

## Exhibit 4

**From:** Samantha Whitley <[cgganalyst2@gmail.com](mailto:cgganalyst2@gmail.com)>  
**Sent:** Wednesday, October 7, 2020 9:11 AM  
**To:** [elections@lowndescounty.com](mailto:elections@lowndescounty.com); [elections@lumpkincounty.gov](mailto:elections@lumpkincounty.gov); [tdean@mcelections.us](mailto:tdean@mcelections.us); Marion County Elections & Registrations <[marioncountyelect@gmail.com](mailto:marioncountyelect@gmail.com)>; Phyllis Wheeler <[Phyllis.Wheeler3@thomson-mcduffie.net](mailto:Phyllis.Wheeler3@thomson-mcduffie.net)>; Doll Gale <[egale@darientel.net](mailto:egale@darientel.net)>; Patty Threadgill <[p.threadgill@meriwethercountyga.gov](mailto:p.threadgill@meriwethercountyga.gov)>; Jerry C <[registrars@millercountyga.com](mailto:registrars@millercountyga.com)>; Terry Ross <[tross@mitchellcountyga.net](mailto:tross@mitchellcountyga.net)>; Kaye Warren <[kwarren@monroecoga.org](mailto:kwarren@monroecoga.org)>; [rmoxsand@hotmail.com](mailto:rmoxsand@hotmail.com); Jennifer Doran <[jdoran@morgancountyga.gov](mailto:jdoran@morgancountyga.gov)>; [vote@murraycountyga.gov](mailto:vote@murraycountyga.gov); Nancy Boren <[nboren@columbusga.org](mailto:nboren@columbusga.org)>; Angela Mantle <[amantle@co.newton.ga.us](mailto:amantle@co.newton.ga.us)>; Fran Leathers <[fleathers@oconee.ga.us](mailto:fleathers@oconee.ga.us)>; Steve McCannon <[smccannon@oglethorpecountyga.gov](mailto:smccannon@oglethorpecountyga.gov)>; Deidre Holden <[deidre.holden@paulding.gov](mailto:deidre.holden@paulding.gov)>; Adrienne Ray <[adrienne-ray@peachcounty.net](mailto:adrienne-ray@peachcounty.net)>; Julie Roberts <[jroberts@pickenscountyga.gov](mailto:jroberts@pickenscountyga.gov)>; Leah Williamson <[leah.williamson@pierceccountyga.gov](mailto:leah.williamson@pierceccountyga.gov)>; Sandi Chamblin <[schamblin@pikecoga.com](mailto:schamblin@pikecoga.com)>; Lee Ann George <[lgeorge@polkga.org](mailto:lgeorge@polkga.org)>; [quit.judge@gqc-ga.org](mailto:quit.judge@gqc-ga.org); [twhitmire@rabuncounty.ga.gov](mailto:twhitmire@rabuncounty.ga.gov); Todd Black <[rcc.boe@gmail.com](mailto:rcc.boe@gmail.com)>; Lynn Bailey <[lbailey@augustaga.gov](mailto:lbailey@augustaga.gov)>; [cynthia.welch@rockdalecountyga.gov](mailto:cynthia.welch@rockdalecountyga.gov); Schley Registrars <[registrars\\_schley@yahoo.com](mailto:registrars_schley@yahoo.com)>  
**Subject:** Followup - new unsealed documents and response to Harvey bulletin

## Providing the Facts—BMD Security Risks and Software Update

The events of the last 11 days have made it clearer than ever that county election officials have the duty to abandon the county-wide use of BMD touchscreen machines and adopt hand marked paper ballots because the BMD units cannot be used securely or legally---certainly making their deployment “impossible,” “impractical” or “unusable.” [Those are the conditions in the statute and new election rule that call for the superintendent’s decision to use hand marked paper ballots.] We offer more facts as your board makes this significant decision.

The 2020 General Election is underway, and last week the Secretary of State ordered election officials across the state to erase the original certified software from 34,000 Ballot Marking Devices and install new software, which was uncertified and untested.

Channel 11 in Atlanta featured the issue tonight. ([https://youtu.be/IMJU2p4\\_LDM](https://youtu.be/IMJU2p4_LDM)) We are aware that several other reporters are trying to get answers as well, without success.

Yesterday the Court unsealed critical information about the voting system changes, which is important for election officials to read. Meantime, the State is pressuring county officials to comply with their instructions, without considering the consequences.

On Monday Chris Harvey issued a bulletin titled, ***“Be Wary of False and Misleading Information re: ICX Update”***

The extra capitalization probably tipped you off to be wary of what was to follow.

If you’ve read many of the Court documents in our Curling v. Raffensperger case, you’ll be familiar with the pattern: Coalition for Good Governance presents testimony from the nation’s most respected expert witnesses, evidence, science, law, and facts. State responds with hyperbole and unsubstantiated claims, and sometimes name-calling.

The State is attempting to force you into a difficult choice –to follow their orders, and trust that nothing goes wrong, or to use your authority do follow what the statutes and election rules require, risking retribution from the State Election Board. It comes down to this - use the un-auditable BMDs with altered software, or use ballots marked by pen for in-person voting.

The experts confirm that installing hastily written software on the eve of in-person voting is akin to redesigning an aspect of an airplane as it is about to take off.

Here’s what’s wrong with assertions made in the Monday’s Bulletin from Chris Harvey:

**Fact:** EAC certification requires pre-approval of de minimis changes before they are implemented. The vendor declaring software error-correcting changes “de minimis” does not make it so. When you received the new software on Sept 30, with, instructions to immediately wipe your BMDs clean and install it, the test lab had NOT issued its report (dated Oct 2) and Dominion had not submitted the proposed “de minimis” change to the EAC. We can find no evidence that the proposed change has been submitted to the EAC for certification, despite the Secretary’s commitment to the Court that it had been done.

**Fact:** the lab that tested the software change did not test to be sure it did not “cause any other issues with the operation of the ICX.”

**Fact:** When you were asked to install the software on 9/30, the updated version of the ICX touchscreen software (version 5.5.10.32) was NOT certified by the Secretary of State. It was technically certified (but without conducting the mandated prerequisite tests) yesterday, October 5. This is risk for your voters and their candidates that the county boards simply cannot tolerate.

**Fact:** The Secretary made no mention that state law requires counties to conduct acceptance testing after installing modified software, and before installing the November programming and conducting LAT, leaving the counties to deal with the consequences of the failure to do so.

With regards to the shocking assertion that the Secretary of State helped draft an intended loophole in the law to make required EAC system certification meaningless – it boggles the imagination. He claims that while the General Assembly ordered that only EAC software be purchased, he can change it behind closed doors to do whatever he wants. The Secretary is shamelessly defending his “election security be damned” policies, despite the his disingenuous “Secure the Vote” logo.

Don’t take our word for any of this. The transcript of the October 1 court conference was just unsealed, along with new declarations from experts Alex Halderman, Kevin Skoglund, and Harri Hursti, plus the Pro V&V test lab letter. We attached them for you to read the grave concerns of the nationally respected experts along with the transcript from the sealed proceedings. The State has been unable to engage experts who support their use of BMDs or this software. Instead they only have (often inaccurate) testimony from vendors.

The SOS wants you to bet your voters’ ballots, and your counties’ candidates’ campaigns, on the high-risk notion that the software change solves the original problem, with no unintended consequences, including the introduction of more errors or malware. Also he wants you to bet that losing candidates won’t challenge the election on the basis of the host of BMD risks, problems and legal non-compliance from ballot secrecy to failing software that may well hide its defects.

The experts are clear: if you use the altered BMDs, your elections will not be defensible.

The only sound choice is to draw a line in the sand and strictly comply with the law. The law holds the County Superintendent responsible for the conduct of elections. And when things go wrong, and the lawsuits come, the Secretary of State **will** blame the counties.

The November 2020 election is consequential. All eyes are on election administrators. And on Georgia. We urge you to put voters first, set aside the problematic BMDs, and use ballots marked by pen for in-person voting as authorized by O.C.G.A 21-2-281 and SEB Rule 183-1-12-.11(2)(c)-(d)—the only legal path before you for conducting an accountable and constitutionally compliant election.

As always, we are happy to hear from you to discuss this further.

Marilyn Marks

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Coalition for Good Governance

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## Exhibit A



## OFFICIAL ELECTION BULLETIN

October 5, 2020

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**TO: County Election Officials and County Registrars**

**FROM: Chris Harvey, Elections Division Director**

**RE: Be Wary of False and Misleading Information re: ICX Update**

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You may have received correspondence today from activists for hand-marked paper ballots and their attorney. These activists have been suing the state and Georgia counties for years because they disagree with the decision of the Georgia General Assembly to use electronic ballot-marking devices instead of hand-marked paper ballots. Because their preferred policy was not enacted, they have tried to force their preferred policy on the state through litigation. The latest correspondence makes false and misleading allegations regarding the recent update to the ICX (touchscreen) component of Georgia's voting system.

As you know, an issue was discovered during Logic and Accuracy testing that, in certain rare circumstances, caused the second column of candidates in the U.S. Senate Special Election to not correctly display on the touchscreen. The issue was caught prior to any in-person voting due to excellent L&A testing by county election officials. Soon after the issue was brought to our attention, Dominion diagnosed the issue and began to work on a solution.

Dominion's solution required a *de minimis* software update to the touchscreen. That update was tested at Dominion, tested again at the state's EAC-certified test lab, and tested again at the Center for Election Systems to determine that it resolved the display issue and did not cause any other issues with the operation of the ICX. The state only distributed the update after verifying the test results with the EAC-certified test lab and acceptance testing the update at CES prior to distribution to counties. This is the normal process to follow for a state certification update. The updated version of the ICX touchscreen software (Version 5.5.10.32) has been certified by the Secretary of State as safe for use in Georgia's elections. You should continue to install the update as instructed

by CES. You should also confirm both the confidential hash value and the version number on each ICX BMD touchscreen during L&A testing.

The correspondence you may have received today also misstates Georgia law when it says that the update has to first be certified by the EAC. Georgia law required the *initial* system procured to be EAC certified, but it does not require that all updates first be certified by the EAC. The law was drafted that way intentionally, with input from our office, to ensure that the state did not have to wait on the EAC when important updates were needed.<sup>1</sup> Even with these provisions of Georgia law, Dominion advises that it has already submitted the update to the EAC for approval as a *de minimis* change, as recommended by the EAC-certified test lab.

Thank you to the counties whose diligent L&A testing allowed this issue to be identified and resolved quickly. And thank you to all county election officials for your continued hard work in this difficult year for election administration.

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<sup>1</sup> You probably remember that the EAC was without a quorum for two years, and therefore unable to take any action.

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

**DONNA CURLING, ET AL.,  
Plaintiffs,**

**v.**

**BRAD RAFFENSPERGER, ET AL.,  
Defendants.**

**DECLARATION OF  
J. ALEX HALDERMAN**

**Civil Action No. 1:17-CV-2989-AT**

Pursuant to 28 U.S.C. § 1746, J. ALEX HALDERMAN declares under penalty of perjury that the following is true and correct:

1. I hereby incorporate my previous declarations as if fully stated herein. I have personal knowledge of the facts in this declaration and, if called to testify as a witness, I would testify under oath to these facts.

2. I have reviewed the “Letter Report” prepared by Pro V&V concerning version 5.5.10.32 of the Dominion BMD software (Dkt. No. 939). The report makes clear that Pro V&V performed only cursory testing of this new software. The company did not attempt to independently verify the cause of the ballot display problem, nor did it adequately verify that the changes are an effective solution. Pro

V&V also appears to have made no effort to test whether the changes create new problems that impact the reliability, accuracy, or security of the BMD system.

3. This superficial testing is deeply concerning, because Pro V&V's characterization of the source code changes indicates that they are considerably more complicated than what Dr. Coomer previously testified was the threshold for considering a change to be "de minimis": "literally a one-line configuration change in some config file that would have no material impact on the system" (Dkt. No. 905 at 102:18-103:14). Instead, Pro V&V states that Dominion made two kinds of changes and modified lines in five different source code files. In general, changes that affect more lines of source code or more source code files are riskier than smaller change, as there is a greater likelihood that they will have unintended side-effects. Changes to source code files, as Dominion made here, also tend to be riskier than changes to "config[uration] files."

4. The nature of the changes gives me further reason for concern. According to Pro V&V, one change involved changing a "variable declaration" to modify the "type" of a variable. A variable's type determines both what kind of data it holds and how operations on it function. Although changing a variable declaration often involves differences in only one line of source code, the effect is a change to how the program operates everywhere the variable is used, which could involve

many parts of the source code and span multiple files. For this reason, changing a variable's type frequently introduces new bugs that are difficult to detect. I have often experienced such problems while writing software myself.

5. It is not possible to evaluate the effects of such a change by analyzing only the lines of source code that have been modified. Yet Pro V&V's description of its "source code review" is consistent with having done nothing more. The company could have engaged an expert in the specific programming language to analyze the quality of the changes and look for subtle side-effects throughout the code, but it appears that they did not.

6. Instead, the report states that "Pro V&V conducted functional regression testing." Regression testing has a well-defined meaning in computer science: checking that a change to a system does not break its existing functionality. After a change to a voting system like this, rigorous regression testing is essential for ensuring that the system's reliability, accuracy, and security are not degraded. Yet the testing Pro V&V describes performing is not regression testing at all. Instead, the company focused entirely on checking whether the ballot display problem was fixed and makes no mention of testing any other functionality whatsoever.

