Election Could Be a Preview of Voting Issues We Might Face in 2020

QUOTES

Georgia Secretary of State

“Georgia’s new, secure paper-ballot system..has performed well” --GA Secretary of State Brad Raffensperger (Georgia Secretary of State, 11/08/2019)

"The implementation of the new voting system is going like clockwork. The system is running as designed" --GA Secretary of State Brad Raffensperger (Georgia Secretary of State, 11/08/2019)

"The rollout to the rest of the state for the March 24 presidential preference primary will go just as smoothly." --GA Secretary of State Brad Raffensperger (AJC, 11/04/2019)

"What we want is for everyone to have 100% confidence that we got it right," he said. "We believe it's a great system, and we've been getting great comments everywhere we go."--GA Secretary of State Brad Raffensperger (The Citizens, 11/07/2019)

Georgia County Election Officials

"Some of the machines just literally went black and rebooted during the day..."It was different precincts, different machines, different hours." --Greg Rigby, Carroll County Board of Elections and Voter Registration Supervisor. (Georgia Recorder, 11/07/2019)

"My hair was red before today. Now it's gray."--Carol Heard, Decatur County Chief Elections Officer (AJC, 11/05/2019)

"It was a statewide issue and they are working to make sure this does not happen in the future"-- Deidre Holden, Paulding County Elections Supervisor on KnowInk Poll Pad problems (Cherokee Tribune, 11/07/2019)

...Deb Cox said some ***electronic poll books malfunctioned in all 10 of the county's precincts when they opened for local elections Tuesday morning***. She said backup paper registration lists were used and voters experienced minimal delays.Cox said a judge ordered Lowndes County polls to say open an extra 45 minutes."--Deb Cox, Lowndes County Elections Supervisor (WRBL Columbus GA, 11/06/2019)

Kirk said the ***Dominion Voting System's Poll Pad used to access voters' information at check-in and create voter access cards malfunctioned at a few precincts*** Tuesday, Nov. 5. However, backup Poll Pads were used and kept voting running smoothly, Kirk said."--Joseph Kirk, Bartow County Elections Director (Cherokee Tribune, 11/06/2019)

Non-Georgia Election Officials

"I'm so confused," -- Doug Hoke, York County (PA) Vice President Commissioner Doug Hoke after he asked whether the full results had come in (York Dispatch, 11/06/2019)

"We don't know if we can trust (the system) next year"-- Jerry Dotter, Carbon County (PA) Election Board Member on Dominion System (Standard Speaker, 11/09/2019)

"I need to know where those votes are. That shakes me," he said. "Where are the extra votes in this race? We need a complete hand-count audit."-- William O'Gurek, Carbon County (PA) Commissioner (Standard Speaker, 11/09/2019)

"A glitch was also found on the [Dominion] ICX voting machines with the audio visual device installed. The issue was unexpected even for the machines' vendor" Julie Leathers, Wayne County (OH) Election Board Director (Daily Record, 11/08/2019)

"We were supposed to have two machines that would allow us to tabulate last night. While two tested and worked perfectly prior to election day, election night unfortunately one of them just didn't work and it was too late to get any more equipment" --Llyn McCoy, Greene County (OH) Elections Board Director on Dominion system (Dayton Daily News, 11/07/2019)

"We talked with the vendor and there was some sort of glitch in the software"--Catherine Fanello, St Joseph County (IN) Election Board Chair on KnowInk IPads (South Bend Tribune, 11/07/2019)

GEORGIA

All Six Pilot Counties Experienced Issues With New Voting Machines In Municipal Elections: "Election officials in Bartow, Carroll, Catoosa, Decatur, Lowndes and Paulding counties reported technical issues with new equipment, either with electronic entry points or with the new ballot-marking machines themselves." (Georgia Recorder, 11/07/2019)

5 of 6 Pilot Counties Experienced Problems w/ Check-In Poll Pads: "Voters in five counties experienced problems with new check-in devices, called "poll pads," caused by a programming error that prevented them from using electronic ballot-marking machines." (Georgia Recorder, 11/07/2019)

3 of 6 Pilot Counties Were Forced to Pull Ballot Marking Devices Offline After They Shut Down Unexpectedly: "In three counties, some ballot-marking machines were pulled offline when they shut down and rebooted themselves." (Georgia Recorder, 11/07/2019)

New Voting Machine Problems Caused Some Voters to Leave Precinct Without Voting and Led to 45 minute Delays: "Only a handful of people left precincts without voting or returning later to vote as precincts were kept open an extra hour, officials said." "Voters in five counties were delayed by up to 45 minutes from checking in to precincts and creating access cards by buggy poll pads, which must function to cast votes on the new ballot-marking machines." (Georgia Recorder, 11/07/2019)

Some KnowInk Poll Pads Failed to Connect to Bluetooth, Causing Delays: "Voters in five counties were delayed by up to 45 minutes from checking in to precincts and creating access cards by buggy poll pads, which must function to cast votes on the new ballot-marking machines." Election supervisors in those counties said some poll pads failed to connect via Bluetooth." (Georgia Recorder, 11/07/2019)

Incorrect Ballot Coding & Software Programming Led to Voter Confusion: "Some voters got confused when the machine asked them to select a party affiliation in the nonpartisan local elections. And some problems are chalked up to programming errors." (Georgia Recorder, 11/07/2019)

Officials in Bartow, Catoosa, and Carroll Counties Said Machines "Literally Went Black" at "Different Precincts, Different Machines, and Different Hours" Throughout Election Day: "Meanwhile, some precincts in Bartow, Catoosa and Carroll counties saw ballot-marking machines suddenly shut down and reboot during voting hours, officials in those counties said. "Some of the machines just literally went black and rebooted during the day," said Greg Rigby, supervisor for the Carroll County Board of Elections and Voter Registration. "It was different precincts, different machines, different hours." (Georgia Recorder, 11/07/2019)

Machines in Carroll County Failed to Read Voter Access Cards Preventing Voters From Making Selections: "...Greg Rigby, supervisor for the Carroll County Board of Elections and Voter Registration. "It was different precincts, different machines, different hours."A few machines also stopped reading the access cards, which kept voters from making selections on the machine's screen that displays the ballot, Rigby said." (Georgia Recorder, 11/07/2019)

Dominion & KnowInk Have Not Responded to Requests For Comment & SOS Has Yet To Re-examine Voting Machines After Constituent Petition: "Dominion and KnowInk did not respond to emails and phone calls Wednesday asking for an explanation for the equipment malfunction." "In August, Raffensperger agreed to reexamine the ballot machines after about 1,500 people petitioned him to do that. That review has not happened yet." (Georgia Recorder, 11/07/2019)

Salon Called the Issues In Georgia Nov Elections "Eyebrow Raising Incidents" "There were also some eyebrow-raising incidents on Election Day as new voting systems were deployed — including as test runs for wider use in 2020's presidential primaries...Two incidents — one in Georgia and another in Pennsylvania — stand out on the new voting equipment front. Both are examples where underperformance, owing to outsourcing technical tasks to private contractors, impeded the voting process and undermined public confidence, according to local news reports.." (Salon, 11/07/2019)

"In Georgia, six counties were testing a new voting system to be deployed statewide in 2020's March primaries...In other words, these counties are using a one-computer system and software to check in voters, who, in turn, will then move to another computer system that will bring up their correct local ballot. These systems, which local officials said were synced during their early voting period, somehow didn't coordinate on Tuesday. Poll hours were extended to accommodate voters who were forced to wait." (Salon, 11/07/2019)

"In Georgia, those issues were at the front door, where voters could not get a correct local ballot. And in Pennsylvania, the programming of new touch screen–based systems apparently undercounted votes to such a degree that local officials said that hand recounts would be necessary. All of these red flags are warnings for what could blow up in 2020, should the presidential election come down to a handful of narrow victory margins in swing counties…" (Salon, 11/07/2019)

"Rigby [Greg Rigby Carroll County BOE supervisor] said he had to swap out "three or four" of the new voting machines that malfunctioned in Carroll County. He said one that wouldn't accept cards to load voters' ballots, and another shut down and rebooted as a voter was using it." (AP, 11/05/2019)

“Raffensperger told The Associated Press he was getting positive feedback from voters. He said any problems were "small issues, and that's really why you do pilots — to work out any kinks or bugs that you might have to get ready for the big day of the presidential primary." (AP, 11/05/2019)

“The question met with chuckles and suggestions that the day’s last voters could take the machines home with them as souvenirs. Then one offered an even more popular idea: They’d take the displays outside and demolish them with baseball bats in the style of the 1999 film “Office Space.” Seventeen years worth of familiarity has bred plenty of contempt for Georgia’s voting system.” (Savannah Morning News, 11/07/2019)

“More than one in 10 votes cast in early voting for this month’s municipal elections were cast on Georgia’s new, secure paper-ballot system which has performed well, according to Secretary of State Brad Raffensperger who noted that deliveries are on schedule for statewide rollout in the March 24 Presidential Preference Primary.” (Georgia Secretary of State, 11/08/2019)

“The implementation of the new voting system is going like clockwork. The system is running as designed,” Raffensperger said. “We are learning some things from our experience during the pilot. The biggest lesson we’ve learned is how much people like the security and ease of using the new system.” (Georgia Secretary of State, 11/08/2019)

"Voters and poll workers are enthusiastic about how easy it is to use and how well it works,"Raffensperger said. "The rollout to the rest of the state for the March 24 presidential preference primary will go just as smoothly.” (AJC, 11/04/2019)

Raffensperger told commissioners that demonstrations of the new voting system, which produces a paper ballot, have drawn positive feedback throughout the state. He offered to speak to local groups in the run up to the 2020 elections so that voters are prepared for the new system."What we want is for everyone to have 100% confidence that we got it right," he said. "We believe it's a great system, and we've been getting great comments everywhere we go." (The Citizens, 11/07/2019)

“Lowndes County election supervisor Deb Cox said some electronic poll books malfunctioned in all 10 of the county's precincts when they opened for local elections Tuesday morning. She said backup paper registration lists were used and voters experienced minimal delays.Cox said a judge ordered Lowndes County polls to say open an extra 45 minutes.” (WRBL Columbus GA, 11/06/2019)

“A glitch with Georgia's new voter check-in computers caused delays in most of the six counties testing it, causing some precincts to stay open late to accommodate voters who left without casting their ballots.” (AJC, 11/05/2019)

“Poll workers weren't able to create voter access cards on new voting check-in computers manufactured by KnowInk. Those cards activate touchscreen voting machines so that they display the ballot associated with the jurisdictions where voters are registered...The same issue also occurred in Bartow, Carroll, Paulding and Lowndes counties. Catoosa County had no problems.” (AJC, 11/05/2019)

“In Decatur County, near the Florida border, some voters waited 45 minutes for the problem to be fixed. Decatur election officials decided to keep precincts open an hour later, until 8 p.m. "Let's get these kinks resolved now before March 24," said Carol Heard, the chief elections officer for Decatur County. "My hair was red before today. Now it's gray." (AJC, 11/05/2019)

“However, the system's electronic Poll Pad — used to verify voters' identities and other information — malfunctioned in Paulding and most other counties Nov. 5 when it pulled up the data but failed to encode the cards needed to access the voting machines.” (Cherokee Tribune, 11/07/2019)

“Elections Supervisor Deidre Holden said her staff used the Dominion system's ballot activation option to allow voters to cast ballots "and also paper ballots when we realized there was an issue." (Cherokee Tribune, 11/07/2019)

“The paper ballots are used for verifying and auditing results, according to the Georgia Secretary of State's office. Holden said she and her workers "had very few issues with the Dominion System" other than the Poll Pad problems.“It was a statewide issue and they are working to make sure this does not happen in the future,” Holden said. ” (Cherokee Tribune, 11/07/2019)

“It went pretty smooth,” said Janine Eveler, director of the Cobb County Board of Elections and Registration. “We had a couple of scanners that had some slowness, or they didn’t receive the ballots in a certain direction, and so once we figured out that if we just flipped the ballot over, they were working. So it’s just getting used to the equipment.” (Cherokee Tribune, 11/07/2019)

“Some counties using the new machines, including Decatur and Lowndes at the Georgia-Florida border, reported issues with sign-in during Tuesday’s elections. The issue, Eveler said, was that poll workers were being prompted during the sign-in process to choose a Republican or Democrat ballot to encode on cards that would display a ballot on the screen for a voter. This November’s municipal elections were nonpartisan. “So the poll workers couldn’t proceed to encode the card because they couldn’t get past that,” Eveler said.” (Cherokee Tribune, 11/07/2019)

“The same issue appeared in Cobb as well, but technicians were already in the field and stopped by each polling location to remedy the situation, she said. Since very few voters were using the new voting machines in Cobb, the error didn’t slow voting.” (Cherokee Tribune, 11/07/2019)

“(There was) only one incident that I heard of directly, where a disabled voter wanted to use a ballot-marking device (and) was not able to,” Eveler said, adding that the voter’s husband was able to help her cast a ballot. “But we prefer that the voter have the independence to vote however they want.”

“Cobb elections officials are expected to meet with the state, voting machine vendors and officials from the other six counties that piloted the new machines in coming weeks to analyze the successes and shortfalls of the new voting system, and there will be lots to hammer out, Eveler said.” (Cherokee Tribune, 11/07/2019)

“A few glitches did not stop Bartow's elections office from conducting elections for four cities without delays using the state's new voting machines. Elections Director Joseph Kirk said the Dominion Voting System's Poll Pad used to access voters' information at check-in and create voter access cards

malfunctioned at a few precincts Tuesday, Nov. 5. However, backup Poll Pads were used and kept voting running smoothly, Kirk said." (Cherokee Tribune, 11/06/2019)

"The Secretary of State's office needs to be completely open and transparent about everything that went wrong with the state's new paper ballot machines during the Tuesday trial run. The state must also be just as open and transparent about what is being done to fix the snafus." (Valdosta Daily Times, Editorial, 11/09/2019)

"In at least one county — Lowndes — the elections office had to rely on the bar-coded paper ballots because of something that did not work correctly. Was this all human error? Then tell the public. Was this a problem with the software? Then tell the public. Was it a hardware problem? Then tell the public." (Valdosta Daily Times, Editorial, 11/09/2019)

"The people of Georgia paid more than $100 million for this new voting system and the people of Georgia have every right to know everything that went wrong and what is being done about it.In addition to the issues in Lowndes, there were other problems at polling places in Carroll, Paulding and Bartow counties." (Valdosta Daily Times, Editorial, 11/09/2019)

"Apparently it was necessary to call in KnowInk technicians because of software programming issues with the Poll Pads used to check voters in at the precincts. This Dominion Voting System is supposed to be the latest, greatest and was ostensibly researched and fully vetted before this live launch on Election Day." (Valdosta Daily Times, Editorial, 11/09/2019)

"The $107 million Dominion Voting System did not function properly despite the fact that representatives from the Secretary of State's office said in media interviews the launch was smooth and successful." (Valdosta Daily Times, Editorial, 11/09/2019)

"Secretary of State Brad Raffensperger should not try to pass off the problems that occurred Tuesday evening as being minor and insignificant. Government should never try to "spin" the facts or re-frame the public conversation to make things look better for political reasons. What happened, happened. And it must be fixed." (Valdosta Daily Times, Editorial, 11/09/2019)

Cybersecurity experts are baffled by local election officials choosing the computerized voting machines. "It's a mystery to me," said Rich DeMillo, a Georgia Tech computer science professor and former Hewlett-Packard chief technology officer. "Does someone have 8 x 10 glossies? No one has been able to figure out the behavior of elections officials. It's like they all drink the same Kool-Aid." (Bloomberg, 11/08/2019)

"DALLAS, Ga. (AP) — Voters and election supervisors testing Georgia's new voting machines gave favorable reviews Tuesday, despite some opening glitches reported by five of six pilot counties, as the state rushes to meet a court-ordered deadline to retire its outdated, paperless system before any votes are cast in 2020." (AP, 11/05/2019)

"Cobb County volunteered to be a guinea pig for paper."I think it enhances the voter's trust," Cobb County Director of Elections Janine Eveler told 11Alive's Christie Ethridge. "It does for me as an election official - being able to, if necessary, hand count what those paper ballots said or if we need a

recount or an audit. Whereas the previous system, it was recorded on a memory device and there was nothing else we could do to prove the results were accurate." (11Alive, 11/05/2019)

"So as an election official I'm grateful we'll have that paper record," Eveler added.The four cities testing out paper ballots are Austell, Kennesaw, Powder Springs and Smyrna.The paper ballot experiment is actually two-fold: Most voters will do it the way you're thinking, by grabbing a pen and bubbling in their ballot like how you took a test in school." (11Alive, 11/05/2019)

"Cobb County elections director Janine Eveler said things were smooth there, too, but there were some logistical things to consider when running a purely paper ballot election, like how to get ballots to the polling places. To send out all of the ballots that were printed for each polling place is too heavy for a poll manager to lift," she said. "So we had to kind of decide, well, we're going to send out a certain number now and then we'll have more ready to go take it to them if they need it." (Georgia Public Broadcasting, 11/06/2019)

"Eveler said there were mostly positive reviews from voters, and added that voters had some creative ways to incorrectly fill in their choices."Sometimes they make an X, or a check … something we've seen is where they mark a line through everyone they don't want and circle the name they do want," she said." (Georgia Public Broadcasting, 11/06/2019)

PENNSYLVANIA

"A shortage of ballot-counting scanners caused long lines, incorrect paper ballot sizes resulted in some ballots getting torn, and many voters didn't know how to use the new machines, officials have said…Numerous candidates held off Tuesday night and Wednesday on commenting about their apparent victories because of the widespread chaos." (York Dispatch, 11/06/2019)

"I'm so confused," said York County Vice President Commissioner Doug Hoke on Wednesday morning after he asked whether the full results had come in...Confusion was worsened when a glitch in the county's system left it outputting that zero precincts were reporting, even though more than 100,000 ballots had been counted...However, state and federal funding has covered roughly 60% of the $1.4 million price tag to purchase machines from Dominion Voting Systems, said York County Solicitor Michèlle Pokrifka." (York Dispatch, 11/06/2019)

"The Republican Party appointed the two candidates for the party's nomination after two candidates had died while in office, leaving vacancies on the ballot, he said. The county reprinted the ballots for those two townships, and then had to bring in the company it purchased the new voting equipment from, Dominion Voting Systems, to reprogram the database program so that it would pick up those candidates, [William O'Gurek, Carbon County Commissioner] said. Adding those two candidates, however, changed the dynamics of the program and the numbers weren't being picked up, he said. Everything alphabetically after Lower Towamensing weren't being properly tabulated in the spreadsheet, O'Gurek said." (Standard Speaker, 11/08/2019)

“Dominion was confident that numbers printed off the scanners were accurate and the problem was with the tallying program, he said.” (Standard Speaker, 11/08/2019)

The election board met in executive session Thursday morning with representatives from Dominion, the county solicitor and administrator, and representatives of the Department of State, O’Gurek said. Dominion was asked to come to the commissioners’ meeting, which started 20 minutes late due to an earlier meeting, to explain what happened, but they refused, he said.” (Standard Speaker, 11/08/2019)

“Dominion then re-programed the tallying system to pick up those candidates. The addition of those candidates changed the dynamic of the program and the numbers were then not properly tabulated in the spreadsheet for communities alphabetically after Lower Towamensing Twp. County commissioner candidate Bob Jacobs raised concerns at Thursday's commissioners' meeting and again Friday at the election board meeting about the disparity in the numbers. On Tuesday night, the election office sent out an email showing all precincts reporting with 14,070 votes in the commissioners' race and Wednesday morning another email came with a total vote of more than 24,000 -- a 10,000 vote difference, he said.” (Standard Speaker, 11/09/2019)

“People also questioned why the county is relying on advice from Dominion, when their equipment and system didn't deliver. "We have to rely on their technical ability," solicitor Dan Miscavige said...Board member Jerry Dotter believed they needed the hand count, and the high-speed scan to test Dominion's system both ways. "We don't know if we can trust (the system) next year," Dotter said.” (Standard Speaker, 11/09/2019)

“Linda Christman of Towamensing Twp. said she talked to voters all day Tuesday outside a polling place. "The voters don't have confidence in this process," she said. "Voter confidence has to be restored." (Standard Speaker, 11/09/2019)

“Before the board voted, [William O’Gurek, Carbon County Commissioner] shared an irregularity that was pointed out to him in the clerk of courts race that he said shook his confidence. The total number of votes minus the undervotes and overvotes should be the number of votes cast for the candidates, he said. That number should be 14,828 in this race, but the number that they have is 14,470 -- a difference of 358 votes, O'Gurek said. "I need to know where those votes are. That shakes me," he said. "Where are the extra votes in this race? We need a complete hand-count audit." (Standard Speaker, 11/09/2019)

“The county received the results from the polls on Tuesday night in a timely fashion, Suchanic said. But it ran into trouble with posting those results online because of a program problem with reading the cards. "So it did take us several hours to work with Dominion (the voting machine vendor) to figure out what the problem was, and we eventually were able to report the majority of our precincts on election night," she said.” (York Daily Record, 11/08/2019)

“We’re talking with (voting machine vendor) Dominion for their professional counseling and holding them to account for the delay in getting results initially tallied,” he said. The county is also searching for solutions internally. “We could also look to do more educational outreach to help people understand the new voting system,” Walters said.” (York Daily Record, 11/08/2019)

“Voters are confused about the process, think they should get a paper receipt, and have no idea about completing the little bubbles,” Lunko said. “Even telling people, we’ve spoiled numerous ballots already, from people overvoting.” (York Daily Record, 11/05/2019)

“Each polling site has one scanner. In addition to creating bottlenecks at numerous sites around the county, some weren’t working properly. Voters were told to put completed ballots in a slot at the back of the scanners at the YMCA and Spry Church polling spots. They were told the ballots would be scanned and counted later.” (York Daily Record, 11/05/2019)

“At one polling place in Fairview Township, hundreds of people filled out ballots but left before scanning them, unable to stay longer or tired of waiting for voters ahead of them to scan their ballots.” (PA Post, 11/06/2019)

Dominion Scanners Could Not Read 2nd Ballot Page, Caused Delay, Scanner Failure:“At the Newberry Township building, the scanner tallied the second sheet, but wouldn’t take the first sheet. They were collected in a separate slot to be counted later. The scanner went down at Shrewsbury Township during the second hour of voting and ballots were collected to be tallied later in the day...The paper ballot and scanning method was picked because it was considered more cost-effective than other options, Suchanic added. The two-page ballot also slowed down the process. Suchanic said. The ballot referendum required a second page.” (York Daily Record, 11/05/2019)

“We just didn’t realize it would be as challenging and time consuming to scan the ballots,” President Commissioner Susan Byrnes said Tuesday night. Byrnes added the new voting system cost the county $1.5 million.” (York Daily Record, 11/05/2019)

“She said that even though there were reports of problems in York and Northampton counties, “there is no problem with the paper ballots that they cast.” And she said that underscores the need to switch to new machines that require a paper ballot.” (PA Post, 11/06/2019)