7. Even for this limited purpose, Pro V&V's testing methodology is inadequate. They first tried to observe the error while using the current version of the BMD software, 5.5.10.30. They managed to trigger it using an artificial test ballot but failed to reproduce it using the real ballot design from Douglas County (where the problem was observed during L&A testing) even after 400 attempts.<sup>1</sup> They then performed the same checks using the 5.5.10.32 software. Pro V&V's basis for concluding that the new software corrects the problem is that they were unable to trigger the error with either ballot after 400 tries. Yet this ignores the obvious possibility that the error might simply be eluding them, as it did with the Douglas County ballot under version 5.5.10.30.

8. That is the full extent of the testing described in Pro V&V's report. They did not test that the other functionalities of the machine are not impacted by the change. They did not test that the BMD selected and printed results accurately, nor did they test that security was unaffected. Tests only answer the questions you ask. Here—regardless of what Pro V&V intended—the only questions asked were: “Is the stated error observed when using the old software?” and “Is the stated error observed when using the new software?” They did not ask, “Is Dominion correct

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<sup>1</sup> It is curious that Pro V&V was unable to reproduce the problem experienced in Douglas County, but they appear not to have made any effort to investigate this.

about the cause of the problem?” They did not ask, “Does this change absolutely and completely fix the issue?” Most importantly, they never asked or answered the key question for determining whether the change is de minimis, “Will these modifications have any impact on the rest of the voting system’s functionality?”

9. Even if the change does correct the bug without introducing new problems, it still represents a significant security risk, because of the possibility that attackers could hijack the replacement software to spread malware to Georgia’s BMDs.

10. Defendants say they will guard against this using hash comparisons, but the hash comparison process they have described is inadequate in several ways.<sup>2</sup> As I have previously explained, examining the hash that the BMD displays on screen provides no security, because malware on the BMD could be programmed to calculate and display the expected hash. Although the State now says it will perform some acceptance testing at a central facility, such testing has limited value at best. Even if performed correctly—by securely computing the hash of the software using a device that is assuredly not affected by malware—acceptance testing can only

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<sup>2</sup> The Pro V&V report lists the hash of a file named ICX.iso, which presumably contains the APK as well as other files. Without access to the ICX.iso file, I cannot confirm whether that the software purportedly being installed on the BMDs is the same as the software Pro V&V built and tested.

confirm that the new software was not modified between Pro V&V and the test facility. It does not ensure that the new software actually matches Dominion’s source code or that it will not be modified during later distribution to counties or installation on the tens of thousands of BMDs statewide.

11. The report mentions that Pro V&V performed a “trusted build” of the new software. This refers to the process by which Pro V&V compiled the source code to produce the APK file for distribution and installation throughout Georgia. The result of compiling source code, often called a software “binary,” is in a non-human readable format, and it is not possible in general to confirm that a binary faithfully matches source code from which it was purportedly compiled. As a result, if Pro V&V were to modify the BMD software to introduce malicious functionality—or if attackers who infiltrated their systems were to do so<sup>3</sup>—there

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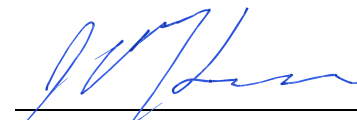
<sup>3</sup> Notably, Pro V&V’s website (<http://www.provandv.com/>) does not support HTTPS encryption, and modern web browsers warn users that it is not secure, as shown below. In my experience, organizations that fail to support HTTPS are likely to be ignoring other security best practices too, which increases the likelihood of attackers successfully infiltrating their systems.



would be no readily available way for the State or Dominion to detect the change. The State's election security experts themselves have emphasized the risk of election manipulation by so-called "insiders."

12. Defendants state that Pro V&V has submitted the report to the EAC to seek approval for a de minimis change. The EAC's de minimis software change process was introduced less than a year ago, and, as far as I am aware, it has only been invoked on one or two occasions so far. In my opinion, the EAC cannot make an informed determination as to whether the new Dominion software meets the de minimis standard based on the information contained in Pro V&V's report, and I sincerely hope the agency demands more rigorous testing before allowing the software to be used under its certification guidelines.

I declare under penalty of the perjury laws of the State of Georgia and the United States that the foregoing is true and correct and that this declaration was executed this 3rd day of October, 2020 in Ann Arbor, Michigan.



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J. ALEX HALDERMAN

**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 hereby incorporate my previous declarations as if fully stated herein. 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 have read the Letter Report regarding “Dominion Voting Systems ICX Version 5.5.10.32” from Pro V&V to Michael Barnes dated October 2, 2020 (“Letter Report”).
3. The Letter Report describes Pro V&V’s evaluation of a proposed code change by Dominion to address a flaw in the current ICX software related to reliably displaying two columns of candidates.

4. Pro V&V's evaluation is inadequate to verify Dominion's opinion of the root cause of the error, Dominion's proposed fix for the error, or whether the nature of the proposed change is considered "de minimis" as defined by the U.S. Election Assistance Commission ("EAC").

### **High Impact Changes**

5. The Letter Report describes changes that are potentially high impact.
6. I expected the change to be limited to one or two lines in a configuration file based its description in the hearings. A configuration file change would provide a new value for the existing code to use.
7. The impact of changing a value being *used* by code is far less than the impact of changing the code *itself*, in the same way that changing the furniture in a house has less impact than moving walls. The value may be different but it will travel the same pathways through the code during operation. The structure and governing rules are unchanged.
8. Instead, the Letter Report describes two sets of changes to the source code *itself* in a total of five files. It does not quantify the number of lines changed, but it must be at least five. These are not merely configuration changes. Variable and function definitions in the source code are changed.

9. The changes described may sound minor, for example changing a variable from an integer (e.g., 123) to a string (e.g., "123"), but I would give them no less consideration. I have broken plenty of code making similar changes.
10. One reason is that any code elsewhere in the program that uses a changed variable or function could be impacted. Another part of the code may act correctly when given 123 but act incorrectly when given "123". The first can have numbers added and subtracted, while the second can be searched for a specific character, but the reverse is often not true.
11. The Letter Report describes a source code review limited to the changed lines of source code. The code comparison performed is similar to reviewing the changed text in a legal blackline. It does not appear that Pro V&V looked throughout the source code for other interactions which could prove problematic.
12. The Letter Report states that Dominion believes the problem is a collision of resource identifiers between their software and the underlying operating system. I think it's a fair analogy to say that Dominion's software and the operating system sometimes try to park in the same parking space.
13. In my experience, an abundance of caution is necessary when the operating system and software running on it are working in a shared

space and not playing well together. A misstep could create additional problems in their interactions and any change should be carefully considered and well tested.

14. The Letter Report does not describe any review of the proposed software's interaction with the operating system. It does not mention the involvement of any expert on the operating system or an opinion regarding colliding resource identifiers—the reported cause and the target of the resolution. This is a concerning oversight.

#### **Inadequate Testing of the Root Cause of the Error**

15. Pro V&V was unable to reliably reproduce the error with the current version of the software, ICX 5.5.10.30. In fact, they reported producing the error only once out of 810 total attempts.
16. Pro V&V appears to have taken Dominion's word for the root cause of the error. The Letter Report does not mention any independent investigation to determine the cause.
17. The description of Pro V&V's first test, using a sample election database, begins with a procedure likely suggested by Dominion—toggling between font sizes to trigger the error. When the 10th toggle produced the error, Pro V&V considered the root cause to be confirmed. That is in itself not unreasonable.

18. However, the same test procedure was later performed using an actual election database, from Douglas County where logic and accuracy testing had revealed the error previously, and 400 toggles and several reboots could not produce the error. Of two test cases that should have both failed, one failed and one did not.
19. Despite these conflicting test results, Pro V&V did not investigate further. They did not consider what might be different between these two test cases to cause contradictory results. They did not consider if the sample election database at the center of their tests was a poor substitute for a real database. They did not consider that the root cause could be different, or that toggling the font size might not be a good trigger for the error.
20. Pro V&V wrote the Letter Report without having confirmed that Dominion's opinion of the root cause was correct.

### **Inadequate Testing of the Proposed Fix for the Error**

21. It is impossible to verify that a proposed change sufficiently addresses an error if the root cause is unconfirmed. A change may only appear to fix the error due to coincidence. Correlation is not causation. A change may incompletely fix the error or create subtle side effects.
22. I have learned this lesson many times while fixing software bugs during my 23 years as a programmer, and I teach that lesson in a course on

software testing. I have also had the practical experience of taking a car to the auto mechanic over and over as they try different solutions for an uncertain cause.

23.Pro V&V's basis for determining that the error was fully resolved by the proposed change, ICX 5.5.10.32, was that the error was not observed after 400 toggles and several reboots.

24.This is not an ideal test case because "absence of evidence is not evidence of absence." The conclusion requires an assumption that subsequent attempts would not surface the error. Given that the first test required only 10 toggles to trigger the error, after 400 toggles and several reboots I might have made a similar assumption.

25.However, when Pro V&V performed the subsequent test on the Douglas County database and also could not observe the anticipated error after 400 toggles and several reboots, they did not revisit their conclusion about ICX 5.5.10.32. They should have.

26.They did not consider that the error could be eluding them in ICX 5.5.10.32 as it was with ICX 5.5.10.30 using Douglas County's database. They did not consider that their assumption that 400 toggles was enough to surface the error was wrong. They did not consider that the proposed change might be an insufficient remedy for the problem.

27. To be clear, I am not suggesting that Dominion's opinion of the root cause is incorrect or that Dominion's proposed change does not fix it. I am saying that testing was insufficient to verify either one. Pro V&V showed no skepticism about their findings when the results created a logical fallacy.
28. Even more surprising, Pro V&V had a real election database from Douglas County in hand, yet they did not test it with ICX 5.5.10.32. The stated purpose of this eleventh-hour software change was to resolve this error for the current election database, rather than create and distribute a new one. The test lab hired to confirm that the new software will work with the current database in a matter of days did not even check.
29. Pro V&V wrote the Letter Report without having confirmed that Dominion's proposed fix correctly addressed the error, neither on the sample election database nor on the election county database counties are planning to use.

### **Inadequate Testing of "De Minimis"**

30. The EAC defines a de minimis change as:

A de minimis change is a change to a certified voting system's hardware, software, TDP, or data, the nature of which will not materially alter the system's reliability, functionality, capability, or

operation. Under no circumstances shall a change be considered de minimis if it has reasonable and identifiable potential to impact the system's performance and compliance with the applicable voting Standard.<sup>1</sup>

31. The Letter Report does not describe any testing to demonstrate that the nature of the proposed change does not “materially alter the system’s reliability, functionality, capability, or operation” and does not have a “reasonable and identifiable potential to impact the system’s performance and compliance with the applicable voting Standard.”

32. Pro V&V ignored these critical, foundational requirements in their testing.

33. Pro V&V did not test whether *any* other functionalities of the device are impacted. They did not test whether the new build of the software correctly selects candidates in a series of contests and accurately prints them on a ballot. They did not test other screens to ensure that a fix to the two-column layout did not break another. They did not check if it was still possible to change languages or screen contrast, or whether the audio ballot, used by voters with disabilities, was still working. They did not test whether the device’s security was impacted.

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<sup>1</sup> “Testing and Certification Program Manual,” Section 3.4.2, available at: [https://www.eac.gov/sites/default/files/eac\\_assets/1/6/Cert\\_Manual\\_7\\_8\\_15\\_FINAL.pdf](https://www.eac.gov/sites/default/files/eac_assets/1/6/Cert_Manual_7_8_15_FINAL.pdf)

34.Pro V&V did not answer the litmus test for de minimis. Does the change materially alter the system’s reliability, functionality, capability, or operation?

35.The Letter Report describes “functional regression testing,” which might help answer this question, but it misuses the term.

36.Regression testing is a “re-running functional and non-functional tests to ensure that previously developed and tested software still performs after a change.”<sup>2</sup> It is so named because a regression is a step backwards in the development of software, the proverbial “two steps forward, one step back.”

37.Pro V&V examined the rendering of the two-column layout in their tests. Regression testing would validate that *other* parts of the software still perform correctly.

38.Regardless of Pro V&V’s determination, this change is not a de minimis change until the EAC reviews it and approves in writing. “The EAC has sole authority to determine whether any VSTL endorsed change constitutes a de minimis change under this section. The EAC will inform the Manufacturer and VSTL of its determination in writing.”<sup>3</sup>

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<sup>2</sup> “Regression Testing”, Wikipedia, available at [https://en.wikipedia.org/wiki/Regression\\_testing](https://en.wikipedia.org/wiki/Regression_testing)

<sup>3</sup> “Testing and Certification Program Manual,” Section 3.4.3

39. The EAC prohibited *any* software changes to be considered de minimis until recently out of concern that even small changes might alter the system functionality, due to potential ripple effects I described earlier.

40. Given that the process is new, I expect that the EAC will scrutinize any request for a software de minimis change carefully. I expect the EAC to ask for more rigorous testing and reporting than the Letter Report.

### **Concerns about the Time Remaining for Review and Testing**

41. In my previous declaration I expressed concern about a software change at this late date and fear that time pressures may result in less thorough review and testing of the proposed change.

42. The Letter Report is a wholly inadequate review. Its tests are incomplete.

43. The EAC has not yet begun to review this proposed software change.

Using the revised software without the EAC's approval will void the federal certification. EAC approval must be granted in the next five business days to allow early voting to commence on the following Monday.

44. Yet the uncertified software has been distributed and counties have been instructed to install it on over 30,000 ImageCast X devices and to begin testing them.

45. Last week, I heard Michael Barnes describe the current procedures for logic and accuracy testing. The procedures do not test every device, for every ballot style, for every candidate. The procedures do not include any additional testing related to this error. This problem and others could pass through logic and accuracy testing undetected.

Executed on this date, October 4, 2020.