“The commissioners simply did not provide for enough scanners,” he said. “They better get more machines next year or they’re going to have a disaster.” Piccola said one poll in Fairview Township had an hour wait just to scan ballots. But it’s more than just needing more machines, he said. They probably will need more poll workers, too, to answer questions about the ballots and the scanner.” (York Daily Record, 11/05/2019)

Some polling places experienced delays. Ron Smith, who was elected county commissioner Tuesday, said he worked at one polling location where people had about a 15 or 20 minute wait at different points in the day. At other polling locations, the wait was longer. Commissioner Byrnes described wait times of about 45 minutes or an hour at some spots. The county said it one optical scanning machine for each of its polling locations wasn’t enough. (PA Post, 11/06/2019)

OHIO

“New voting equipment in Greene County led to a delay in reporting results Tuesday night and is forcing the elections board to amend the results today for races in Fairborn, according to Llyn McCoy, Greene County elections board director.” (Dayton Daily News, 11/06/2019)

“McCoy said there were 53 votes that didn't get included in the final, unofficial results for Fairborn races...This was the first election for Greene County to use new voting equipment provided by Dominion Voting Systems. McCoy said there was a problem with one of the machines that's used to read the USB drives on which all the county's votes are stored. That delayed results from being reported and led to one of the USB drives from the Tri-County polling location in Fairborn not being included in Tuesday night's totals. “ (Dayton Daily News, 11/06/2019)

McCoy said Wednesday morning her staff figured out why they were getting error messages. "There were old files on the flash drives. As a security precaution, it won't let you upload those drives," she said. The elections board met in an emergency session Wednesday afternoon to approve the "Amended Unofficial Final Election Results Report," which included 53 votes that were not tabulated Tuesday night. (Dayton Daily News, 11/07/2019)

Updates came slowly and the final, unofficial results were not reported until approximately 11:30 p.m., more than an hour after vote tallies were finalized in other counties..."We were supposed to have two machines that would allow us to tabulate last night. While two tested and worked perfectly prior to election day, election night unfortunately one of them just didn't work and it was too late to get any more equipment," McCoy said [Llyn McCoy, Greene County elections board director]. (Dayton Daily News, 11/07/2019)

The elections board deployed 327 new Dominion ICX voting machines and a new version of its electronic poll book software to polling stations across the county Tuesday. The morning proved a “little chaotic” when poll workers set up the new machines for the first time, board Director Julie Leathers said. (Daily Record, 11/08/2019)

“We did train our workers on the new equipment, however, it is very difficult to simulate and anticipate every scenario that could occur on Election Day,” she said. “All in all, I feel that our roll-out went extremely well.” Most polling locations had trouble encoding voter access cards through the electronic poll book. (Daily Record, 11/08/2019)

“A simple fix was discovered and disseminated to polling locations as soon as possible. In the meantime, poll workers provided paper ballots to voters,” Leathers said. (Daily Record, 11/08/2019)

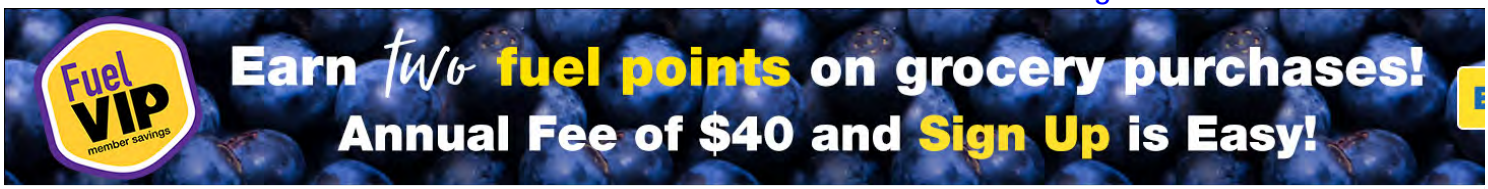
“A glitch was also found on the ICX voting machines with the audio visual device installed. The issue was unexpected even for the machines’ vendor, according to [Election Board Director Julie] Leathers. The issue affected only one machine per polling location. Each location had two to 11 additional machines that experienced no issues.” (Daily Record, 11/08/2019)

Indiana

“At about 20% of the 80-plus polling locations in the county, technical issues with PollPads, provided by vendor KnowInk, caused delays for voters. The pads are used to scan voter’s ID cards when they

check in. The pads aren't part of the new equipment this year, and have been used in previous elections." (South Bend Tribune, 11/07/2019)

"We talked with the vendor and there was some sort of glitch in the software" for the iPads, said Catherine Fanello, chair of the board. The board dispatched about 15 technicians to polling sites to help poll workers. Jake Teshka, the 5th District incumbent on South Bend's city council, said he saw roughly 50 people walk away from the voting poll at Marshall Traditional School early Tuesday morning as he was greeting them." (South Bend Tribune, 11/07/2019)



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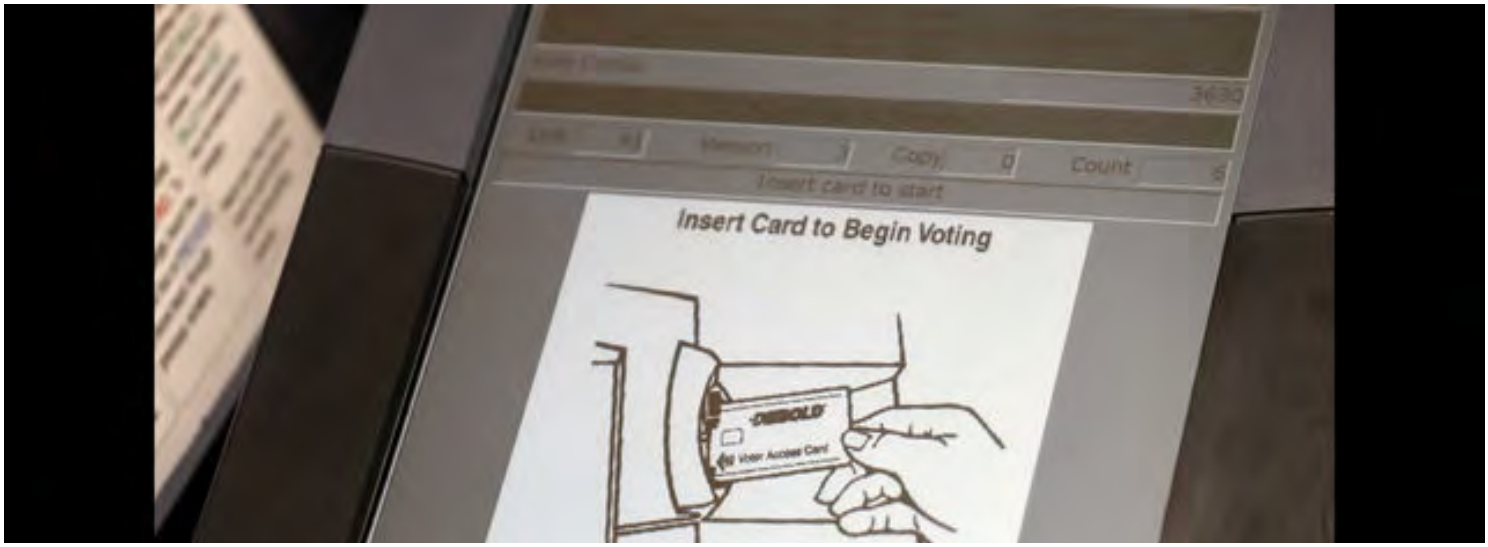
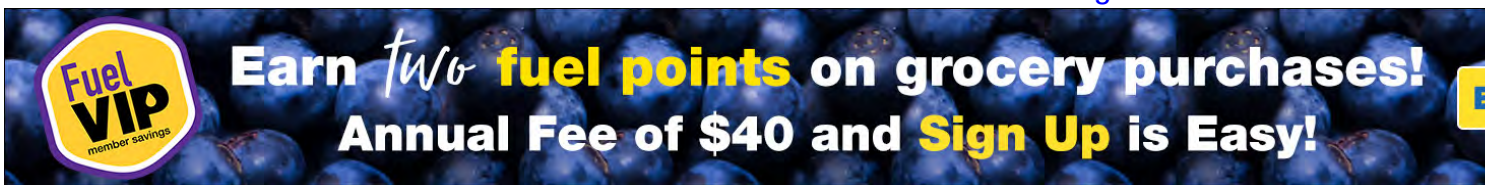


ATLANTA (AP) - The Latest on Georgia's test of new voting machines during local elections in six counties (all times local):

2:30 p.m.

A second Georgia county is keeping polls open late because of a glitch with new equipment used to check voters' registration.

Content Continues Below



Lowndes County election supervisor Deb Cox said some electronic poll books malfunctioned in all 10 of the county's precincts when they opened for local elections Tuesday morning. She said backup paper registration lists were used and voters experienced minimal delays.

Cox said a judge ordered Lowndes County polls to say open an extra 45 minutes.

Decatur County had similar problems Tuesday morning and polls there will also close later.

Six Georgia counties are testing new voting machines Tuesday that combine touchscreens with paper ballots. Officials plan to roll out the new system statewide during the March presidential primaries.

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Noon

An election official says a software glitch delayed voting for about 45 minutes in a Georgia county that is testing the state's new voting machines.

Decatur County elections supervisor Carol Heard said electronic poll books used to check voters' registration and load their ballots onto a keycard malfunctioned at all three precincts after they opened at 7 a.m. Tuesday.

Heard said about a dozen voters altogether were waiting. A judge ordered polling places in Decatur County to stay open an extra hour Tuesday night.

Heard said: "I'm glad this was brought up now and not next year," when higher turnout is expected for the 2020 presidential elections.

Six Georgia counties are testing new voting machines Tuesday that combine touchscreens with paper ballots. Officials plan to rollout the new system statewide during the March presidential primaries.

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12:30 a.m.

New voting machines that combine touchscreens with paper ballots are getting a limited test run in Georgia. It's part of an effort to meet a court-ordered deadline to retire the old touchscreen only system before any votes are cast in 2020.

Voters in six counties are casting ballots on the new machines Tuesday in elections for mayor and other local offices. Georgia's remaining 153 counties won't use the new system until the state's presidential primaries in March.

Elections in Georgia are being closely watched after problems from two-hour waits at the poll to allegations of voter suppression in 2018 led to lawsuits and changes to state law. A federal judge in August ruled Georgia's paperless voting system in use since 2002 was "seriously flawed" and must be retired by Jan. 1.

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Trending - Most Read Stories

EXHIBIT

2

1. GEORGIA IMPLEMENTATION SKEPTICISM
2. DELIVERY TO *GA COUNTIES* TIMELINE SLIPPAGE
3. DELIVERY TO GA *FACILITY* TIMELINE SLIPPAGE
4. NUMBER OF PILOT COUNTIES CHANGED FROM 12 TO 10 TO 9 TO 6

All Response Documents Located at https://sos.ga.gov/securevoting/ > Award Information > Dominion Response to Request for Proposal

GEORGIA IMPLEMENTATION SKEPTICISM

Dominion Plans to Deploy 200 Fewer Implementation Staff than 2002 "The major differences and the reason the number of staff personnel is reduced from approximately 550 to 350 is due to the fact the state has a statewide management infrastructure in place and the counties are used to a statewide touch screen type voter experience. In 2002, the State had a multitude of different voting systems in place including hand marked paper ballots, punch card systems, early optical scan systems, lever machines and direct-recording electronics (DRE's). Everyone from the state to the counties had to be trained on a new way of voting and managing the process." *(Dominion Response Document 12-1 PM)*

Colorado SOS on Georgia's Implementation Timeline: "It Blows My Mind" "What Georgia is trying to do basically blows my mind," said Dwight Shellman, an election official at the Colorado secretary of state's office. His state adopted a Dominion system in 2016."We had 2 1/2 years to do it, and it was challenging," Shellman said. "I can't imagine implementing the number of counties Georgia has in, what, two months? Three months?" (AJC, 11/01/2019)

Colorado SOS on Georgia's Implementation Timeline: "It Blows My Mind" "What Georgia is trying to do basically blows my mind," said Dwight Shellman, an election official at the Colorado secretary of state's office. His state adopted a Dominion system in 2016."We had 2 1/2 years to do it, and it was challenging," Shellman said. "I can't imagine implementing the number of counties Georgia has in, what, two months? Three months?" (AJC, 11/01/2019)

Fulton SOS Said Timeline is "Somewhat Crunched" and would require "Long Hours to Make it Happen "Voting machines likely won't arrive until after this fall's local elections and potential runoffs, he said. "The timeline is somewhat crunched, but we'll get it done," Barron said. "We may have to put in some long hours to make it happen." (AJC, 11/01/2019)

Dominion Warned SOS Original March 31st Timeline Was Not Fast Enough for March Elections. "If the intent is to use the new system statewide for the March PPP election, we must mitigate the risk of an unsuccessful experience by delivering and training ahead of the published schedule. If delivery dates per the statement "Completion of Phase 2 – Part 2 will be completed prior to the end of the first quarter of 2020 (March 31, 2020)" represents the GASOS intent, the March PPP will not be ready for a statewide roll out and use of the new system in March 2020. The SAFE Commission made it clear a statewide usage of the new system will be ready to use in the March PPP election. Dominion is committed to make that a reality by adopting an aggressive Implementation Plan and Training schedule." (Dominion Response Document 12-5)

DELIVERY TO *GA COUNTIES* TIMELINE SLIPPAGE

Dominion Says Goal is for Machines to Be Delivered by December 31, 2019, "If Not Earlier" "The Dominion delivery schedule will follow the quantities as defined in Attachment O. Phase 2 – Part 1, but will be able to deliver ahead of schedule if permitted by the GASOS. Completion of Phase 2 – Part 2 will be scheduled for completion by December 31, 2019, if not earlier. This will allow us to remain ahead of the schedule described in the RFP thus avoiding undue pressure on the State or the Counties as we prepare in January to conduct training across the State." (Dominion Response Document 12-1, page 5)

Dominion's Goal Was To Have Machines Delivered By December 2019. "The master delivery schedule addresses the Pilot County needs first so training content may be tailored to the situation and training classes conducted in August and September. Poll worker training will be conducted in October or perhaps sooner as the Counties adjust to the changeover. Delivery of the Pilot County equipment will be scheduled to correspond to the decommissioning program and readiness of the counties to receive new product. The delivery schedules for the remaining counties will align with the State's decommissioning plans and schedules following the November Election. By delivering and accepting the EMS software and equipment including central scanning equipment in August, we will then focus on the high-volume Acceptance Testing for the BMD's beginning in October, or late September if the GASOS staff schedules permit. The plan accelerates in November once the General Election is finalized and the decommissioning program kicks off. The pace will continue right up until the end of the year with the goal to have all counties delivered by the end of December 2019. If for any reason there are schedule delays, we will have sufficient inventory of voting system and poll book products in the warehouse Acceptance Tested to ensure every county has system components from which to train." (Dominion Response Document, Supplemental Technical Response, page 42-43)

Dominion Says Machines Should Ideally be Delivered by End of 2019 and "No Later" than January 15, 2020 "The Dominion plan is to deliver fully by the end of 2019 or no later than January 15, 2020 so the State, the counties, and the poll workers all have adequate time to install, train and establish the support model for the statewide election in March." (Dominion Response Document 12-6, page 1)

On Oct 10, SOS Said "All Counties Should Have All Equipment by January 15th At the Latest." "Question: Is there a "final" date when we can expect to have all our equipment and he said tech would be available middle of February, but we start mailing ballots on Feb. 4, Doesn't L&A have to be done at least on some of the equipment before mailing ballots? Answer: All counties should have all equipment by January 15th at the latest. We will be working with Dominion to provide technicians for the PPP which will begin at the end of January." (Transcript: Q&A From Region Calls on October 10, 2019)

SOS Says Voting Machines Will Be Delivered to Counties by "Mid-January" "A federal judge ordered a pilot of hand-marked paper ballots as part of a larger lawsuit challenging the use of electronic voting machines. Judge Amy Totenberg said the state must stop using its current outdated direct-recording electronic machines after 2019. Hand-marked paper ballots would be the system put in place if the

BMDs are not ready in time. But Raffensperger says the rollout of new machines are ahead of schedule and should be ready by mid-January." (GBP, 11/06/2019)

SOS Says Machines Will Be Delivered by "End of January" "Gabe Sterling, the secretary of state's chief operating officer, said that the pilot results were what he hoped for – largely successful while identifying areas that need attention before the statewide rollout. "Overall, we feel like we are in a good position to make sure that these kinds of issues don't happen," chief operating officer Gabe Sterling said to reporters Thursday. "When you have an election with millions of people voting at one time, things are going to happen."Sterling also said all of the new equipment will be delivered to the state by the end of January and that the procurement and testing process is running ahead of schedule."(GPB, 11/15/2019)

SOS Says Machines Will Be Delivered by "Late January " "Sterling said he's confident that the state's voting system will be ready for the presidential primary, and all equipment is scheduled for delivery by late January."We feel like we are in a good position to make sure that these kinds of issues don't happen," Sterling said. "Now we're going to have the ability to deal with them and shine a light on those problems." (AJC, 11/18/2019)

SOS Says Machines Will Be Delivered by "Early February" "Raffensperger and his staff say they're ahead of schedule getting new machines to local election officials. Six counties used the new equipment for a test run during elections for mayors, city councils and school boards last month. A few dozen more are scheduling deliveries. Gabriel Sterling, project manager for the secretary of state's office, said all 159 counties should have their voting machines by early February — roughly a month before advance voting starts. (AP, 12/11/2019)

DELIVERY TO *GA FACILITY* TIMELINE SLIPPAGE

Dominion Initially Expected to Deploy Machines to GA Facility in July 2019
"Receipt of Products for Pilot Election: July 2019
• Acceptance Testing of Voting System, Software and Poll Pads by GASOS
• Hash Validation Testing
• Distribution to begin of all voting system products to the respective Pilot counties
• In House Depot Repair as needed" *(Dominion Contract, pulled down)*

Dominion Then Planned Machine Deployment to GA Facility to Begin in August
"Dominion will establish a warehouse operation close to the new GASOS offices. The Dominion facility will open in early July right after contract award and signing is complete. We will receive the first shipment of voting system products and components in late July for acceptance testing and deployment to the twelve Pilot Counties starting in August...The training and installation of the new system for the 12 pilot counties will begin in August on dates agreeable to the counties selected for the November pilot. GASOS staff will receive initial training as the counties and poll workers are trained. The training

curriculum and suggested time frames are provided in detail in the appropriate sections of the Dominion clarification responses." *(Dominion Response Document 12-4)*

Dominion Said ~20% of Machines Would Arrive Each Month Beginning in August & Ending in "Mid December." "Approximately 20% of the new system products and components will begin arriving each month starting in August and continue through mid-December 2019. Acceptance testing will begin immediately upon receipt of product and deployment schedules developed for delivery of Phase 2 – Part 1 and Phase 2 – Part 2." *(Dominion Response Document MS 12-5)*

> **Oct 17th, SOS Says ~6000 Machines Delivered to GA Facility**
> "Election supervisors in the pilot counties received training first. Most of their colleagues in other parts of the state are being training in coming weeks, except for those busy conducting municipal elections in non-pilot counties. Their training begins after the Nov. 5 election day..."The election so far is running very smoothly," Rigby said. "Poll workers are not having any trouble adapting to the new system."...Already, more than 6,000 touch-screen voting machines have been delivered." (Oct 17th SOS Press Release, 10/17/2019)
>
> **Nov-1st, SOS Says ~10,000 Machines Delivered to GA Facility** "Dominion later adjusted its schedule to meet the state's deadlines. The company has delivered more than 10,000 voting machines so far, and implementation is on schedule, according to the secretary of state's office. Dominion must install voting machines, printers and ballot scanners, then test them and train poll workers, all before Election Day." (AJC, 11/01/2019)

NUMBER OF PILOT COUNTIES CHANGED FROM 12 TO 10 TO 9 TO 6

SOS Lists 12 Pilot Counties to Receive Equipment in Initial RFP. Bacon, Bartow, Carroll, Catoosa, Charlton, Decatur, Evans, Fulton, Gwinnett, Lowndes, Paulding, Treutlen. (Dominion "Full RFP", Page 82-87)

Dominion Lists 12 Pilot Counties To Receive Equipment in Phase 1: Bacon, Bartow, Carroll, Catoosa, Charlton, Decatur, Evans, Fulton, Gwinnett, Lowndes, Paulding, Treutlen. Please see Dominion Response Document 12-3 PM, page 10 for chart of Implementation Timeline. *(Dominion Response Document 12-3)*

Dominion Said Training & Installation for 12 Pilot Counties Would Begin in August. "The training and installation of the new system for the 12 pilot counties will begin in August on dates agreeable to the counties selected for the November pilot. GASOS staff will receive initial training as the counties and poll workers are trained. The training curriculum and suggested time frames are provided in detail in the appropriate sections of the Dominion clarification responses." *(Dominion Response Document 12-4)*

April 2019, SOS Told Federal Court Approved Vendor Must Be Able to Initiate 10 County Pilot By August 2019. "In an April 11, 2019 filing with the Court, the State Defendants further represented that "potential vendors must be able to initiate a ten-county pilot by August 2019." *(Curling v Raffensperger, page 144)*

April 2019, SOS Told Federal Court Pilot Program Would Have "At Least 10 Counties" But Possibly More "Counsel also discussed at the April 19 conference with the Court the new statute's provision for the State to conduct "a pilot program for at least ten counties – but it could have more – to test – for testing purposes of the machines," so that actual elections will be run this year in 2019 on ballot-marking devices. (Id. at 8.)" *(Curling v Raffensperger, page 143)*

July 2019 SOS Gives Federal Court "Preliminary" List of 10 Pilot Counties: Bacon, Bartow, Carroll, Catoosa, Charlton, Decatur, Evans , Lowndes, Paulding, and Treutlen. "And although the State told the Court in April 2019 that Fulton and Gwinnett Counties would be participating in the pilot program, only after the July hearing concluded did the State advise the Court that the pilot counties for the new voting system have not yet been definitively selected...A "preliminary list" of counties to pilot the new voting system includes: Bacon, Bartow, Carroll, Catoosa, Charlton, Decatur, Evans , Lowndes, Paulding, and Treutlen." *(Curling v Raffensperger, page 144)*

Fulton County Declined To Participate in Pilot & Gwinnett County Had No Scheduled Elections "But as Richard Barron, the Director of the Fulton County Elections Office, testified in the 2019 hearing, Fulton County backed out of the pilot program based on perceived operational challenges. (Tr. Vol. II, Doc. 571 at 218.) And Gwinnett is no longer an ideal candidate for the pilot rollout because it has no scheduled elections in November 2019." *(Curling v Raffensperger, page 143)*