  
\_\_\_\_\_  
Kevin Skoglund

## **DECLARATION OF HARRI HURSTI**

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

1. This declaration supplements my prior declarations (Docs. 680-1, 800-2, 809-3, 860-1, 877, and 923-2) and I stand by the statements in those declarations.
2. I arrived at the Fulton County Election Preparation Center (“EPC”) on October 1, 2020 around 3:45pm. I was there in my capacity as an expert engaged by the Coalition Plaintiffs to conduct a Rule 34 inspection. (Exhibit 1) . I was accompanied during part of my visit by Marilyn Marks of Coalition for Good Governance.
3. My goal for this observation and inspection was to review the ongoing updating of the Dominion software for Fulton County ballot marking device ("BMD") touchscreen units to ICX software version 5.5.10.32. It is my understanding that Fulton has an inventory of over 3,300 BMD touchscreens, all of which are to be updated with this software. A number of the machines were in the EPC warehouse and were staged to be updated or marked after the update had been completed.
4. Upon our arrival, Ms. Marks and I were informed by Derrick Gilstrap, the manager of EPC, that all of the people working to upgrade the devices were

Dominion technicians. Mr. Gilstrap stated that he did not feel comfortable installing a last-minute software change, and did not want Fulton County staff to be responsible for installing it. He told us that he told Dominion to conduct this operation, prior to having his staff install the November 2020 election programming and Logic and Accuracy testing (“LAT”).

5. Mr. Gilstrap told us that after the software update step that LAT would immediately begin, and made no mention of Acceptance Testing that should occur prior to LAT.

6. Acceptance Testing is an almost universally mandated basic test of the hardware and software when a change or repair to either has been made before counties are permitted to install election programming and deploy voting system components. Acceptance testing must be performed on each unit, and cannot be performed on a sample basis. Fulton’s failure to conduct such testing should be a serious warning sign of further recklessness in the installation of inadequately tested software.

7. Mr. Gilstrap stated that Dominion had started the software update project with four workers, but soon realized that the task would take extended periods of time. Mr. Gilstrap stated that Dominion had accordingly increased the workforce to 14 and expected the installation work to be completed on Monday, October 5.

8. The new software was contained on USB sticks. However, there was no inventory management present for the USB sticks. There also was no inventory control for the technician authorization smartcards, which provide access to the controls of the touchscreen. Workers did not sign or otherwise document when they took possession or returned the technician cards and software upgrade USB sticks. Those items were in an open plastic bag which was sometimes placed on table, and sometimes carried around the working area by the manager. Anyone was able to pick up a USB stick or drop them there freely, permitting the easy substitution of USB sticks containing malware or to leave the premises with copies of the software update.

9. Some workers worked one BMD touchscreen machine at the time, while others simultaneously worked on 2 or 3 machines. There was no accountability for how many sticks and technician smart-cards each worker had in their possession. Clearly, the USB sticks were not considered to be security sensitive items at all.

10. Some of the workers had instructions for software update visible in their pockets, while others did not seem to have the instructions readily available. One worker showed me the instructions, but it was different from the instructions I had seen that were sent to the counties. None of the technicians that I observed were following the instructions as they installed the new software.

11. Technicians were not following a common process, and they all made their own variations on the workflow. In my experience, this can negatively affect the quality and reliability of the software installation. Many workers were texting and making phone calls while working and not focusing on their work. As a result, I observed repeated human errors such as skipping steps of the process.

12. Some workers consistently took an extra step to destroy previous application data before uninstalling the old version of the software. Uninstalling software packages results in destroying application data, but that is known to be unreliable in old versions of Android. The step they took is ensuring, among other things, destruction of forensic evidence of Fulton's use of the equipment in prior elections.

13. To avoid destruction of all forensic evidence from the BMDs, a number of images of the electronic data contained on the BMDs should be taken from a sample of them before installation of the new software.

14. As part of the updating process, the workers are directed to enable the "Install from Unknown Sources" setting. This is an insecure mode because it turns off the operating system verification of trusted sources and therefore allows software from any source to be installed. During the 45 minutes of my observation, I observed that many units had been left in insecure mode. I estimate 15% of the units were already in the insecure mode when the work began on them, having

been left that way during the last software installations, or because of interim tampering.

15. As described before, most workers I observed were not focusing on the work they were tasked to do, and as result, they were accidentally skipping steps. I observed that, as result of these human errors, the units were erroneously left in the insecure mode either by the workers skipping the step to place the machine into the secure mode after upgrade, or doing the step at such a fast pace that the system did not register the touch to toggle the switch and the worker did not stop to verify the action.

16. The State Defendants and Dominion have repeatedly overstated the value of their hash test, but my observation showed that they themselves are not relying on such test as a control measure. Dominion workers are not even checking the hash value. I deliberately followed many workers when they processed the units. During over 45 minutes of observation, none of the workers took the step of verifying the hash value. Some workers did not realize that the upgrade had failed and the mistake was only caught by persons who were closing the cabinets when and if they looked at the software version numbers before closing the doors.

17. I also observed random errors that were not caused by humans. For example, software sometimes refused to uninstall because the uninstall button was

disabled, or the installation silently failed. The technicians treated devices with issues by simply rebooting them. Technicians made no effort to diagnose or document the cause of the issues. The casual nature of dealing with the irregularities caused me to conclude that these abnormal incidents are commonplace.

18. Based on my observations of the software update, I would anticipate that these machines are likely to behave inconsistently in the polling place, depending on a number of factors including the care taken in the software installation process.

19. The current abbreviated LAT protocol adopted by Fulton County and the State cannot be relied on to identify problems created by the new software or its installation (or other problems with programming and configuration unrelated to the new software). Even if counties were conducting the full LAT required, it is but one step that is needed, and is quite insufficient for ensuring the reliability of the BMD touchscreens—which at the end of the day, simply cannot be done.

20. In my professional opinion, the methods and processes of adopting and installing this software change is completely unacceptable. The methods and processes adopted by Dominion and Fulton County do not meet national standards for managing voting system technical problems and remedies, and should not be accepted for use in a public election under any circumstances.

21. It is important that full details of the software change made be available for analysis and testing to determine the potential impact of the changes. I concur with Dr. Halderman's opinion in Paragraph 8 of his September 28, 2020 declaration (Doc. 923-1), in which he states that if the problem is as limited as described by Dominion, it could have been addressed with far less risk by the State without making an uncertified, untested software change.

22. In my opinion, the installation of the last-minute software change adds intolerable risk to the upcoming election, and the simple solution of removing the BMD units from the process and adopting hand marked paper ballots is imperative.

23. I note that I wanted to document the upgrading process, but Mr. Gilstrap told me that I was prohibited from taking photographs or video. I showed him the Rule 34 inspection document and pointed out the paragraph permitting photographing. He read that carefully but told me that he needed to clear that with his superiors before I could start taking pictures. He never cleared this with his superiors while we were there.

I declare under penalty of the perjury laws of the State of Georgia and the United States that the foregoing is true and correct and that this declaration was executed this 4<sup>th</sup> day of October, 2020 in Atlanta, Georgia.

  
\_\_\_\_\_  
Harri Hursti

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

DONNA CURLING, *et al.*

*Plaintiffs,*

v.

BRAD RAFFENSPERGER, *et al.*,

*Defendants.*

CIVIL ACTION

FILE NO. 1:17-cv-2989-AT

**STATE DEFENDANTS' NOTICE OF FILING  
REDACTED VOTING SYSTEM TEST LABORATORY REPORT**

Pursuant to the Court's September 30, 2020 docket entry, and as discussed in Defendants' Notice of Filing Regarding the Court's Request for Documentation, [Doc. 929], State Defendants provide notice of filing a redacted copy of the Voting System Test Laboratory Report, attached hereto as **Exhibit 1**.

Respectfully submitted this 5th day of October 2020,

/s/ Carey Miller

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*Counsel for State Defendants*

**CERTIFICATE OF COMPLIANCE**

Pursuant to L.R. 7.1(D), the undersigned hereby certifies that the foregoing **STATE DEFENDANTS' NOTICE OF FILING REDACTED VOTING SYSTEM TEST LABORATORY REPORT** has been prepared in Century Schoolbook 13, a font and type selection approved by the Court in L.R. 5.1(B).

/s/ Carey Miller  
Carey Miller

# Exhibit 1

# Letter Report



To: Michael Barnes  
From: Wendy Owens - Pro V&V, Inc.  
CC: Jack Cobb - Pro V&V, Inc.  
Date: October 02, 2020  
Subject: Dominion Voting Systems ICX Version 5.5.10.32

---

Dear Mr. Barnes:

Pro V&V is providing this letter to report the results of the evaluation effort on the ICX version 5.5.10.32. An examination was performed to confirm that this version of the ICX software corrected the issue with displaying of two column contests found in ICX version 5.5.10.30.

## Background

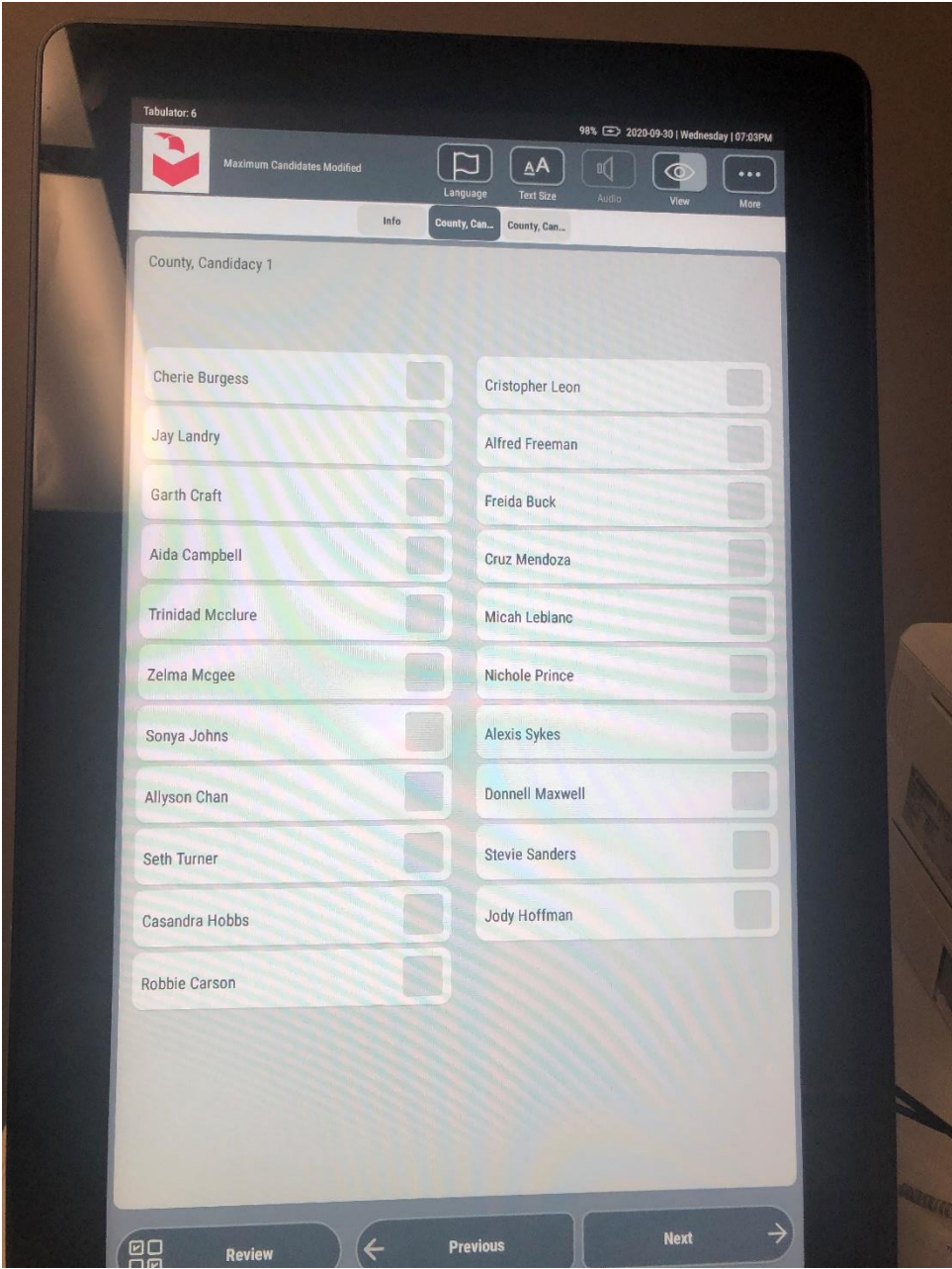
Pro V&V was contacted by Georgia Secretary of State Office and Dominion Voting System to analyze an issue that was discovered in Georgia's Election Logic and Accuracy Testing (L&A testing) for the 2020 General Election. It was discovered during L&A testing that a display error, under certain conditions, would occur where the second column of candidates would not be displayed properly. Dominion Voting Systems researched the issue and found that a static container identifier was causing a collision with an Android automated process for assigning container identifiers. This collision caused the display for the second column candidates not to be rendered on the screen properly and occurred so infrequently that it appeared intermittent.

## Test Summary

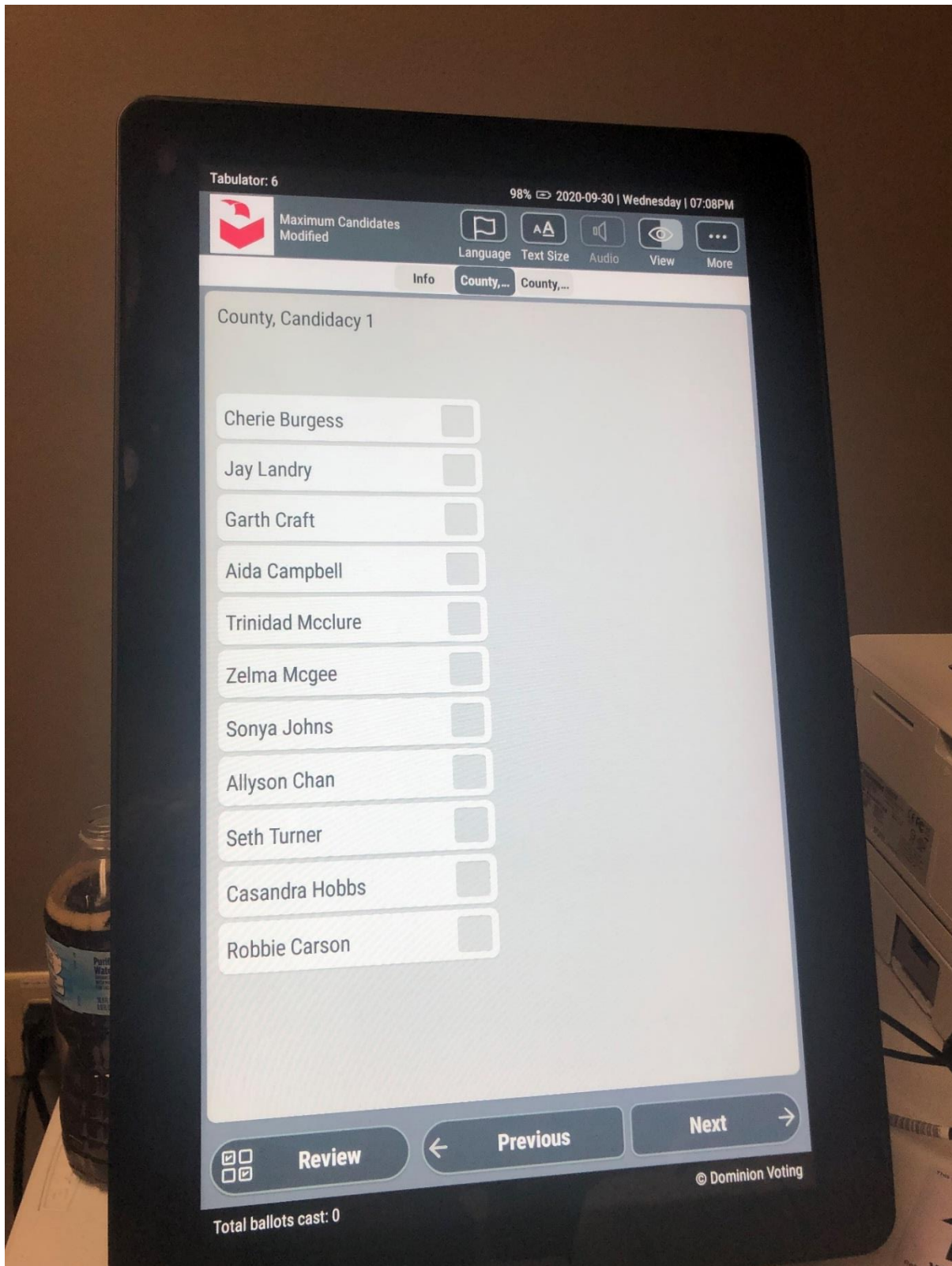
Dominion Voting Systems submitted source code for ICX version 5.5.10.32 to Pro V&V. Pro V&V then conducted a comparative source code review comparing ICX version 5.5.10.32 to the VSTL-provided previous ICX version 5.5.10.30. The source code review found two source code changes in a total of five files. One change was a variable declaration change the variable type to a string from an integer and changing the assignment from a static number to assigning another variable. The other update was to change a function call passing a "wrapper tag" instead of a "wrapper ID". All other source code remained constant. After conducting the source code review, a Trusted Build process was conducted. The Product from this build is the ICX.iso file. The SHA-256 hash for this file is as follows:

ICX.iso -

Pro V&V conducted functional regression testing using version 5.5.10.30 and 5.5.10.32. An ICX machine was loaded with 5.5.10.30 and an election containing two 2 column contests. Pro V&V toggled between “Normal” and “Big” font sizes. Approximately on the 10<sup>th</sup> toggle the column disappeared as presented in Photograph 1 and 2 below:



Photograph 1: Max Candidate Election Contest One



Photograph 2: Second column was not rendered.

After reproducing the issue. The same device was load with the ICX version 5.5.10.32 and the same election. Pro V&V toggled 50 times then rebooted, 100 times then rebooted and finally 250 times. Pro V&V never observed the issue.

Pro V&V requested Douglas County Georgia's 2020 General Election database that had produced the issue, but could not reproduce the issue for the ICX software version 5.5.10.30. Even though Pro V&V could not reproduce the issue, Pro V&V ran the same test as the test election toggling 50 times then rebooted, 100 times then rebooted and finally 250 times. Pro V&V never observed the issue.

### Conclusion

Based on the review of the source code and nature of the change, Pro V&V recommends the change be deemed as de minimis. Based on the testing performed and the results obtained, it was verified through source code review and functional testing that the issue found in ICX version 5.5.10.30 can not be reproduced in ICX version 5.5.10.32.

Should you require additional information or would like to discuss this matter further, please contact me at 256-713-1111.

Sincerely,



Wendy Owens  
VSTL Program Manager  
[wendy.owens@provandv.com](mailto:wendy.owens@provandv.com)

SEALED TRANSCRIPT

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

|                             |   |                 |
|-----------------------------|---|-----------------|
| DONNA CURLING, ET AL.,      | : |                 |
|                             | : |                 |
| PLAINTIFFS,                 | : |                 |
| vs.                         | : | DOCKET NUMBER   |
|                             | : | 1:17-CV-2989-AT |
| BRAD RAFFENSPERGER, ET AL., | : |                 |
|                             | : |                 |
| DEFENDANTS.                 | : |                 |

TRANSCRIPT OF ZOOM VIDEO CONFERENCE PROCEEDINGS

BEFORE THE HONORABLE AMY TOTENBERG

UNITED STATES DISTRICT JUDGE

OCTOBER 1, 2020

9:08 A.M.

**MECHANICAL STENOGRAPHY OF PROCEEDINGS AND COMPUTER-AIDED**

**TRANSCRIPT PRODUCED BY:**

|                                 |                                       |
|---------------------------------|---------------------------------------|
| <b>OFFICIAL COURT REPORTER:</b> | <b>SHANNON R. WELCH, RMR, CRR</b>     |
|                                 | <b>2394 UNITED STATES COURTHOUSE</b>  |
|                                 | <b>75 TED TURNER DRIVE, SOUTHWEST</b> |
|                                 | <b>ATLANTA, GEORGIA 30303</b>         |
|                                 | <b>(404) 215-1383</b>                 |

UNITED STATES DISTRICT COURT  
OFFICIAL CERTIFIED TRANSCRIPT

A P P E A R A N C E S O F C O U N S E L

**FOR THE PLAINTIFFS DONNA CURLING, DONNA PRICE, JEFFREY SCHOENBERG:**

DAVID D. CROSS  
MORRISON & FOERSTER, LLP

**FOR THE PLAINTIFFS COALITION FOR GOOD GOVERNANCE, LAURA DIGGES, WILLIAM DIGGES, III, AND RICARDO DAVIS:**

BRUCE BROWN  
BRUCE P. BROWN LAW

ROBERT ALEXANDER MCGUIRE, III (VIA VIDEO CONFERENCE)  
ROBERT MCGUIRE LAW FIRM

**FOR THE STATE OF GEORGIA DEFENDANTS:**

VINCENT ROBERT RUSSO, JR.  
CAREY A. MILLER  
ROBBINS ROSS ALLOY BELINFANTE LITTLEFIELD, LLC

**FOR THE FULTON COUNTY DEFENDANTS:**

CHERYL RINGER  
OFFICE OF THE FULTON COUNTY ATTORNEY

**P R O C E E D I N G S**

**(Atlanta, Fulton County, Georgia; October 1, 2020.)**

THE COURT: Good morning. Counsel, would you just check the extra numbers here -- anyone with an extra number here or person here to make sure everyone here is identified with you. I can see what they appear to be.

Mr. Martin, is this everybody that you have let in?

COURTROOM DEPUTY CLERK: Yes, ma'am, this is everybody.

THE COURT: All right. So if -- the two individuals who are just solely appearing by telephone, can you identify yourselves?

MS. RINGER: Phone number ending in 8737 is Cheryl Ringer from Fulton County.

THE COURT: Okay. Very good. That is fine.

And the person whose number ends in 8993, would you identify yourself.

MR. FRONTERA: Your Honor, can you hear me? This is Mike Frontera, general counsel, with Dominion Voting Systems.

THE COURT: Very good. Thank you very much. All right. That is fine. Everyone is authorized to be on.

Thank you, everyone, for being here. I want to say from the start that we have this now on the platform -- a different Zoom platform, and we are -- I am -- I have authorized the videotaping of the hearing solely for the

1 purpose of if I determine that some portion of this really  
2 should have been on the public record that it can be made  
3 available on the record.

4 Not knowing what was going to be discussed exactly  
5 and understanding that there might be some confidentiality  
6 issues, I decided that we should just proceed in this way,  
7 rather than by making it open and then trying to pull it back.  
8 So that is the purpose of videotaping it. I don't really --  
9 normally wouldn't do that.

10 But under the emergency circumstances here, I have  
11 proceeded this way. And I think it is the soundest way of  
12 proceeding in that way. And also I can make any portion of  
13 this that would be public be available to the public.

14 Additionally, I want to note though that the  
15 videotape is not -- will not be the transcript of record. The  
16 only transcript of record of that will be created by Ms. Welch  
17 as the court reporter in this matter. And you are not to refer  
18 to the videotape at any point as kind of the official record in  
19 this matter. And, of course, the transcript will be filed.

20 I am -- just was, frankly, perplexed by the response  
21 that the State filed last night. And I know everyone is busy.  
22 I'm not trying to in any way minimize how busy you are. And --  
23 and Mr. Russo already has told me from the start that he has to  
24 be out -- that he has to be complete by 10:00.

25 Are you starting the hearing in front of Judge Brown

1 at 10:00, Mr. Russo?

2 MR. RUSSO: Your Honor, that hearing is at 10:00.  
3 But we have sent two of our colleagues there to do it so we  
4 could be here. So Mr. Belinfante and Mr. Tyson are there, and  
5 Mr. Miller and me are here. So you have got us today.

6 THE COURT: Okay. Very good. Wonderful.

7 MR. MILLER: And I think the 10:00 issue was specific  
8 to Dr. Coomer's availability.

9 THE COURT: All right. Very good. So please,  
10 everyone, bear that in mind as to Dr. Coomer's availability  
11 because if there is something that he needs to address early  
12 on, whether it is from the perspective of the Court or the  
13 State, let's be sure we just jump ahead and get his input.

14 MR. RUSSO: Your Honor, also, we have the staff from  
15 the Secretary's office on standby. We have Mr. Germany, the  
16 general counsel, on right now. But Mr. Sterling and Mr. Barnes  
17 are -- we told them to continue working since they have  
18 election stuff going on and that if you needed something from  
19 them we would patch them in accordingly.

20 THE COURT: That's fine. All right. Well, as I  
21 understand it, the -- from what you -- from what the State  
22 submitted last night -- and it wasn't on the record. That was  
23 just, I think, a letter from counsel. It was that you -- that  
24 basically the State defendants were proceeding, that you were  
25 sending the software out today -- the software to jurisdictions

1 across the state, and basically this is a distraction that I  
2 was causing, and it was none of my business. Well, that was  
3 the tonality of it. It was a quick letter.

4 But let me just say -- start from the start is that I  
5 think I have endeavored to work cooperatively with everyone. I  
6 have an order to issue. I need to -- whatever it says, whether  
7 it is just simply -- you know, doesn't do anything at all,  
8 which is certainly -- you know, given everything I have told  
9 you in the past that I am very reluctant to even consider in  
10 this election saying, oh, suddenly do a sudden change to the  
11 paper ballot.

12 But I still -- this is still a record. And I don't  
13 know what will happen in the days ahead. But I think that the  
14 Court is entitled to, with respect, be given the information  
15 needed to issue an intelligent decision. And this was a change  
16 of circumstances.

17 And I am -- I don't know who thought I wouldn't have  
18 issued a decision without full knowledge of the circumstances  
19 that have arisen. I don't mean this personally against anyone.  
20 I think everyone has generally been very professional with me.  
21 But this is not an acceptable response, and I know everyone is  
22 short on sleep and at their wits' end on some things. So I  
23 understand it that way. I sure am very short on sleep too.

24 And there is a lot of stress under these  
25 circumstances. So I humanly recognize all of that. And so I

1 just sort of had to breathe in and say, all right, where are we  
2 going from now, once I got the response and just say, all  
3 right, you know, without any drama, I want to understand what  
4 is going on.

5 And that -- the expectation I had was not the -- that  
6 things were just proceeding and that I wouldn't basically know  
7 what was happening.

8 So I think that is -- just as an initial matter, that  
9 is where we're at. I mean, I am, you know, at 95 percent on  
10 having an order ready to be timely issued. And I held it back  
11 while this is going on.

12 And, of course, that is why on Monday we issued the  
13 order on the one thing that was clearest that needed to be  
14 acted upon as soon as possible. But I was holding back as soon  
15 as I heard anything was going on.

16 So let's just talk about what has happened. My  
17 understanding from the letter on September 29th that is on the  
18 record that -- as opposed to the letter that I received  
19 yesterday from counsel that the acceptance testing -- there  
20 would be acceptance testing that would occur before there was  
21 going to be distribution.