SOS Executive Summary Says They Initially Picked Nine Counties "With that in mind, the implementation team understood that piloting the new system in real world conditions, with the introduction of poll workers, polling places, and most importantly voters, would be vital to bring potential issues to the forefront. With that in mind, we picked nine counties to do the initial pilots: Bacon, Bartow, Carroll, Catoosa, Decatur, Evans, Lowndes, Paulding, and Treutlen. All elections officials were brought in for three days of training to our Center For Elections with Dominion and SOS Staff. Bacon, Evans, and Treutlen ended up having no municipal elections, so the remaining six counties conducted their November elections on the new system." (SOS Executive Summary Initial Findings Report, 11/14/2019)

Final Contract: Pilot Will Only Include 6 Counties But Exact Counties "To Be Determined" Later "Pilot Election" means the pilot election to be administered on November 5, 2019 in up to 6 Counties (exact Counties to be determined by mutual agreement), including the coding of election database (and additional training needed in connection therewith), training of personnel including poll-workers of the Counties hosting the Pilot Election, logic and accuracy testing at each of the participating State Sites, election day support at the participating State Sites, and post-Pilot Election auditing and validation of results." *(Dominion Master Solution Purchase Agreement, page 69)*

SOS Announces 6 Pilot Counties: Bartow, Carroll, Catoosa, Decatur, Lowndes & Paulding "Georgia's new voting machines will be tested in local elections in six counties this November before they're rolled out statewide for the presidential primary in March. The first areas to use the state's voting system are Bartow and Paulding counties in metro Atlanta, Decatur and Lowndes counties near the Florida border, Carroll County near Alabama and Catoosa County near Tennessee, according to the Georgia secretary of state's office." (AJC, 9/10/2019)

On Sept 25, the SOS Told Counties the Number of Voting Units They Would Receive Was "In The RFP" "How soon will we know how many voting units we will receive? Answer: That number is in the RFP." (Q&A from September 25, 2019, Callsy with Counties by Regions)

Fulton County Elections Director Said County Was Anxious To Receive Voting Machines So That Poll Worker Training & Equipment Testing Could Begin. "Now that Georgia has selected Dominion, many areas across Georgia, such as Fulton County, are anxious to receive their new voting machines, Fulton Elections Director Richard Barron said.Poll worker training and equipment testing can't be done until then. In addition, the State Election Board hasn't yet approved rules and procedures for how to conduct elections with the new voting machines.Voting machines likely won't arrive until after this fall's local elections and potential runoffs, he said."The timeline is somewhat crunched, but we'll get it done," Barron said. "We may have to put in some long hours to make it happen." (AJC, 11/01/2019)

EXHIBIT O

IN THE UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF GEORGIA ATLANTA DIVISION

DONNA CURLING, et al. **Plaintiff,** **vs.** **BRIAN P. KEMP, et al.** **Defendant.**	**CIVIL ACTION FILE NO.: 1:17-cv-2989-AT**

SUPPLEMENTAL DECLARATION OF JEANNE DUFORT

JEANNE DUFORT declares, under penalty of perjury, pursuant to 28 U.S.C. §1746, that the following is true and correct:

1. My name is Jeanne Dufort.
2. This declaration supplements my declarations of June 17, 2019 and September 10, 2018 and I stand by all of the content of those declarations.
3. I have personal knowledge of all facts stated in this declaration, and if called to testify, I could and would testify competently thereto.
4. I am a registered voter in Morgan County. I am a member of Coalition for Good Governance and an active volunteer in supporting its voter education and election security efforts.

5. During the December 3, 2019 Valdosta municipal runoffs, I spent approximately 7 hours observing Precinct 5, Rainwater Conference Center, in Lowndes County.

6. Based on my personal observations of voting on December 3, I am greatly concerned about the violation of ballot secrecy caused by the new Dominion ballot marking devices. The screens, measuring approximately 13.5 inches by 23 inches, are very large and bright, and stand nearly vertical. When the voter makes a selection, a wide band lights up across the screen. As a result, the voter's selection may be seen from a distance of 25-30 feet away. In the precinct I observed, the voting stations were lined up around the perimeter of the room with voters facing the outer walls. A poll worker stationed at the scanner had a clear view of the BMD screens on several at of the most utilized BMD stations – she stood at least 25 feet away and yet could see choices as voters made their choices. I stood by her, and I was able to see voter choices. Poll watchers from both Democrat and Republican Parties also stood at a similar spot and told me that they could read the voter choices.

7. I observed poll workers stationed by the ballot scanner reminding voters to check their ballot before scanning, and most voters appeared to attempt to comply with the instruction. There were only two races on the Valdosta

ballot, making it relatively easy for the voter to verify the two choices indicated in text.

8. In watching the verification exercise, I considered how difficult, if not impossible, it would be for me to verify a typically long general election ballot card with my own votes. I believe that most voters would also find it impossible to accurately recall the entire ballot contents, their votes, and detect missing races or errors.

9. After polls closed, along with Coalition for Good Governance members Rhonda Martin and Marilyn Marks, I went to the central election office, and discussed my polling place observations with Deb Cox, Lowndes County Election Director. She indicated that she had already found it necessary in the pilot to deploy fewer Ballot Marking Devices than allotted in some precincts, and less than the number of DREs historically deployed, because of the larger footprint of the BMD station setup. We discussed the fact that the number of pieces of bulky equipment (BMD screens, printers, back up batteries, and scanners) in the new BMD system created space constraint problems yet unsolved.

10. We expressed our concerns to Ms. Cox about such a reduction in voting machines and the potential impact on voting lines and voter wait times with a reduction of the number of machines. It was clear that Ms. Cox was

concerned about the problem and working diligently on alternative layouts and machine allocation issues. I left the discussion with the impression that based on current precinct configurations and polling place locations, Lowndes County will not be able to meet the statutory ratio of 1 machine for every 250 registered voters. This is one of the many alarming BMD system implementation problems facing 2020 elections in my view.

11. As we discussed the ballot secrecy issue with Ms. Cox, she was already well aware of the problem and made the point that trying to create more space between the units to reduce the amount of improper visual access would further reduce the number of Ballot Marking Devices in a polling place.

12. The lack of privacy of the ballot displayed on the BMD would definitely discourage me from voting in person if I have to vote on a BMD. I value my private voter choices and do not wish to have others know how I vote on all races, although I'm willing to disclose many of my votes. I described my feelings about the secrecy of my ballot in my previous declaration of June 17, 2019.

13. Additionally, I do not wish to vote on a BMD because my official votes to be counted are embedded in a QR code that I cannot read. This system effectively forces me to cast votes that I cannot read and I have little

confidence that the vote I would be casting is the vote I intend. I feel that I should not be forced to cast such votes if I wish to vote in person.

14. My preference is to vote in person on Election Day with my friends and neighbors in the social experience of Election Day precinct voting, benefitted by the opportunity to obtain the latest news on candidates and issues before I vote. However, I try to make a practice of not voting on unauditable touchscreen units, such as the DREs or the current BMDs, which requires a mail in ballot. Further I will try to avoid voting on a BMD that creates a QR code as my official vote that I must cast without knowing the choices embedded in my official vote.

15. One of the additional reasons that I would not choose to vote on a BMD is that voters are expected to verify the text printout that follows the QR code official votes. The purpose of such verification is to attempt to provide a basis for a potential audit of the outcome.

16. Chris Harvey, Georgia's Election Director, states on a demonstration video (https://youtu.be/3QXV7scwQhA (2:10)) that the voter will be "charged with" confirming the accuracy of the machine markings on the ballot summary card before casting their ballot card.

17. However, the voter verification exercise is quite difficult on a long complex general election ballot. It requires the voter to either bring a marked sample

ballot to the polls to review after the ballot card is printed to help recall the full content of the ballot, or to memorize the content of the ballot.

18. I cannot reasonably memorize the ballot contents to verify my marked ballot, and don't want the stress of attempting to do so in a crowded polling place. I believe that very few voters would bring a marked sample ballot for verification or memorize the ballot content, and would also feel a great deal of stress being told that they are expected to remember and verify complex ballot contents.

19. I attended the November 21, 2019 meeting of Morgan County Board of Election and shared my concerns about ballot secrecy. Prior to public comments, Jennifer Doran, the election director, had reported on the Pilot Elections, and pointed out in particular the concerns about ballot secrecy with the new BMDs. (page 5 of Exhibit 1) She described attempts to improve the situation, with no resolution as of the meeting. Transcript of the meeting attached as Exhibit 1 is a true and accurate record of a portion of the meeting.

20. Jennifer Doran informed the BOER about pilot election problems, including Ballot Marking Devices randomly cycling off and on, ballots jamming in scanners, and poll pads not coding BMD access cards. She reported that many of the problems required the help of the Dominion technician to

resolve. From questions posed by BOER members, some of who have been poll managers and understand the logistics of running elections, my impression is they have serious concerns about the consequences if Morgan County experiences similar equipment malfunctions. They are concerned with how many backup machines will be available, and the potential inconvenience to voters with just one Dominion technician supporting the entire county.

21. Jennifer Doran also informed the BOER of the need to increase staffing at polling places, saying "there are extra steps the voter is going to have to take, which is going to require more poll workers, which we had already talked about – that we are going to need an extra poll worker or two in each" (Exhibit 1, pg. 5)

Executed on this date, December 16, 2019.

Jeanne Dufort

EXHIBIT

1

Exhibit 1

Morgan County BoE Meeting Nov 21 2019

MAN 1 [00:00:02] Next item on the agenda is the monthly budget review. Jennifer?

JENNIFER DORAN [00:00:05] You got a copy of the budget as a last line. We're still on budget or under budget. It helped that we didn't have a November election so we're right now just preparing for next year. And then, of course, you see a big chunk of money that just came out, 'cause we're about to go to conference, um, two weeks. Two board members and Sue and I are going.

MAN 2 [00:00:42] Does the county have enough tables to provide for the two voting places and still have enough tables right now? That's the two fire stations.

JENNIFER [00:00:51] Yes.

MAN 2 [00:00:52] Will they provide those to us or--we don't have to buy these.

JENNIFER [00:01:16] Yes they do.

WOMAN 1 [00:01:16] What do we have to have repaired?

JENNIFER [00:01:18] I'm sorry?

WOMAN 1 [00:01:20] Repaired. Fifty-two point twenty-two [unintelligible] repairs and maintenence.

JENNIFER [00:01:30] We haven't expended anything.

WOMAN 1 [00:01:32] Oh, okay. That's [unintelligible].

JENNIFER [00:01:35] Yes.

MAN 1 [00:01:36] All right. So the other questions or discussion about the budget? If not, we're gonna move on to the staff reports. Jennifer?

JENNIFER [00:01:49] So you know we've got elections coming up in 2020. We had one candidate to file a declaration of intent to accept contributions. That doesn't necessarily mean they qualified to be on the ballot, but they have filed--started the ethics. Kenny Stewart for sheriff, just to let you know he's now candidate on the ethics side... And then... Old equipment pickup. I have packed up everything and just waiting for the state to come and pick it all up--with the old equipment. I have not gotten a call yet, so I don't know when that's going to be. I'm gonna do a polling place inspection then we'll start talking about the new equipment. So the new equipment does have a lot of electrical components to it. And so the head of the maintenance [unintelligible] went to all the polling places to make sure that all the polling places were adequate to handle the electrical load. There's going to be a couple of places where we have to set up the equipment slightly different, but it works with the flow. But all of the polling places can handle--I sent y'all an e-mail saying that we're sending them out just in case we had to change polling places. But he said that they're all good. And the state is also going to be sending out inspectors to every polling place in this state. They'll be checking for electrical , ADA compliance, and security. Again, I haven't gotten a phone call about that, but we are waiting. So it's a contractor with the

state will be coming out. They'll prepare reports and then send us the reports, letting us know their assessments for all those. Any questions about---.

MAN 1 [0:03:50] So they're going to send you a list of basically what they're looking for?