22 I guess it is a filing now. I'm sorry. I didn't  
23 realize that counsel's letter was filed. So excuse me for  
24 that.

25 In any event, I thought there was going to be

1 acceptance testing before there was distribution. And maybe  
2 there was, and maybe I misunderstood what was instead stated in  
3 the brief letter.

4 So, first of all, let's just start off just as to  
5 that. Did that occur?

6 MR. RUSSO: Your Honor, yes. So, first, you know,  
7 let me say we filed the letter under seal because that is what  
8 was discussed on Monday. As a letter, you said to file it  
9 under seal. So that is why we filed it that way.

10 THE COURT: That is fine.

11 MR. RUSSO: We didn't necessarily think there was  
12 something in there that was attorneys' eyes only or anything to  
13 that extent.

14 THE COURT: All right. Then I will lift the seal.  
15 Okay. Fine.

16 MR. RUSSO: In terms of the acceptance testing, the  
17 Secretary of State's office did conduct acceptance testing  
18 prior to distribution of the update. That is correct.  
19 Mr. Barnes did that. And then the distribution proceeded.

20 THE COURT: And when did Mr. Barnes do that?

21 MR. RUSSO: I believe his acceptance testing was  
22 done -- conducted yesterday. Mr. Miller might -- might know if  
23 it was done yesterday or the day before. Frankly, my days are  
24 starting to run together right now.

25 THE COURT: Yeah.

1 MR. MILLER: Your Honor, I believe it was done Monday  
2 and Tuesday. And so the kind of process through that -- the  
3 acceptance testing was, you know, essentially receiving the  
4 application from Pro V&V and running through just a typical  
5 acceptance testing and, you know, primarily ensuring also that  
6 the rendering issue that was discovered in logic and accuracy  
7 testing was not recurring.

8 And, importantly, you know, there's -- acceptance  
9 testing was not the only thing being done. The voting system  
10 test laboratory was also doing its part.

11 And, frankly, Your Honor, as to the filing, we  
12 certainly didn't intend any disrespect. We do, you know, have  
13 to note our objections. And, of course, it becomes an awkward  
14 situation to do so. And we do appreciate your understanding  
15 throughout this thing.

16 But we also, frankly, understood that you may be  
17 seeking the Pro V&V evaluation, which the formal evaluation we  
18 just -- we don't have right now. They have completed the  
19 evaluation. The written report is not done yet.

20 MR. RUSSO: That's right, Your Honor. That was in  
21 our filing yesterday. And we didn't -- you know, we expect  
22 that report -- to have it by the end of the week.

23 To the extent there is any delay from Pro V&V getting  
24 us the report, we just didn't want, you know, there to be  
25 any -- any misunderstanding about a delay if we made that

1 representation. But we do expect it by the end of the week,  
2 and we will file it upon receipt.

3 In terms of the EAC issue, you know, the order said  
4 to file -- to file anything that is filed with the EAC,  
5 presuming a filing is made with the EAC. Dominion actually  
6 does -- Dominion would make the filing with the EAC, not the  
7 State. And Dr. Coomer can speak to that.

8 But there appeared to be some misunderstanding in  
9 counsel's email yesterday regarding the EAC filing. But to  
10 be -- to be clear, we -- since it has not been filed yet, we  
11 didn't have any update for you. But that is a Dominion issue,  
12 not a Secretary of State issue.

13 THE COURT: Well, it is obviously the responsibility  
14 under the state law still though for you to have an  
15 EAC-certified system.

16 MR. RUSSO: Well, Your Honor, I mean, the update is a  
17 de minimis update. So that is according to Dominion.

18 In terms of what state law requires and what state  
19 law doesn't require, I mean, there is not a claim in this case  
20 regarding our compliance with state -- with state law. The  
21 only state law claim that was in this case was abandoned by  
22 plaintiffs earlier and dismissed in Your Honor's order on the  
23 dismissal a couple of months ago.

24 THE COURT: All right. Let me just put it this way.  
25 I mean, it is an indicia of -- it is an important indicia of

1 what is going on and is this -- and from an evidentiary  
2 perspective certainly relevant.

3 So I would -- you know, I went back at least and  
4 looked at the most recent regulations issued by the EAC. And I  
5 didn't see it as not being a requisite step to -- even a  
6 software modification as being requisite. Maybe I will hear  
7 differently from Mr. Coomer or Dr. Coomer -- excuse me. And  
8 Dr. Coomer is welcome to address at this point where things  
9 stand.

10 DR. COOMER: Good morning, Your Honor. This is  
11 Dr. Coomer. Yeah. So I'll try to describe the process again.

12 So we identified this change. And it was our feeling  
13 that it was de minimis. But we do not make that determination  
14 ourselves as a company.

15 So the way the EAC process works is we submit that  
16 change to an accredited laboratory, in this case Pro V&V. They  
17 analyze the change. They look at the code. And they determine  
18 whether it is de minimis or not.

19 If it is de minimis, then they do whatever testing  
20 they need to do to prove the nature of the change and verify  
21 it. And then they label it a de minimis change. They write a  
22 report. And at that point, it is just submitted to the EAC as  
23 what is called an ECO, an engineering change order.

24 So there is no new EAC certification effort. It is  
25 simply updating the current certification for this ECO. And

1 that is what we --

2 THE COURT: I'm sorry. ECO? I'm sorry.

3 DR. COOMER: ECO, engineering change order. And this  
4 is a software ECO. And that is how the process works.

5 So once Pro V&V has the final report, we will submit  
6 that to the EAC, Election Assistance Commission, certification  
7 as an ECO, engineering change order, for the current  
8 EAC-certified system, the 5.5-A.

9 THE COURT: So the November 15 clarification --  
10 notice of clarification from the EAC that indicates that a  
11 proposed de minimis change may not be implemented as such until  
12 it has been approved in writing by the EAC, that is  
13 meaningless? That is Provision 3.4.3.

14 DR. COOMER: I have got to be honest. We might be a  
15 little bit out of my bounds of understanding of the exact rules  
16 and regs there.

17 THE COURT: And Mr. Maguire, as counsel for you -- it  
18 looks like he is present.

19 MR. MAGUIRE: Yes. That's correct, Your Honor.

20 THE COURT: Is that said at all?

21 MR. MAGUIRE: I'm sorry. I'm unprepared to address  
22 it, Your Honor.

23 THE COURT: All right. That is fine. I didn't ask  
24 you to be prepared. I just wanted to -- in case you wanted to,  
25 I wanted to give you that opportunity.

1 MR. CROSS: Your Honor, if it is helpful to you,  
2 Mr. Skoglund -- this is an area of expertise for him.

3 Your Honor has hit the nail on the head, which what  
4 Dr. Coomer's explanation left off was once that EAC paperwork  
5 goes in you still have to wait for approval from the EAC. The  
6 EAC has to agree that it is a de minimis change and that it can  
7 operate under the existing certification.

8 If they disagree, then you have got to get a new  
9 certification. But until that is approved, you do not have EAC  
10 approval to proceed. And Mr. Skoglund can explain that in more  
11 detail. So right now they would be proceeding without EAC  
12 approval. That is where we stand. That should be undisputed.

13 THE COURT: Maybe that is what they have determined  
14 they must do. But I'll let Mr. Skoglund briefly discuss it. I  
15 mean, I think it is sort of evident.

16 But, Mr. Skoglund, can we -- thank you.

17 MR. RUSSO: Your Honor, one quick point. O.C.G.A.  
18 21-2-300(a)(3) is clear that the equipment has to be  
19 EAC-certified prior to purchase, lease, or acquisition. The  
20 ongoing EAC certification that is now being raised, that is not  
21 in the statute. But Mr. Skoglund can go ahead and explain the  
22 rest of the process.

23 THE COURT: All right. And I'll get back to you,  
24 Mr. Russo.

25 MR. SKOGLUND: So I would just agree with what has

1 been represented already. That is correct. You void your  
2 certification if you don't have written approval before making  
3 this change.

4 So the correct process is to go to the VSTL, then go  
5 to the EAC, have them review it. They are the ones who make  
6 the determination of de minimis based on the recommendation of  
7 the VSTL. But it is really up to them to decide that. And  
8 then they are the ones who bless it as being part of the  
9 certification.

10 THE COURT: Either Mr. Russo or Dr. Coomer, is there  
11 any -- has there been any type of contact at this point with  
12 the EAC to say you are in emergency circumstances?

13 DR. COOMER: This is Dr. Coomer. I don't -- I don't  
14 believe so. But we were waiting for that final report from Pro  
15 V&V. And then that would be immediately submitted to the EAC.

16 MR. RUSSO: That's right. The Pro V&V report --

17 THE COURT: I'm sorry. Who is speaking right now?

18 MR. RUSSO: Vincent Russo.

19 THE COURT: All right. I'm sorry. We've got a lot  
20 of people here.

21 MR. RUSSO: No problem. The Pro V&V report or Pro  
22 V&V has indicated it is a de minimis change. So as  
23 Mr. Skoglund mentioned, the EAC will take that report and that  
24 recommendation and proceed from there.

25 But, again, we will file that report with you. And

1 Dominion will move forward with its piece in reliance on that  
2 report.

3 MR. MILLER: Your Honor, I do also just want to point  
4 out briefly that, you know, EAC certification is not  
5 necessarily across the board. There are other states that  
6 don't have EAC-certified systems. Of course, we're still  
7 seeking to -- Dominion is still seeking to obtain the  
8 certification. But I did just want to point that out for the  
9 Court as well.

10 THE COURT: This is a -- obviously, it is a provision  
11 the EAC has because it is -- no matter whether you call it de  
12 minimis or not, it always obviously raises issues when you  
13 change a piece of software and then you have to redo  
14 everything.

15 You are obviously all doing testing, and I am glad  
16 that you are doing the testing. But the fact that you could be  
17 in a place that doesn't require anything is one thing. But,  
18 you know, we are using a statewide system. So it has larger  
19 repercussions when you have a statewide system also.

20 All right. And so the software -- the new software  
21 is supposed to be distributed today. And what is the schedule  
22 from -- since you have said you are going forward even without  
23 the EAC approval or without seeing the actual testing  
24 documentation, what is your next plan? What is going to happen  
25 next?

1 MR. MILLER: Your Honor, it was distributed  
2 yesterday, I think, with the dropoff. And which also I do want  
3 to briefly mention, you know, we sent an email about the  
4 confidentiality of the dropoff process.

5 At this point, that is no longer confidential. It  
6 was the prior to -- you know, it is a schedule of secure  
7 transfer of files that was filed on the public docket. And so  
8 that is the issue. I did just want to make sure we don't have  
9 a loose thread there.

10 But in terms of the process next, the counties will  
11 begin engaging in that logic and accuracy testing that was put  
12 on pause after the last issue was discovered. And so we  
13 started that. The counties will also verify the hash value on  
14 the software that was given to them, which has already been  
15 verified by Pro V&V, the hash outside of the system at the  
16 Center for Election Systems, and additionally a hash again  
17 outside of the BMD system before those software was copied to  
18 the drives that were sent to the counties in sealed  
19 envelopes -- sealed, numbered envelopes via the post-certified  
20 investigators connected with the Secretary of State's office  
21 who met their county liaisons at Georgia State Patrol posts.  
22 That was --

23 THE COURT: What was verified at the Georgia State  
24 post?

25 MR. MILLER: That was where the transfer occurred.

1 So when the software was received -- you know, Pro V&V  
2 conducted their verification and validation, provided the  
3 trusted build hash to the Secretary's office. The Secretary's  
4 office then compared that trusted build hash to the hash of the  
5 actual software they had received outside of the BMD system.

6 You have heard here before the concept that the BMD  
7 can trick you into saying that the hash is verified. But,  
8 again, this is wholly outside of the system such that that  
9 is -- that is a separate issue entirely.

10 After that delivery to the counties, the counties  
11 will also verify the hash and will then conduct their logic and  
12 accuracy testing.

13 THE COURT: All right. All I was asking was when you  
14 said something was verified when they picked it up at the  
15 Georgia State Patrol.

16 That was just the sealing -- the seal of the  
17 envelope?

18 MR. MILLER: Your Honor, yes. So the envelope was  
19 sealed by -- right, was sealed by the Center for Election  
20 Systems. And then the investigators of the Secretary's office  
21 met county superintendents at Georgia State Patrol posts.

22 THE COURT: Okay. That's fine. Have you in any way  
23 expanded the scope of your logic and accuracy testing in light  
24 of these circumstances?

25 MR. MILLER: Your Honor, so I think -- I guess I

1 would separate it out briefly in that the Center for Election  
2 Systems conducted their own sort of modified logic and accuracy  
3 testing, which I referred to earlier as logic and accuracy  
4 testing within CES, on BMDs that they themselves had that have  
5 never been used in elections to verify that -- first of all,  
6 that that same issue was not recurring but also to continue the  
7 logic and accuracy testing such that -- to confirm that there  
8 were no ancillary issues brought in to do so.

9           At the time it is sent to the counties, the counties  
10 will then conduct their logic and accuracy testing, which now  
11 also includes before inserting anything into the BMD verifying  
12 that hash number, verifying it is the correct software. That  
13 is kind of the initial step, which I believe -- I don't have  
14 the letter in front of me. But we laid out kind of that first  
15 couple of steps of the logic and accuracy testing.

16           THE COURT: All right. But you haven't decided at  
17 this juncture -- to your knowledge that there have been no  
18 change in the logic and accuracy testing protocols or just  
19 going from one electoral race to the next in the machines so  
20 that you don't do the entire ballot on every -- on a larger  
21 number of machines in each of the counties?