JENNIFER [00:03:53] No, they're just gonna come out and do it. The assessments. But what they're doing is making sure that the electrical supply is adequate and that is ADA compliant. And then there's enough security because obviously we don't drop off the equipment the right before it starts to pick it right up. So they just want to make sure that the buildings are secure.

MAN 1 [0:04:18] So if there's any places that aren't under, county control, like churches and stuff like that, do we have an adequate backup plan [unintelligible]

JENNIFER [00:04:32] Well, that's there are only three that are not county-owned buildings. Buckhead Baptist. Centennial, [unintelligible] Memorial. Buckhead Baptist is half a mile from Buckhead fire station. If those polling places are not adequate, we do have a backup that are county-owned buildings we have the Buckhead fire station. In Centennial, the Rutledge Fire Station, which is a little under two miles away. And then we have [unintelligible] Memorial is only two tenths of a mile from the Bostwick fire station. So if we had to move them, there are places that are under our control that we could move into. However, of course, you know, there's a 60-day requirement that we have to do it before an election. So it have to be done early in January. So hopefully they will get us a report quickly so that we have time to take care of that, because we do have to advertise it to the public. And, you know, there's a bunch of tight timeline.

MAN 1 [0:05:52] Yeah, it's two consecutive weeks, right?

JENNIFER [0:05:54] Yeah. I'm hoping it's sooner rather than later that we're going to get that inspection done.

MAN 2 [0:05:59] Jennifer, this machine requires how many plugs?

JENNIFER [0:06:06] So what happens is we have the UPS, which is an Uninterruptable Power Source. It's, you know, a big box. The smaller ones allow us to plug two BMDs, which are the tablets, and two printers in them. So they had bigger UPSes that they now say that we're probably-- the smaller countiesies are going to get the smaller UPSes which are lighter [unintelligible] can hold more.

MAN 2 [0:06:42] The voting machine requires one? The screen? It requires a plug? Electrical source?

JENNIFER [0:06:50] No. So what it is, is it plugs into the UPS box. So it plugs in two tablets, two screens and two printers. So four pieces get plugged into one. So that's one outlet.

MAN 2 [0:07:09] How many are we gonna have at Bethany?

JENNIFER [0:07:10] Four. So we would have two of those UPSes. And two of them will fit on a circuit.

MAN 2 [0:07:16] Now, Alan says Bethany has enough receptacles?

JENNIFER Well, it's not so much the receptacles. It's making sure that the circuit is clear. And at Bethany and Clacks Chapel, we're gonna have to unplug the ice maker, which I think generally anyway, because it's so loud that... That's just one of the accomodations we're gonna have to make is that we're just going to unplug that thing, which is something we do anyway.

MAN 2 I guess the question is, I'm not an electrical genius like all these other people in the world, but I know a lot of stuff in that little thing right there it's going to blow something.

JENNIFER Right. So I can plug in two of the UPSes in one. But I've got to make sure there's nothing else on that circuit. So there's... I guess there's a fuse.... I'm not an electrical expert either, but I know that like when you blow something you pop one thing. So basically nothing else could be plugged in it. And in those two instances, the ice maker is on the same circuit. So that's something we'll have to unplug. So you don't blow it.

MAN 3 [Unintelligible] the circuits need to be dedicated. Only to the--

JENNIFER Correct. Just to the UPS.

WOMAN 1 Maybe it's a good thing we're getting the smaller ones because [unintelligible]

JENNIFER Well, they're smaller and they draw less, but then you need more.

WOMAN 1 You need more but number 1 they cost a lot less--

JENNIFER Yes. Well, there are also a lot lighter. The big ones are almost 90 pounds. The smaller ones are 50 pounds, which are still fairly heavy. But they're supposed to be on wheels with a handle. But Alan-- I gave him all the specifications before he went out and so he knew exactly what we have, or what we will be getting, and what we are requiring. Of course, then that state's coming back, doing the same thing.

MAN 3 Someone have to sign off on that?

JENNIFER So what--they do it-- they said I can go with them are they go on their own. Since three of them are private, though--I'll go to those just so I'm not turning over keys to churches. But they will prepare a report and then send it when it's done.

MAN 2 Well, I'll make a suggestion somebody go with them. No offense intended to the state or anybody. This is Morgan County. I wanna make sure we're right. I wanna ask the right questions. If I only see one receptacle I want that guy to tell me I can plug in eight machines, it ain't gonna blow. I just.. I don't think we have... We have two places. Clacks Chapel and Bethany Springfield that are old old old fire stations. That means their electrical stuff is old. Again, I'm not an electrical genius, but I know I can't plug too many things in something beforefor something blows. And that I [unintelligible]. I think somebody needs to go and I think we need to tell the state--I won't say I don't trust them, but I would like to be with them or you.

MAN 1 Well, how about Alan? I mean, since he's--

MAN 2 Or Alan.

JENNIFER Alan would be a good person because first of all, he has access to the circuit breakers and whatever else electrical they may need.

WOMAN 1 Jennifer, I think I would prefer that the state sign off on that rather than one of us and more than county.

JENNIFER They're not...They are signing off on it. We are not going to sign off on anything. What they're going to do is prepare a report saying "this place is adequate, it's not adequate, or this is what you need to do" and then we will have to act based on those reports. I don't think it's us deciding if something-- I did the preliminary before I knew that the state was going to do it. I just said that we sort of had a heads up if it was going to be okay.

MAN 3 Jennifer, do you have a copy of the technical specifications from the vendor of the machines?

JENNIFER I do have for the UPS requirements, the amp circuit? I do have that information.

MAN 3 Can you send that out?

JENNIFER I will.

MAN 3 Is the vendor making the specification that these units be on circuits by themselves?

JENNIFER Yes.

JENNIFER Did they say why?

JENNIFER It's just because there's so much-- I mean, when you're talking about four pieces of equipment into one power supply, that's a lot of--just the ampage.

MAN 3 Okay.

MAN 1 Right. Are there any other questions or discussion regarding the staff report.

JENNIFER Oh, I'm not finished.

MAN 1 Oh, I'm sorry. Go ahead.

JENNIFER That's just part two. So now we are going to talk about the new equipment. I'm going to sort of do an overview of what we have learned from the state about the thing. There are some good and bad. So if you'll let me finish all of it, then we'll go through all that. First of all, once the old equipment is gone, the new equipment will be coming in. Yesterday, we were told that we could volunteer to be one that early ones. So I've already sent an e-mail saying we be glad to take them as quickly as you can give them to us. So, you know, there were six counties that did elections on all the new equipment. There were some kinks that we'll go over in just a minute. They--the election directors did

say that overall the voters liked them. It was sort of a...intuitive process of checking in, working on the ballot. Going to the scanner. There are extra steps. So that's one thing we're gonna have to make sure that voter flow is--- make sure that we focus on that. And they did say that there are some issues they're working on, but they're improving. But overall, it went well. That is the secretary of state.

JENNIFER [00:14:23] They did say that we'll need to make sure we address voter flow because, basically, the voter is going to check-in, BMD, get your printer, review your ballot, and then scan it and then leave. So there are extra steps that the voter is going to have to take, which is going to require more poll workers, which we had already talked about--that we are going to need an extra poll worker or two in each... We need to make sure that we set up barriers so that "enclosed space" is actually defined. And I've already looked at the retractable barriers that you see at, like Chick-fil-A that you can just pick up and... like a [bill? bell? belt?] between them. The state attorneys are working on the new SEB rules now. They do have a meeting in December where--I don't know what the timeline is, but I know that after they draft them, they have to accept them and then wait 30 days before adoption. So they're not going to be adopting them in December, but they-- I'm assuming they can look over.

MAN 3 [00:15:29] Jennifer? Sorry to interrupt, but SEB means...?

JENNIFER and MAN 3 [00:15:37] State Elections Boards.

JENNIFER [00:15:41] Yes. So they had some preliminary rules, obviously, for the pilot counties to follow. And they're refining them and writing them as we speak. And then you will notice in your packet, two pages back in front. This is an article from the AJC. I thought it was a really good sort of summary of some of the issues that came up in the pilots. One of the things that's not listed here. And let [unintelligible]. The screenings are massively big. They're bright. And voters and the public have complained that you can see it from far away. I went back there to see if we could lean them back-- You know, the current units are almost flying back like this. So they're not set up like the new ones are. The new one has the arm and I went back as far as I could go, and it's still very visible. If you're standing beside the person the blue privacy screens are adequate here. But if you're walking beside somebody, you can see the full screen of the person. So Dominion has privacy screens that you can purchase to put on there. I don't know if you've ever seen it. People have them on their phones. So if you're looking at the phone at an angle or from far away, you can't see it-- you have to be right in front of it. They do make those for themm. They're almost 80 dollars per screen. So I have ordered one. And we're going to-- should be getting our second demo set soon. And I'd like to set up one with the screen and one without. First off, before we make a big expenditure to see if they are worth the money and if they are going to do the job. So hopefully that'll come in soon. And then we can see the difference with the screen and without because that is a concern with people.

JENNIFER [00:17:37] So then technical issues, which are highlighted in this article, is the BMDs, which are the ballot marking devices, several of them kept rebooting on their own after they were already in service. Like, a voter would be standing there, pressing a button and they would just cycle off. They would just turn off. And sometimes they would reboot on their own. Sometimes a technician would have to go in and do stuff. There were some errors that would pop up. And so, you know, that's a big concern is--you know, the machine just is taken out of service until it's back on. Some ballots jammed in the scanner. They have a few reports of that. Sometimes--- we have been told that ballots can be inserted face up, face down, forwards or backwards. So there's basically four ways you

can get a ballot in. Sometimes the ballots kept coming back out, so they had to reposition them. The poll pads were not coding the cards. There was some kind of data issue where they were requiring a party to be put in-- like during our primaries, we have to put a Republican, Democrat or a nonpartisan. And of course with a municipal election, there is no party, but they wouldn't let you advance forward and they corrected that on site. But It took an hour to an hour and a half to get them back online. One of the things, if that's to happen, poll pads--we can bypass the poll pads and actually manually activate the BMDs--a pollworker can with a pollworker card--which, those also failed in some places. But Dominion said that they've received the logs from the equipment and they're reviewing them for the issues. So hopefully in the next few months keep kinks worked out.

JENNIFER Anybody have any questions? That's a lot of information.

MAN 3 Back to the poll pads.

JENNIFER Yes.

MAN 3 Is their function to activate the ballot marking device?

JENNIFER Well, there's two--Yes. Two purposes. One, to actually give a voter credit for voting. To check them in and saying, "Avery Jackson's here. And he's voting." That also is to activate the voter card--what used to be a yellow card. Now it's a white card-- which you insert into the BMD.

MAN 3 It was the poll pad that caused the machine to to automatically reboot.

JENNIFER No. Those were just separate issues. Yes.

MAN 3 Is there a fix for the problematic reboot the vendor has implemented yet?

JENNIFER Well, not yet. They are still reviewing. They collected all the logs that come from the machines to see what the problems were. The Secretary of State released an executive summary which listed all the issues that were reported from the pilot county. I didn't print it out because it's like 20 pages, but I summarized it. Some of rebooted on their own without any extra tinkering. However, it's a slow reboot. It's not like you just turn the TV off and turn it back on. But then some of thenm, when they did reboot them, they had to--There were errors that the tech had to work on and do something with them.

MAN 2 We're gonna have how many scanners at each?

JENNIFER We're scheduled to have one scanner.

MAN 2 How many scanners are we getting?

JENNIFER We are getting 10. We'll have one in early voting. Seven precincts and then we'll have the two left as extras.

MAN 2 We have [several? separate?] Polling places?

JENNIFER Yes.

MAN 2 [00:22:29] [Unintelligible] how they solve the problem they replaced the scanner.

JENNIFER [00:22:49] Yes. That is... They did that was BMD and scanners, where they just took that one out service and put new ones. That is a fairly limited option for us because we'll have two. So if three break down, we can't just replace them. Unless we purchase more.

MAN 3 [00:23:04] Jennifer. You also mentioned ballot jamming.

JENNIFER [00:23:07] Yes, the ballots, as they were being scanned in--

MAN 3 [00:23:11] After the voter has voted?

JENNIFER [00:23:13] Yes. So it's been printed--

MAN 3 [00:23:15] --And printed out.

JENNIFER [00:23:17] Yes.

MAN 3 [00:23:17] Then it's inserted into the reader. Am I correct?

JENNIFER [00:23:21] Yes.

MAN 3 [00:23:22] Is that where the damage occurred?

JENNIFER [00:23:24] It is.

MAN 3 [00:23:26] Do we know why? Why it jammed?

JENNIFER [00:23:31] They have not said. That was just--- when they listed it, they just said that's what happened.

MAN 2 [00:23:45] I think there were six counties that were guinea pigs, correct?

JENNIFER [00:23:51] Yes.

MAN 2 [00:23:51] How many scanners broke down? Did they say? Was it just one?

JENNIFER [00:23:58] There were multiple ones that-- I think they took-- let me test my memory. There were multiple that had problems and then there were one that was taken out of service completely.

MAN 2 [00:24:10] So only one had to be taken out.

JENNIFER [00:24:13] From my memory yes.

MAN 2 [00:24:17] So I could reboot the scanner. So the poll manager, pollworker--.

JENNIFER [00:24:19] Yes.

MAN 2 [00:24:22] --Handled almost 99 percent of the problems.

JENNIFER [00:24:34] Well, they did have a Dominion technician there that was supporting, which we will also have. Dominion's planning on having a technician in every county in March. So there'll be there'll be an actual Dominion person here to help us troubleshoot.

MAN 2 [00:24:45] These six counties. There was one in each county, or one at each precinct?

JENNIFER [00:24:52] I don't know, but for March, we're going to have one in each county.

MAN 2 [00:24:57] Yeah, if I was [unintelligible] at the poll place in-- yeah, I could fix all the problems, too. But if you're over in Bostwick and I need you at Bethany Springfield, there's a lot of people going to have to wait a heck of a long time. [Murmuring] Okay, thank you.

JENNIFER [00:25:19] I think I covered everything that was in the... Check-in computers, rebooting, scanning. The power... One of them was just an error where they did not find [live?] power in that precinct. They just didn't plug them in the day before, I guess. Find an outlet that worked.

MAN 3 [00:25:43] So in summary, we have kind of a wide range of issues.

JENNIFER [00:25:47] Yes.

MAN 3 [00:25:47] Some going from what could be termed as minor to some fairly major ones, I would say. Right? Is that a fair assessment?

JENNIFER [00:25:56] Yes. We were told that, you know, that we always send in hand-marked paper ballots for provisionals. Every precinct has them every election. They get a small supply because we don't have a lot of provisionals. But we were told that, you know, if the poll pad breaks down, we can manually activate the BMD--a poll worker can do that. So there's not-- it doesn't completely stop you from that. But he said that we need to make sure that we do have enough hand-marked paper ballots so that if this doesn't work and this doesn't work, that we don't stop the election on election day, that we then mark--start working on [hand-marked] paper ballots.

WOMAN 1 [00:26:49] Cobb County has [hand-marked] paper ballots, didn't they?

JENNIFER [00:26:56] They did.

WOMAN 1 [00:26:56] What kind of issues did they have with them?

JENNIFER [00:26:58] Initially, I think some of the poll workers were giving out wrong ballots styles, but the Cobb County director seemed to be pleasantly surprised at how well the election went. She had concerns about how many ballots--The law says we have to have a sufficient number [equal?] to the number of voters. Which is sort of a, you know-- if you have 50,000 voters, you have to have 50,000 ballots.

WOMAN 1 [00:27:34] And I think I read that they had one for each other.

JENNIFER [00:27:37] Yes. So she had expressed concern about the number of ballots, but the actual procedure, except for a couple of minor poll worker errors where they were

giving wrong ones, was a successful pilot. And they did use-- my understanding is they use the poll pad for check in, because I told you that it has two purposes, checking in and activating the cards. And then they use the Dominion scanner. But I don't know if they had any issues. Those were not in [unintelligible].

MAN 1 [00:28:04] And the state's going to set up an audit anyway afterwards. That right?

JENNIFER [00:28:09] Yes. Bartow County did an audit. The published report says it went well. But I don't have any other details on that.

MAN 3 [00:28:22] Jennifer do you have contact to... Talk to to see what's the timeline on addressing different issues with the machines?

JENNIFER [00:28:34] Well, the report is that they are they have the logs and they're working on it. So, no, I don't have a concrete answer. But we are--we do get weekly updates. So as soon as I know whatever I know [unintelligible].

MAN 3 [00:28:57] So no estimated time to complete?

JENNIFER [00:29:01] No. Hopefully by March 23rd.

MAN 3 [00:29:11] When will you be-- you're going to order this $80 barrier here?

JENNIFER [00:29:15] I have.

MAN 3 [00:29:15] You already ordered that?

JENNIFER [00:29:18] Yes.

MAN 3 [00:29:18] When is it due to arrive?

JENNIFER [00:29:20] I don't know. I just ordered it yesterday afternoon. I had been working on trying to make the thing to tilt back more or to make the privacy screens taller. Privacy screens taller is not going to help at all. And they don't tilt back enough to ensure privacy.

MAN 3 [00:29:46] If these are purchased by lot can they come at a cheaper price, or...

JENNIFER [00:29:51] That's as far as I've gotten because I did the math on it. If we ordered one for every BMD that's coming in, it's going to be about $5500. If we do just enough that-- of what we deploy it's going to be $4500 because we don't use every BMD that we have. Obviously gonna need something for [unintelligible].

WOMAN 1 [00:30:19] Every BMD needs it though Jennifer? Because if one goes down, we have to replace it--.

JENNIFER [00:30:23] Yeah, well we could also just move the screen from [unintelligible]. But instead it's been $4000-$6000. We'll spend eighty dollars to make sure that it's going to do what is supposed to do.

WOMAN 1 [00:30:39] Do they-- like I had one for my phone and it was a sticky back just like that, right. Exactly. So if you move it often enough, you lose that.

JENNIFER Yeah.

WOMAN 1 Okay.

JENNIFER But hopefully we won't have them be taken out of service.

WOMAN 1 Okay.

JENNIFER But once we do get it and we get the second one think it would be a good idea that the board and the public come in and-- you know, you do have to look at it head on so that someone standing beside you doesn't see what you're doing or somebody walking behind you. But I think that would be good, you know-- get public and board feedback before we spend that kind of money.

WOMAN 1 Worse comes to worse, we could lay the screens flat, right?

JENNIFER Well, I mean, you could kick--do the kick stand and land completely flat, but--.

MAN 3 We have approximately 60 screens? 62?

JENNIFER We're gonna get 72. We deploy about 60 of them. Any other questions about that [unintelligible]?

MAN 3 [Unintelligible]. information. Appreciate it.

JENNIFER Okay. So the Secretary of State has a voter education coordinator for each region. Someone to help us do the demos, has some materials. She just started setting stuff up. I spoke with her the other day. And we have you know, we've done the demo before our meeting. I'm going to do a demo tonight at the Democratic Party meeting. But I think that in January, once we get at least one more machine, we should have an after hours demo. Like a set, like 6 to 8 p.m. or whatever. So they come in and the coordinator can come in and help do an education for it. And so the earlier I can set something up--guarantee that she is free. But I'd like to do just that we have all or most of our equipment in and have it set up in here after work hours, because, you know, if we do it during the day, we may not get a lot of people that are able to come in. That or we have a hundred people at lunch hour. But it's set up after hours, just a two hour demo or a voter education. And then if we do that, I'd like to advertise, you know, spend some money, put it in the paper and social media, and do outreach to local clubs to let everybody know about it so we can get more people in here. I think more people are more comfortable with it. The less confusion, there is on election day. If that suits y'all, I'll just set something up in January. At some point.

JENNIFER All right. And then so the-- in odd number years, the secretary of state does a maintenance list of the [unintelligible] maintenance. No activity, two general elections. If you've been inactive and then you do not vote in two general elections, which would be 2016, in 2018, we-- the law changed with HB 316. Notice has to be sent out saying if you do not [unintelligible] do something, then you'll be removed from the voter roles. The Secretary of State--since it's new, that notice, we're used to just remove on without any notice--The Secretary of State sent them out and [unintelligible] There's a whole thing in here, just kind of an overview of the law, of how-- why we're doing that. The

notices were mailed out on November 6. So the clock ends on December 16th at the end of the 16th. If the voter has not done something where they either re-register, update their address or send something to us in writing, that they are still at that address or different address, then they will be removed.

MAN 3 The contact have to be in writing?

JENNIFER It does have to be in writing. I mean, it can be online. Like, you can do that online voter registration. But we do need a signature because... It's just like-- you're basically re-registering at the correct address. The confirmation--the notice that the Secretary of State sent out--you can send that back in confirming that you live at that address or updating your address.

MAN 3 But are they allowed to call in to the office?

JENNIFER No, we need it in writing. Or they can go renew their driver's license or--.

WOMAN 2 Make contact.

JENNIFER Yes, some kind of contact, that's not just phone. And we do have 253 voters on that list. And if you're interested, the breakdown is [unintelligible] where they changed it and they never got back with us. They went inactive. We have 52 of those. There's "no contact," which means they went inactive because they had not made any contact with our office, which means renewing your driver's license, [unintelligible], no voting, no signing petitions. No, nothing like that. We had 152 of those. And then some of them-- we had 49 that went inactive because of returning to mail. So that totaled 253.

MAN 3 You said 49 returned mail?

JENNIFER 49 return mail. 152 no contact and 52 [unintelligible]. We have had a lot returned to us, but nobody has updated-- Nobody has filled that out and returned it to us.

MAN 3 [Unintelligible]

JENNIFER Well, I mean, if it's been returned, that means they had not received the notifications. Most likely because they have moved from that address. We've had a small handful that had a forwarding address on there. And so we forwarded that notice to new address. But, you know, if you've filled out the change of address and it's been so long, the post office doesn't forward it. They just return it back to us. Which means either they don't live there and it's been so long that they can't afford it. Sometimes people do not put P.O. boxes. They just put their address, but they don't have a mail receptacle. You know, that's pretty common out in the country. Everybody has a P.O. box. But if you don't put the P.O. box, we send it to the injuries that you gave us. You live at 123 Main Street but don't have a mailbox, it's gonna get sent back to us and you're going to go inactive, even though you're still at 123 Main Street, but because you don't have a mailbox it comes back to us. There was a report of some voters on the list, not in Morgan County, who had voted in 2018, so they were not supposed to be on that list. And the Secretary of State fixed that. Actually went through all the names. And nobody has voted in at least five years, if ever. Some hadn't voted since 1992 or 96. But the latest was 2014.

MAN 3 [00:40:12] So, Jennifer, the initial notices went out November 6.

JENNIFER [00:40:16] Correct.

MAN 3 [00:40:17] And December 16th is the--.

JENNIFER [00:40:19] Is-- the clock ends.

MAN 3 [00:40:21] What happens after December 16th, just to be clear?