22           And that is the process you-all described, one race  
23 for one and then round-robin.

24           MR. MILLER: And I'm not sure I can speak to any of  
25 the -- any detailed adjustments. What I will say is the

1 testing that was done within CES included five different ballot  
2 styles that were chosen from Dekalb County being a county that  
3 would have large ballot styles -- basically, you know, a number  
4 of races, number of different types of ballots on there. And  
5 then they were conducted on those different styles and also  
6 conducted on the four different machines and printing out  
7 basically hundreds of ballots to confirm the testing.

8 THE COURT: Well, as far as you know, there has been  
9 no -- no one has considered trying to test a larger range of  
10 the ballot -- the full ballot in a larger range of machines as  
11 testified to in -- at the hearing and which was the protocol  
12 that Mr. Harvey indicated was the protocol in his testimony?  
13 Is that right?

14 MR. MILLER: Your Honor, as I understand it, the full  
15 ballot is tested on all of the machines.

16 THE COURT: That wasn't his testimony. The testimony  
17 was -- is that one race -- you picked a race. You went to the  
18 next machine, and it would do the next race. And then you  
19 would -- if you exhaust the race, which in Georgia you probably  
20 wouldn't exhaust the race, you would start with the next one --  
21 if you had 12 machines, you did the 12 first races. Then you  
22 would go back to Number 1 machine, and you would go -- and it  
23 would do the 13th race. Then it would go to Number 2 machine,  
24 and it would do the 14th race.

25 That is what I'm getting at. So that, really, you

1 have a fraction of the machines that are actually doing the  
2 race at issue. But it might screw up other races. So that is  
3 really what I'm trying to get at.

4 But it doesn't sound like there have been any change  
5 in the process, in any event, from what you know.

6 MR. MILLER: Your Honor, I would defer to the  
7 testimony and the written instructions on logic and accuracy  
8 testing. But yes. To answer your question, I couldn't comment  
9 as to any sort of very specific minutia within that.

10 THE COURT: All right. I'm really not asking you to  
11 testify yourself as to it.

12 As far as you know, no one has indicated to you that  
13 they changed any of the --

14 MR. RUSSO: That's correct, Your Honor. As far as we  
15 know, the process is the same as Mr. Harvey has discussed  
16 previously.

17 THE COURT: That's all I'm trying to get at.

18 MR. RUSSO: You know, with respect to printing the  
19 ballots and each race that we discussed at the hearing, that  
20 hasn't changed. The only change is with the logic and accuracy  
21 testing are to ensure that the hash value -- check the hash  
22 value of the new software and the version on the front end.

23 THE COURT: And does Dr. Coomer know what was -- what  
24 type of testing was done on the software at PV&V?

25 DR. COOMER: Your Honor, I'm not sure of the complete

1 test plan that they completed. Again, Pro V&V themselves  
2 determine what test plan is necessary based on their analysis  
3 of the code itself.

4 THE COURT: They didn't tell you?

5 DR. COOMER: I don't have the details. I would  
6 just -- I could probably get that. But I don't have the  
7 details.

8 THE COURT: When did they complete it?

9 DR. COOMER: I believe they completed that either  
10 late Monday or Tuesday.

11 THE COURT: Do you know who was performing the  
12 testing there?

13 DR. COOMER: The individual employees' names, no, I  
14 do not.

15 THE COURT: I mean, is there a head of the unit that  
16 deals with security or not at this point? Because we had very  
17 vague testimony of that at the hearing.

18 DR. COOMER: I don't know the makeup of Pro V&V's  
19 employees.

20 THE COURT: And do you have a backup plan in case, in  
21 fact, there are issues that are arising in connection with  
22 this? I mean, you are hoping for the best. You are thinking  
23 the best will occur. But what -- if there are issues again,  
24 what is the plan?

25 DR. COOMER: We'll work with our -- we'll work with

1 our partners at the State to do whatever is necessary.

2 MR. RUSSO: Your Honor, this issue, as you recall,  
3 came up as a result of this U.S. Senate special election having  
4 too long of a -- too many candidates and the Secretary of State  
5 not wanting to have any candidates claim that they were  
6 unfairly treated by being on the second page because surely  
7 someone would say that by being on the second page they lost  
8 votes.

9 We are not aware of any other issues with the BMDs  
10 that would change, you know, the processes going forward. I  
11 mean, Mr. Barnes conducted logic and accuracy -- his logic and  
12 accuracy testing -- his acceptance testing I should say -- on  
13 the machines.

14 The machines will go through acceptance testing. If  
15 anything new is discovered in that process, we'll, of course,  
16 have to address that. But we have no reason to believe at this  
17 juncture there is anything new since this issue with the  
18 ballot -- the number of candidates being on one screen has been  
19 resolved.

20 THE COURT: Dr. Coomer, did you get an opportunity to  
21 read Dr. Halderman's affidavit that was filed that if it really  
22 was just simply only the first time ran on a machine why  
23 wouldn't it have been adequate essentially to address this by  
24 just basically running it the first time?

25 DR. COOMER: Well, so there is a

1 mischaracterization -- I'm not sure where that came from. So I  
2 did not have a chance to --

3 THE COURT: Uh-oh. Everyone put themselves on mute,  
4 and we'll try to --

5 DR. COOMER: So I didn't read -- I didn't have time  
6 to read the entire declaration. But I will say that -- and not  
7 to disparage Dr. Halderman whatsoever. But he is making  
8 assumptions when he does not have an understanding of the  
9 actual issue.

10 If I had time and charts and I could work on a  
11 whiteboard, I could explain exactly what the issue is. But it  
12 is not that it happens the first time. I said that it only  
13 happens once -- can -- not that it always does -- but can  
14 happen only once during a voting cycle. And that is a power  
15 cycle of the machine. It is a rare occurrence that based on --  
16 not just the ballot layout but, you know, the sequence of how  
17 the voters have gone through the ballot.

18 There are essentially some indexes that are created  
19 by Android operating systems. And we have an index that we are  
20 referencing. And if there is a collision between those two,  
21 the issue happens. And it can only happen once because Android  
22 keeps incrementing these indexes.

23 So it can only collide once. And there is a very  
24 specific set of circumstances that leads to this collision.  
25 And it doesn't happen every time.

1           Our analysis showed us how to actually reproduce that  
2       deterministically. So I have seen some other things -- I'm not  
3       sure if it was in Dr. Halderman's declaration or not -- that we  
4       didn't understand the root cause of this and it was  
5       undetermined how and when this could happen. And those  
6       statements are not correct either.

7           So this is why we felt very confident in this change  
8       because it is very minimal. Instead of referencing this  
9       particular ID, we reference it now as what is called a tag.  
10      There is no collision possible between our tag and these  
11      Android IDs.

12           And then just to hit on this point, you know, asking  
13      what if something else happens, well, this version -- you know,  
14      the certified version that is being used in Georgia has been --  
15      has been used by millions of voters across the U.S.

16           This is the first time we have seen this issue. And,  
17      again, it is due to the unique layout to handle the special  
18      Senate contest with the two columns of candidates.

19           So I just wanted to sort of make that known. You are  
20      still on mute, Your Honor.

21           THE COURT: Can you explain to me what the -- to make  
22      sure I don't misunderstand what you mean by power cycle, is  
23      it -- basically it could happen every time that -- is it when  
24      you turn the power on and then the next time when you turn the  
25      power on?

1 DR. COOMER: Correct. Yeah. When you turn the power  
2 off and you turn it back on, Android starts those indexes back  
3 over.

4 THE COURT: All right. Then does it happen each time  
5 just in the beginning or any time in the cycle? That was the  
6 other part that was a little confusing to me because I had  
7 thought you indicated before or somebody had indicated it was  
8 right at the start of the cycle.

9 DR. COOMER: No, it is not right at the start.  
10 Again, it depends on a variety of factors. So, you know, it  
11 depends on the number of -- the number of display elements that  
12 are on the ballot itself and how the voters walk through.

13 So it could be -- it could be several voters. And,  
14 again, it doesn't happen all the time because you have to have  
15 this unique overlap, you know. And that is wholly dependent  
16 on, you know, the sort of behavior of the voters going through  
17 the ballot of whether they just happened to hit on this unique  
18 circumstance. But it is not -- it is not necessarily within,  
19 you know, X number of voters.

20 THE COURT: Okay. And it is not -- so if you -- it  
21 is not dependent on the fact that this is the first time  
22 you've -- it is not the first ballot in any event?

23 DR. COOMER: Correct.

24 THE COURT: It is not the voter who gets -- who is  
25 the first one in line who gets it necessarily?

1 DR. COOMER: Correct.

2 MR. CROSS: Your Honor, could I ask a quick  
3 clarifying question?

4 THE COURT: Yes.

5 MR. CROSS: I just want to make sure I understand.  
6 On Monday, Dr. Coomer said -- he said this happens only once  
7 for one voter during a complete machine cycle. That was where  
8 Dr. Halderman's understanding was coming from.

9 So is it right that it is not just once for one voter  
10 during a machine cycle? It could happen more than once?

11 DR. COOMER: No, not during the machine cycle. When  
12 I say machine cycle, I was referring to power cycle. So it can  
13 only happen once.

14 MR. CROSS: So then why is Dr. Halderman wrong? Why  
15 couldn't you just power it on?

16 DR. COOMER: Because once is not the same as first.

17 **(Unintelligible cross-talk)**

18 MR. RUSSO: We are here to answer your questions,  
19 frankly. Plaintiffs can go do discovery if they would like to.  
20 We are in discovery. So you can continue to answer for now.  
21 But I did want to raise that before we --

22 THE COURT: I think -- Mr. Russo, I appreciate that.  
23 But it was -- I certainly had the impression that Mr. Cross did  
24 too. So I'm very happy that Dr. Coomer is explaining it.

25 So if Mr. Cross had a misunderstanding too, then I

1 think he is entitled to try to --

2 MR. RUSSO: And that is fine. I just wanted to make  
3 sure before we got too far down this road that I raised this.

4 THE COURT: All right.

5 MR. CROSS: So, Dr. Coomer, all I was asking you: It  
6 will happen only once in a power cycle, but you don't know when  
7 it will happen, meaning you couldn't just do a single test  
8 ballot? You would have to do test ballots until it happened  
9 the one time and then you --

10 DR. COOMER: Right. And, again, to be clear, it  
11 doesn't always happen. Right? It is this unique way of going  
12 through the ballot. So you could -- you could say, oh, I'm  
13 going to wait until this happens and it never happens because  
14 you have passed those conditions.

15 MR. CROSS: Got it. Okay. Thank you. That is  
16 really helpful, Dr. Coomer.

17 DR. COOMER: Sure.

18 THE COURT: So -- and maybe one has to have  
19 Mr. Barnes here or someone else from the department present.  
20 So I'm just trying to understand how the logic and accuracy  
21 testing that is being performed at this juncture mirrors  
22 that -- those conditions since it is not necessarily the first  
23 time it has been done.

24 What were -- what are the instructions to make sure  
25 that it doesn't happen, partially because, you know, the point

1 really is the size -- the vote should be counted properly is  
2 you just don't -- it could -- there are repercussions if it  
3 does in terms of people getting confused at the polls and other  
4 sorts of problems that can happen there that it triggers -- the  
5 people are worried about their votes and one comes to a halt,  
6 et cetera.

7 MR. CROSS: Your Honor, could I ask one more  
8 question?

9 Dr. Coomer, you mentioned that you could do -- you  
10 figured out a way to do it deterministically, which means you  
11 could trigger it. Would that work to -- rather than doing new  
12 software, could the counties trigger it using this  
13 deterministic approach? Then you could trust it wouldn't  
14 happen again with the existing software. Would that be a fix?

15 DR. COOMER: I mean, that is -- theoretically, that  
16 is possible because it depends on, again, a lot of variables.  
17 So each -- you know, obviously each county and each machine  
18 has -- may have a different set of ballots on there.

19 So like -- so what we did is -- obviously, this was  
20 identified in two counties. And we know the ballot styles that  
21 they were testing in those counties. So we zeroed in on that  
22 and found a way using those two projects how to make it happen.

23 We would have to do that for every machine in every  
24 location because it is dependent on the ballots that are in  
25 that machine to then want to determine whether you could make

1 those IDs collide.

2 Does that -- does that clarify? That would be,  
3 again, theoretically possible. A nightmare. And then that  
4 whole process would have to be done every time the machine is  
5 turned on.

6 THE COURT: Let me start this way simply: You-all  
7 did some logic and accuracy testing yourself when you were  
8 trying to do the software modification?

9 DR. COOMER: Oh, extensive testing. Extensive.

10 THE COURT: All right. How did you modify -- how did  
11 you do it so that -- in light of these circumstances in terms  
12 of the protocol so that you would -- it would be at least  
13 randomly captured?

14 DR. COOMER: Right. So -- well, the first thing we  
15 did is obviously analyze the projects where it was -- where the  
16 issue arose. And that led us to figuring out what the root  
17 problem was.

18 Then our initial testing was we actually set up a  
19 quick project where -- knowing how the code behaved we knew  
20 exactly the steps to take within a few clicks to make this  
21 issue happen. Right? And so we set that up, verified on  
22 multiple machines that we could make it happen according to  
23 step A, B, C.

24 So then we applied the change and then redid those  
25 steps, verified that that issue no longer arose, and then we

1 took that back to, you know, the actual -- some of the actual  
2 real Georgia elections that would be tested and ran full  
3 regression tests over several days to verify that nothing else  
4 was impacted.

5 THE COURT: You ran full regression tests to  
6 determine what? I didn't hear the last part of your sentence.

7 DR. COOMER: That no other functionality was  
8 impacted.

9 THE COURT: So have you made any recommendation to  
10 the State regarding any additional measures that should be  
11 taken in order to test the functionality of both the fix as  
12 well as that it didn't impact anything else?

13 DR. COOMER: So I don't -- I don't know all of the  
14 information that was communicated to the State. But I believe  
15 we did -- again, as I mentioned, we had those two counties  
16 where we -- you know, where the issue was experienced. We know  
17 how to make it happen in those two counties. I believe we  
18 provided those steps to the State for verification. But,  
19 again, I'm not the one that is actually communicating the  
20 operational aspects directly with the State.

21 And then as far as the other functionality again, the  
22 pre-logic and accuracy testing process we feel is enough to  
23 verify that the system as a whole is still functioning as it  
24 should.

25 THE COURT: Let me just say that in your testimony

1 before this Court you indicated that you had not been aware  
2 that -- that the full ballot had been tested in each machine.

3 So I guess would it be wise to have more of the full  
4 ballot tested in every machine? I mean, for instance, among  
5 other things, this particular race?

6 DR. COOMER: I'm not sure -- I'm not sure I'm  
7 following. But, again, you know, the logic and accuracy  
8 testing that I'm aware of from the State I believe is adequate.

9 THE COURT: I don't want to get into a  
10 cross-examination with you myself about that. But you do  
11 understand that there is only a small fraction of the machines  
12 each that are tested for -- for instance, as to this particular  
13 race that are going to be out in the field?

14 DR. COOMER: Again, I don't -- I don't know every  
15 single detail of the L&A that they are doing.

16 THE COURT: All right. That is fine. Then we'll  
17 just -- we'll stop at that then.

18 Mr. Russo and Mr. Miller, is there anyone who is  
19 familiar with the -- what the instructions have been to the  
20 field with the State available just to talk for -- speak for a  
21 minute or two?

22 I know Dr. Coomer has to leave in four minutes. So  
23 before we do that, I want to make sure that there is not  
24 anything else that counsel wish for Dr. Coomer to address.

25 MR. BROWN: Your Honor, this is Bruce Brown. I have

1 one question for Dr. Coomer.

2 Our information is that the version of the software  
3 that was certified was .30 and the current version is .32.

4 What was .31, and what is .32? And have the  
5 incremental changes from the various versions been tested,  
6 certified, or approved?

7 MR. MILLER: Your Honor, we're just going to raise  
8 the same objection earlier as far as cross-examination of the  
9 witness right now.

10 THE COURT: Well, I think it is --

11 DR. COOMER: Version numbers change for a variety of  
12 reasons. I'm not even sure what that question is trying to get  
13 at.

14 THE COURT: Well, it is trying to understand if there  
15 have been software change or some other change between the  
16 5.5-A, I guess, .30 and 5.5-A.32, which this is. In other  
17 words, what happened -- do you know what was .31?

18 DR. COOMER: There is absolutely no other change than  
19 the one we supplied that we alluded to.

20 MR. BROWN: So why are there two version numbers?

21 DR. COOMER: There is not two version numbers. There  
22 are a variety of reasons why when you do a build a version  
23 number turns out the way it does.

24 I don't know what you are digging at. But I can tell  
25 you -- I can state as fact -- and I just did -- that the

1 only --

2 MR. MILLER: Your Honor --

3 DR. COOMER: -- between those two builds is this  
4 change that we submitted.

5 THE COURT: All right.

6 MR. BROWN: So there is not a version 31?

7 **(Unintelligible cross-talk)**

8 MR. MILLER: Your Honor, we just reraise the same  
9 objection. Dr. Coomer is here voluntarily right now. Dominion  
10 is not a party to this. He is trying to be helpful to the  
11 Court. And we are going down a path of cross-examination  
12 again.

13 MR. CROSS: Why are they scared to answer questions?

14 THE COURT: All right. No more commentary, let me  
15 just say. My understanding --

16 DR. COOMER: I'm not scared to answer your questions.

17 THE COURT: All right.

18 MR. CROSS: I wasn't talking to you, Dr. Coomer.

19 THE COURT: My understanding just from what  
20 Dr. Coomer said was very -- there were a lot of people  
21 speaking -- is that Dr. Coomer said that there was no separate  
22 change from the 5.5-A that has been made so that there is -- to  
23 the extent the other one had a .30, there was no .31 separate  
24 change.

25 DR. COOMER: That's correct.

1 THE COURT: Is that correct?

2 DR. COOMER: That's correct.

3 THE COURT: All right. Fine. Thank you. Is there  
4 anything else?

5 All right. Doctor, you are welcome to stay as long  
6 as you want to stay. But I understood that you had a hard  
7 deadline.

8 DR. COOMER: Yeah. I do have a hard stop, and I do  
9 appreciate that.

10 THE COURT: All right. Thank you very much.

11 MR. CROSS: Thank you, Dr. Coomer.

12 THE COURT: Is it Mr. Barnes who is giving directions  
13 to people in the field about the L&A testing at this point?

14 MR. RUSSO: I think Mr. Barnes would be the best  
15 person to try to answer your questions. He is involved with  
16 the development of logic and accuracy testing.

17 THE COURT: All right. Is he --

18 MR. RUSSO: We're going to -- if you can give us one  
19 minute here to get in touch with him.

20 THE COURT: That is fine.

21 **(There was a brief pause in the proceedings.)**

22 THE COURT: Good afternoon, again, or good morning.  
23 Morning, Mr. Barnes, also.

24 I just -- we were discussing the circumstances around  
25 the software being distributed and subject to logic and

1 accuracy testing again. And I wanted to find out whether there  
2 were -- to your knowledge, whether there were any additional  
3 instructions about conducting logic and accuracy testing that  
4 was given to any -- all or any of the counties relative to the  
5 software.

6 MR. BARNES: The one additional instruction was for  
7 the counties to verify the new hash signature for the new  
8 version number of the ICX application.

9 THE COURT: And therefore am I to assume that there  
10 were no -- there was no other modification and in particular  
11 there was no expansion as to the number of the ICX machines  
12 that were going to be tested for purposes of looking at that  
13 race in particular or any other races?

14 MR. BARNES: Again, we did not give them another list  
15 of instructions to follow for their L&A testing. Part of their  
16 normal L&A testing is to check every vote position on every  
17 ballot as they go through the ballot style. And that is how  
18 the occurrence was found with the old version. So we were just  
19 going to have counties follow the same protocols with the new  
20 version.

21 THE COURT: Mr. Harvey had confirmed before though  
22 that the instructions were that you would run the ballot --  
23 let's say -- let's -- just consider that there were ten  
24 machines, let's say, that were being tested. That you would  
25 run race Number 1, which would presumably be the presidential

1 race, on Number 1 machine. Then you would run race Number 2 in  
2 priority on machine Number 2. And when you had finished the  
3 ten, then you would go back -- the 11th race would be tested  
4 again -- would be tested on the machine Number 1 again.

5 Is that something different than you know of?

6 MR. BARNES: No. What my understanding of the L&A  
7 procedure is is the ballot is loaded on to the L&A -- on to the  
8 test screen ballot. And then the first race of the ballot is  
9 displayed. And then on that race, they will mark each -- they  
10 will touch the first candidate, validate that the mark is  
11 there; proceed to the next race on the ballot; mark the  
12 candidate, make sure it is there; and proceed all the way  
13 through the ballot until they arrive to the summary screen.  
14 And they validate that they see those selections on the summary  
15 screen.

16 They then backtrack. Go back to the first race in  
17 the ballot, remove the mark from the first candidate, and then  
18 mark the second candidate in that race and proceed through the  
19 ballot again all the way through the summary screen.

20 And this is done to make sure that every vote  
21 position is responsive and that the system shows that summary  
22 selection at the end. They will produce one printed ballot  
23 through that exercise with at least one of those candidates per  
24 contest marked. But they won't produce a ballot for every  
25 instance, for every candidate in every race on every machine.

1 They will just produce one printed ballot at the end of that  
2 test of that particular BMD.

3 THE COURT: And have you looked at the instructions  
4 that were given in January via Mr. Harvey's office?

5 MR. BARNES: Yes, ma'am.

6 THE COURT: And that is what you think is consistent  
7 with what -- what you have described is consistent with the  
8 protocol described?

9 MR. BARNES: Yes, ma'am.

10 THE COURT: Well, let me walk through it again.  
11 Because that certainly was not my understanding from the  
12 testimony provided or from the observations that were provided  
13 by people at the -- observers at the polling.

14 So I'm not -- so you are saying basically the member  
15 of the staff who was testing it will go in and vote on the  
16 presidential race? And just walk me through it again so I can  
17 stop you now that I have heard the whole -- what you think is  
18 supposed to happen.

19 MR. BARNES: Okay. So we'll take it as a single  
20 race, single -- single ballot, single race. And we will say  
21 the presidential race, which has four candidate options.

22 On the testing, they would load the ballot, bring up  
23 the contest that shows the four -- the four contestants. They  
24 will mark the first contestant and then leave that screen and  
25 go to the summary screen to validate that that mark is showing.

1           They would then go back to the race itself, remove  
2     the mark, and then put a mark for the second candidate and then  
3     proceed back to the summary screen, confirm that that is  
4     showing. Go back again to the ballot, remove the mark, mark  
5     the third candidate in the race, proceed to the summary screen,  
6     confirm that is showing. And then go back to the race, remove  
7     the mark of the third candidate, put a mark for the fourth  
8     candidate, which is the write-in, type in some form of a name,  
9     proceed to the summary screen, verify again that that is  
10    showing.

11           Then they would backtrack, go back to the race  
12    itself, remove the mark, go to the summary screen, verify that  
13    that mark again is not showing. Then go back to the race. And  
14    now they are going to put a mark on the ballot so that they can  
15    produce a printed ballot from the machine.

16           And they may select the first candidate or second  
17    candidate or third candidate depending on what they are needing  
18    to produce for their test deck. So they may do the first  
19    candidate and then proceed back to the summary screen and then  
20    print the ballot.

21           THE COURT: So is the printed ballot the one with all  
22    of the choices?

23           MR. BARNES: The printed ballot will only have the  
24    one selection made at that last operation. The ballot can only  
25    have one mark for the race.

1 THE COURT: I don't -- because I don't know  
2 whether -- is anyone with you from -- are you able to receive  
3 an email if I send counsel the L&A procedure -- January  
4 procedure and they sent it to you at this point?

5 MR. BARNES: Yes, ma'am. I have access to email.

6 THE COURT: I don't want to be the person directly  
7 sending it to you. But -- all right. But if counsel doesn't  
8 have it directly offhand, Ms. Cole can send it to one of you  
9 right away so you can send it on.

10 Send it both to Mr. Miller and Mr. Russo.

11 LAW CLERK COLE: Okay. I can also send it to Harry,  
12 and he can share it on the screen.

13 THE COURT: Okay. Why don't we do both? Why don't  
14 we send it because it is harder for -- let's do both and give  
15 Mr. Barnes an opportunity to look at it. All right?

16 **(There was a brief pause in the proceedings.)**

17 MR. BARNES: I haven't received anything as of yet.

18 LAW CLERK COLE: Mr. Martin has it now if you want  
19 him to share his screen.

20 THE COURT: I want Mr. Barnes to be able to review it  
21 without having to see it on the screen first.

22 MR. RUSSO: My email might be running a little slow.  
23 So I emailed it. So it is just a matter of --

24 THE COURT: That is fine.

25 Ms. Cole, can you pull up Mr. Harvey's affidavit

1 also?

2 LAW CLERK COLE: Yes.

3 MR. RUSSO: Do you know what docket number that is?

4 THE COURT: Well, the affidavit?

5 MR. RUSSO: Yes, ma'am.

6 LAW CLERK COLE: My recollection is it is 834-3.

7 MR. RUSSO: Thank you. I was just trying to look  
8 through the transcript for that explanation. I was not finding  
9 it. I appreciate that.

10 MR. CROSS: Do you mind forwarding that document that  
11 Ms. Cole sent you so that I can pull it up too?

12 MR. RUSSO: Yes.

13 MR. CROSS: Thank you.

14 THE COURT: Does everyone have the procedure?

15 Mr. Barnes, you don't have it still?

16 MR. BARNES: No, Your Honor, I do not.

17 THE COURT: Mr. Russo, did you send it?

18 MR. RUSSO: I did. Let me try again.

19 THE COURT: Okay. Very good.

20 MR. MILLER: I think we both actually sent it.

21 THE COURT: All right.

22 **(There was a brief pause in the proceedings.)**

23 THE COURT: All right. Mr. Barnes, did you get it  
24 yet?

25 MR. BARNES: Yes, Your Honor. I just received it.

1 THE COURT: Very good. Let me give you an  
2 opportunity -- I'll give you the opportunity to read the  
3 portion that deals with the process for looking -- testing the  
4 polling place scanner, that one -- I'm sorry -- right above it,  
5 testing the BMD and printer.

6 And have you had an opportunity to look at that, that  
7 Section D?

8 MR. BARNES: Yes, ma'am. I'm reviewing that.

9 **(There was a brief pause in the proceedings.)**

10 MR. BARNES: Your Honor, I've read it.

11 THE COURT: Thank you very much. So my understanding  
12 both from Mr. Harvey's testimony on this particular procedure  
13 and what the witnesses to the L&A testing observed when they  
14 were able to observe this in a -- because it was public was  
15 that the description provided in the text under -- in  
16 connection with the word example was what was occurring, that  
17 there was not -- every race was not in a particular ballot --  
18 ballot machine -- every race that was listed on the ballot was  
19 not, in fact, tested on that one machine. That, in fact, it  
20 was -- you went from machine to machine as described under the  
21 word example.