JENNIFER [00:40:24] If they have not sent something in, made contact with us, they will be removed. They'll be canceled. If you'll look, I printed out it says "overview" gives the date of 11/6 [unintelligible] then 12/16. [Unintelligible]

[00:40:33] The last one is that I have received a letter from the Republican Party.

[00:41:43] Dana's term is up at the end of the year and she's been reappointed for another four-year term. I had previously received a letter from the Democratic Party. Avery, his term is also up and he's going to be doing another four year term. Sent the stuff to the secretary of state. And they're preparing the paperwork so by January, by our first meeting, y'all can be sworn in for your new term by Judge [Mary? Merrick?]. And that is the end of my staff report.

MAN 1 [00:42:24] Alright. There's no further questions or discussion?

EXHIBIT P

IN THE UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF GEORGIA ATLANTA DIVISION

DONNA CURLING, et al. **Plaintiff,** **vs.** **BRIAN P. KEMP, et al.** **Defendant.**	**CIVIL ACTION FILE NO.: 1:17-cv-2989-AT**

DECLARATION OF FLOYD E. ROSE

FLOYD E. ROSE declares, under penalty of perjury, pursuant to 28 U.S.C. §1746, that the following is true and correct:

1. My name is Floyd E. Rose.
2. I have personal knowledge of all facts stated in this declaration, and if called to testify, I could and would testify competently thereto.
3. I am a registered voter residing at 611 Pineview Drive, Unit B-1, Valdosta, Georgia 31602 in Lowndes County.
4. I, along with my wife, Estella Rose, moved from 4001 Foxborough Blvd., Valdosta, Georgia to my present address in May, 2018.
5. To the best of my knowledge, my wife and I changed our Driver's Licenses to reflect our new address in July, 2018.

6. I voted in person at the Lowndes County Board of Elections (Early Voting location), in the November 2018 election with no problem. I presented my Driver's License at that time.

7. I voted in person at the Lowndes County Board of Elections (Early Voting location) in the November 5, 2019 Valdosta election with no problem. I presented my Driver's License at that time.

8. I attempted to vote at the Lowndes County Board of Elections (Early Voting location) in the December 3rd runoff and I was told that the pollbook records did not match my current address on my Driver's License. I voted a provisional ballot but it was rejected, although I am an eligible elector and live in the city of Valdosta.

9. My wife, Estella Rose, also lives at 611 Pineview Dr., Unit B-1, Valdosta, Georgia, 31602.

10. My wife was permitted to cast a ballot on Nov. 5th and on Dec. 3rd. with no problem, although my provisional ballot was rejected.

11. The pollworkers did not refer to a paper pollbook that should have been available with the correct voter address records documented.

12. I attended the December 3rd Provisional Vote count at the Lowndes County Board of Elections to question why my vote was rejected and to object to the loss of my vote, but was given no satisfactory answers.

13. I am very upset about being disenfranchised by what appears to be errors in the electronic pollbooks.

14. I am fearful that such errors will be repeated in the 2020 elections and my vote will be wrongly rejected again.

Executed on this date, December 16, 2019.

Floyd E. Rose

EXHIBIT Q

IN THE UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF GEORGIA ATLANTA DIVISION

DONNA CURLING, et al. **Plaintiff,** **vs.** **BRAD RAFFENSPERGER, et al.** **Defendant.**	**CIVIL ACTION FILE NO.: 1:17-cv-2989-AT**

DECLARATION OF ELISA GOLDKLANG

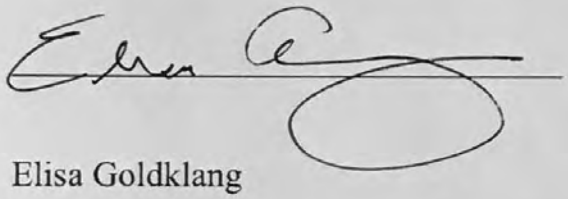
ELISA GOLDKLANG declares, under penalty of perjury, pursuant to 28 U.S.C. §1746, that the following is true and correct:

1. My name is Elisa Goldklang.
2. I have personal knowledge of all facts stated in this declaration, and if called to testify, I could and would testify competently thereto.

3. I attended the November 12, 2019 meeting of the Cobb County Board of Elections, where Cobb County Election Director Janine Eveler reported to the Board and public on the hand marked ballot pilot election.
4. Attached is a transcript of the portion of the meeting in which that discussion was held. [Exhibit 1]
5. The video recording of the meeting is available at https://youtu.be/rL_4rihgbhc
6. The attached transcript is an accurate record of the discussion of the referenced portion of the meeting.
7. As an active Georgia voter, I was very pleased to hear Ms. Eveler's report of how well the pilot hand marked paper ballot election went.
8. I was a poll observer myself and personally observed the success of the hand marked paper ballot operation and the voters' apparent satisfaction with voting on hand marked paper ballots.
9. I hope that the Cobb County Board of Elections will be permitted to use hand marked paper ballots in 2020. I would like to vote at my neighborhood voting place in person, but I am not comfortable voting on a BMD. On the Georgia BMDs, I cannot read the vote I would cast because the vote is encoded in a QR code that I have no way to decipher. I feel very uneasy casting a vote that I cannot read on a system that I know is unauditable.

10. Also, I do not feel comfortable attempting to verify the accuracy of the BMD ballot printout of the text interpretation of my choices on a long complex general election ballot. Requiring a voter to attempt to remember all the details of a complex electronic ballot in order to test the machine marking accuracy is a challenging burden that should not be my responsibility as a voter.

Executed on this date, December 16th, 2019.



Elisa Goldklang

EXHIBIT

1

PORTION OF THE NOVEMBER 12, 2019 MEETING OF THE COBB COUNTY GA BOARD OF ELECTIONS

[Note: Janine Eveler is the Cobb County Elections Director.]

Janine Eveler

A little bit about the hand-marked paper ballot pilot. We learned some things. We, you know, have not ourselves ever conducted one. So, you know, ["mostly" or "most of these"] folks saw me in front of the [Georgia] Legislature telling them it would be really difficult and there were these issues and there are some things that were difficult about it. But there were also some things that we--I think we're a little surprised at and pleased about. When there was an issue with the poll pad encoding cards--which has been in the news and several folks have already mentioned it--and technicians had to reprogram the encoding part of the poll pad so it was able then to encode a [ballot or valid] card. We didn't have a problem because our ballots were already printed. So that was a relief on our part--whereas the other pilot counties were really scrambling to get their poll pads reprogrammed and able to encode cards, we just continued with the processes that we were already starting with, which is handing out the paper ballot.

I'm aware of only one case--and there may be more but this was one that I was made aware of--where a couple came in and the wife was visually impaired and wanted to use the Ballot Marking Device and we were not able to encode her card at that time. So we did issue her a paper ballot and her husband was there to assist her. Which--you know, she was able to vote and an assisted ballot is fine, except that we would rather that she had the independence to use the audio ballot. We had-- there were a couple other things that I was going to talk about as far as-- We have a late delivery of the Uninterruptible Power Supplies, which were the units that the vendor was providing to all the counties in case the printers failed. If there was a power outage and we didn't have power, we couldn't print any ballots. So the vendor was supplying a UPS unit for every two Ballot Marking Devices. Well, getting those was coming in at the last minute. We were delivering them to the polls on Monday before the election, but really that didn't concern us as much as we did other counties because if we can't print a ballot, we still have ballots already printed. So again, there were some pros and cons. Some of the things that were difficult about it was getting all the ballots to the polling place. Because with the handling of live ballots, as folks have mentioned, the chain of custody is very important and the Georgia code does say you have to have a ballot printed for every active registered voter

and in these 16 precincts there were 73,000--72,000 somewhat--registered voters.

So we had to print enough ballots to account for absentee mail and early voting and the polls. And we took that 73,000 and we split it across those different types, because we knew we had way more ballots than we even needed. And then what ended up happening is, we looked at a case--that we already had, because we didn't want to buy anything--that was on wheels that we could provide to the poll workers with their pre-printed ballots, and they can wheel it to the polls. Well, it was too heavy to lift with the number of ballots that would have been allocated to the polls. So we re-thought that and we decided we would send them--also have cases that we already had, but they were smaller cases that we would put 600 ballots in each case. And we gave them three cases at the biggest polls. And then that still wasn't all the ballots that we were supposed to provide to every registered voter. So we kept some behind. And we got a plan in place that if they ran out, after a certain--they would get to a certain point in their supply, they would contact us and we would get those back out. And we had a chain of custody for them, ready to transport those. So we kind of had some planning, you know, rethinking because it was just logistically too many ballots, to send out with poll workers to have them lift the cases. But it

worked out fine. They didn't need any secondary transport of any ballots. every poll had enough ballots in the first allocation that we gave them.

And then just to talk about a little bit how many were cast on each of the two different types-- [Ballot Marking Device vs Hand-Marked Paper Ballots] We were concerned at one point motor planning that, you know, people might choose to vote on the BMD when we were basically set up--

Man

Could you explain [unintelligible] BMD [unintelligible]?

Janine Eveler

Ballot Marking Device. Yes, thank you. We were basically planning our numbers of ballots and supplies, with the thought that the Ballot Marking Device would be only for those who had disabilities and needed, you know, visual enhancements or an audio ballots. So we put most of our resources into the hand-marked ballots. But we were concerned that what if more people wanted to use the Ballot Marking Device and there was a line because we only had one at each of the polling places. As it turned out, it wasn't--That didn't happen at all. We had a total of 41 ballots that were cast on the Ballot Marking Device

between the Election Day polls and the Advanced Voting locations. So it truly ended up being just for those who had, you know, some kind of a disability that they couldn't mark a hand-marked ballot.

Woman

Janine, what was that number again?

Janine Eveler

41.

Woman

41? Okay.

Janine Eveler

And then 11,599 were on the hand-marked paper ballots. So it truly was a, you know, a real pilot of that system, and the Ballot Marking Device was there just as a failsafe for disabled voters. And of those 11,599 that marked a hand-marked paper ballot, we had 55 that required spoiling, and that was a lot smaller number than what I expected. In, you know, some of the discussions about this process before we actually, you know, embarked on it, there was a lot of talk about hand-marked ballots were marked improperly a lot of times and they weren't

scan. What we found happened is yes, people did mark them irregularly with a checkmark or an X, or in some other way [than filling in the bubble]. But when they came--when the scanner rejected that, as "I don't understand this, this is an irregular mark," voters were able to correct that in a lot of times and just completely fill out the bubble, even if the little tail of the checkmark was still outside the lines, and it was able to read the filled-in bubble just fine. So there was some correction. I've taken to heart some of what people have talked about as far as privacy. We'll kind of talk about that a little bit more. We do want to assist voters that are having a ballot come back out so that they know how to fix it or how to interpret the message that comes out. But we do want the voter to have a private ballot.

And a couple people have talked about the issue where the ballot--we had actually put on our scanner, we put a sticker on there that, you know, was just something that we came up with. I don't know if anybody else did. We said "insert face down," because that was...we did recognize that if there is an assisting, or there was some education of the voters that needed to take place, that we didn't want the ballot to be out there. So we were--in most cases, voters read that and put it face down. But we did experience a couple of scanners that, after a

period of time they were not reading it quickly facedown. It had to be inserted in reinserted several times before we read it. And it does read four different ways. It reads it, you know, top, face-down, face-up and then bottom first face-up and face-down. So they were trying to secondary way to see if it would go through that way and they flipped it face up. And it was reading it when they did that. So, you know, we're going to talk more with the vendors and with the state about some of those issues. Again, as I said, this is a pilot, so we're going to take back all the good and the bad. And we're supposed to be meeting with the vendors in the state on Friday to go over some of the what went right, what went wrong, and hopefully improve the process for March coming up. Well, we're gonna do it again in December.