22 MR. BARNES: My -- excuse me.

23 THE COURT: Yes. Go ahead.

24 MR. BARNES: My reading of the document outlines that  
25 the ballot style will be displayed on, we'll say, machine one

1 and that the process of creating the ballot that is going to be  
2 used for the test deck for machine one would be that the --  
3 that the operator would select the first candidate not for just  
4 one race but the first candidate in every race on that ballot,  
5 proceed through the whole ballot, and then at the end would  
6 then print that one ballot that had the first candidate  
7 selected.

8 So that the machine one would have ballot style one  
9 and then it would have the selection of the first candidate in  
10 every race selected and print it.

11 On the second machine, the ballot would be loaded.  
12 And then from that machine, the ballot that would be printed  
13 for the test deck would be the second candidate in each race.  
14 And then that ballot would be printed for the test deck.

15 And then they would go to machine three, load the  
16 ballot. And on this one, the ballot that would be produced for  
17 the test deck would be the third candidate in each race within  
18 that ballot and so forth and so on.

19 THE COURT: Well, that certainly is somewhat  
20 different than my understanding the testimony and evidence.  
21 And -- but I understand what you are saying.

22 What is the -- so just to summarize again is that you  
23 understood that if I -- whoever was Number 3 in each race would  
24 have been picked -- if you were on the third machine, you would  
25 have picked Number 3 -- the candidate in the third position for

1 every single race?

2 MR. BARNES: Yes, Your Honor.

3 THE COURT: And what if there wasn't a candidate?

4 MR. BARNES: If there is not a third -- if one race  
5 has four candidates but the second race only has two  
6 candidates, then you do not make a selection at all. You would  
7 skip. There is not a third option to choose. So you would  
8 leave that race blank.

9 THE COURT: Then you would continue down the ballot?

10 MR. BARNES: Yes, Your Honor.

11 THE COURT: I think this is sufficiently a material  
12 change in the way that perhaps it has been presented. I'm not  
13 saying anything -- that you are wrong in any way or -- but I  
14 just think that I would like to make sure there is nothing that  
15 the plaintiffs want to ask in light of that testimony.

16 And have you observed this yourself or not?

17 MR. BARNES: I have not been in the field to observe  
18 the L&A testing with the new system, Your Honor.

19 THE COURT: All right. So you haven't been in the  
20 field to observe their application of this procedure?

21 MR. BARNES: That's correct.

22 THE COURT: All right.

23 MR. RUSSO: Your Honor, I pulled up Mr. Harvey's  
24 declaration, and I'm looking at that. And he seems to indicate  
25 that all -- that testing the ballots -- a test deck where you

1 use every permutation would be overly burdensome and  
2 unnecessary, as the Coalition plaintiffs urge, in other words,  
3 to generate test ballots so that all candidates in all races  
4 within the unique style have received a single vote.

5 I think maybe that is where some confusion is coming  
6 into play. And I think Mr. Harvey was under the impression --  
7 and his declaration seems clear to me. But to the extent there  
8 is some confusion that maybe you thought every permutation on  
9 the ballot maybe had to run a test deck with every combination,  
10 is that -- and I'm just maybe trying to understand it also  
11 myself -- where the disconnect is here, frankly.

12 THE COURT: Mr. Skoglund was, I think, the  
13 Coalition's witness or -- is that right? Or was he Mr. Cross'  
14 witness?

15 MR. CROSS: Mr. Skoglund was a witness for the  
16 Coalition.

17 THE COURT: Okay.

18 MR. BROWN: I'm sorry, Your Honor.

19 THE COURT: So I'm assuming that you spent some more  
20 time -- particular time on this, Mr. Brown.

21 So are there any -- anything you want to point out or  
22 ask Mr. Barnes about?

23 MR. BROWN: Thank you, Your Honor. My question would  
24 be, sort of to cut to the chase -- and that is: On the logic  
25 and accuracy testing as described by Mr. Barnes, all of the way

1 through tabulation, there is only one ballot that is actually  
2 tested and that the other testing that Mr. Barnes described was  
3 testing the accuracy of the summary screen rather than the  
4 accuracy of the final output.

5 Is that correct, Mr. Barnes?

6 MR. BARNES: What I was describing was the generation  
7 of the test deck that has to be generated at the end of the L&A  
8 testing.

9 THE COURT: Wait a second. I think we should put  
10 ourselves on -- everyone but you on mute so that we make sure  
11 that we --

12 Go ahead.

13 MR. BARNES: Again, what I was describing was the  
14 generation of -- it is two parts. It is the L&A test to  
15 validate display of ballot operation of the touchscreen being  
16 receptive to touch and then the generation of the record from  
17 each device that is used to organize the test deck that is then  
18 scanned by the scanner.

19 So the tester wants to go through and look at each  
20 race on the ballot, make sure that all the candidates are  
21 displayed, make sure that all candidates are receptive to  
22 touch, and take that all the way to the end of the summary  
23 screen. And then they back out and continue that through all  
24 positions.

25 But when they have completed that, they have to

1 produce a record. But they are only required to produce one  
2 printed record from that BMD. And then they accomplish to get  
3 all positions voted and a vote registered by doing the machine  
4 one, the machine two, the machine three through the ballot  
5 style.

6 MR. BROWN: Thanks.

7 MR. CROSS: Your Honor, could I ask a follow-up  
8 question?

9 Mr. Barnes, did I understand you right so if you've  
10 got -- well, let's just take a concrete example. There is a  
11 Senate race this year that has, as we understand it, it sounds  
12 like 20 or so candidates.

13 So that means you would generate a test ballot that  
14 has -- you would generate a separate test ballot for each of  
15 those candidates on however many machines correspond. Right?

16 So let's say there are 20 candidates. You would  
17 generate 20 separate test ballots on 20 consecutive machines  
18 selecting each candidate in turn.

19 Do I have that right?

20 MR. BARNES: What you would do -- let's say that  
21 there are -- let's say that there are 20 machines. We'll make  
22 a balanced number. Let's say -- actually we'll say there are  
23 10 machines and there's 20 candidates.

24 Then you will start with machine one, check all the  
25 races, check all of the candidates, make sure they are

1 responsive. But when you are done with that machine, at the  
2 end of that machine, you would select the first candidate in  
3 that Senate race and produce a ballot printout.

4 Then you would go to the second machine. The second  
5 machine, again, you would check the full race, check all  
6 positions, check responses. But when you are done with that,  
7 you would produce one ballot from the second machine and that  
8 would have the second candidate.

9 And you would repeat that process through those ten  
10 machines. When you got to the 11th candidate, you would be  
11 returning back to machine Number 1. And on machine Number 1,  
12 you would now select -- again, you have already looked at all  
13 of the candidates again already. So on that machine, you are  
14 going to produce a second ballot. And that second ballot is  
15 going to have the 11th candidate selected.

16 And then you will continue to proceed in that manner  
17 until you have produced a record that -- a vote record that has  
18 every candidate in that race voted one time.

19 MR. CROSS: And if you have got -- if the other  
20 elections have fewer candidates -- right? So let's say you are  
21 at candidate 6 out of the 20 and all of the other races have  
22 fewer than 6 candidates, at that point forward, you would not  
23 have any candidates selected on those races for the test  
24 ballots?

25 MR. BARNES: That's correct.

1 MR. CROSS: So that would mean if we have got a race  
2 this year of, say, 20 or so candidates, you would have a pretty  
3 large number of test ballots coming out of machines that have  
4 no candidate selected for some of those races?

5 MR. BARNES: That would be correct.

6 MR. CROSS: Thank you.

7 THE COURT: Just state that again, what you were  
8 saying, Mr. Cross.

9 MR. CROSS: Because this year we've got a Senate race  
10 that has a large number of candidates -- it sounds like 20 or  
11 more -- and because once you get over -- say the next highest  
12 number of votes is -- I'm trying to think of the easiest way to  
13 say what I just said.

14 Once you get over the next highest number of -- say  
15 every other race had two -- only two selections. Right? Once  
16 you get to the race that has three or more candidates, you stop  
17 selecting any candidates in all of those other races. You  
18 don't go back and just select one that you have already  
19 selected.

20 So that means once you get to 3, 4, 5, 6, on up  
21 through 20-something candidates when you are testing it, all  
22 the other races on the ballot would have no selections on any  
23 of those test ballots for all of those machines. So you would  
24 be going machine to machine to machine.

25 THE COURT: You are only going by position number. I

1 see.

2 MR. CROSS: So with this particular year with a race  
3 with that many selections -- you are talking a pretty large  
4 number of BMDs that would have test ballots with only a single  
5 candidate selected, which then gets printed and tabulated.  
6 Those BMDs would not have test ballots for candidates for all  
7 but one race.

8 MR. RUSSO: I mean, there's always going to be  
9 elections where you only have maybe one person in a race. So,  
10 Mr. Barnes, that is what you would do, for example, if you had  
11 a county commission race also on the ballot and you've got one  
12 person in that race. Right. You would put that -- you could  
13 check that person off the first -- on the first test ballot.  
14 But going forward -- I mean, there is going to be other  
15 contested races, of course. You know, maybe you have a house  
16 race, a state house race with three candidates. So you have  
17 got to go through those three times. But the county commission  
18 race with only one candidate would only have -- be selected the  
19 first time through.

20 MR. BARNES: Correct. Correct. And if --

21 MR. RUSSO: We have had this happen in every  
22 election.

23 THE COURT: Well, I'm not sure that really helps  
24 because, of course, when you have only a single -- a single  
25 individual then they are in position one. So they are going to

1 be tested -- those races are all going to be counted as  
2 position one.

3 The problem here we have is position -- the fact that  
4 there might not be any others races that have Position 10 and  
5 so -- or Position 8. So that basically in the very race that  
6 sort of seemed to have -- on the ballot that had created a  
7 quirk, you are going to have the least amount of L&A testing --  
8 that's all -- in terms of output.

9 MR. CROSS: Well, yeah. I'm not sure that is quite  
10 right, Your Honor. Let me back up.

11 They will test every candidate in that Senate race.  
12 So that particular race that has a large number of  
13 candidates -- right? -- that will get tested.

14 What it means is that for all of those ballots  
15 beyond, say, the first three or four candidates, depending on  
16 what else you have there, there will be no L&A testing for any  
17 of those other races.

18 THE COURT: Right.

19 MR. RUSSO: Well, they are tested the first time. I  
20 mean, I think we are saying the same thing.

21 MR. CROSS: No. No, they are not. What Mr. Barnes  
22 is saying is there is no ballot that will be printed at all  
23 from those BMDs that gets printed and scanned and tabulated  
24 that has any candidate selected from any race other than the  
25 Senate race once you get beyond the max number of candidates in

1 those other races.

2 And given a lot of those races are only going to have  
3 maybe 2 or 3 candidates but we have got a race with 20 or more,  
4 you are talking about maybe 50 to 20 machines each time that  
5 are not having a single candidate tested to get printed and  
6 scanned and tabulated.

7 MR. RUSSO: I understand what you are saying. But  
8 you would have had -- that person who is -- you know, if it is  
9 a race of three people, you would have had a test ballot that  
10 would have had that person -- the third ballot would have been,  
11 you know, in this example that you gave a race of three people.

12 Now, when you get to person four -- Mr. Barnes can  
13 explain it. And if I'm wrong, I'm wrong. Mr. -- I'll let  
14 Mr. Barnes explain it.

15 MR. CROSS: Because once you get to selection --  
16 again, Mr. Barnes, I thought I -- let me just try my question  
17 again. I thought we had it straight.

18 Let's say the maximum number of candidates on a  
19 ballot was 4. That is the most you have in any race is 4,  
20 except for you have got the Senate race, let's say, that has 20  
21 candidates.

22 Are you with me?

23 MR. BARNES: Yes.

24 MR. CROSS: Once you get to selection five to test  
25 that, meaning printing a ballot and scanning it, in the Senate

1 race, you are going to do that and that ballot is not going to  
2 have any other candidate selected for the test ballot; right?

3 MR. BARNES: On that ballot style. But when there  
4 are multiple ballot styles within the polling location, once  
5 you complete ballot style one, you then have to do the same  
6 thing for the next unique ballot style within that -- within  
7 that polling location. So there is opportunity for more  
8 ballots to be generated with more selections.

9 MR. CROSS: Right. But most -- particularly on  
10 election day -- putting aside early voting, on election day,  
11 most of your ballots -- most of your polls are going to have a  
12 single ballot style; right? Otherwise, you are talking about a  
13 polling site that has multiple precincts.

14 MR. BARNES: There is -- every precinct in the state  
15 is different. Some only have one ballot style. Some have  
16 many. It is a potpourri out there.

17 MR. CROSS: But with my example, you would have --  
18 unless you are printing multiple ballot styles on that BMD, you  
19 are going to have selections -- you are going to have machines  
20 five through -- you are going to have 15 machines -- remaining  
21 5 to 20, you are going to have 15 machines for which your test  
22 ballot has only a single selected candidate just in that Senate  
23 race; right?

24 MR. BARNES: The ballot that is printed for the test  
25 deck, yes. But every position would have been looked at on

1 that ballot during the examination.

2 MR. CROSS: On the screen?

3 MR. BARNES: Correct.

4 MR. CROSS: And looking at the screen does not tell  
5 you what actually gets tabulated; right?

6 MR. BARNES: The screen is the interaction and the  
7 intent of the voter. The ballot is what will be the official  
8 record.

9 MR. CROSS: Right. So --

10 THE COURT: And the next step is, of course, the  
11 scanner tabulator?

12 MR. BARNES: Correct.

13 THE COURT: And you can't really test that just from  
14 looking at the screen?

15 MR. BARNES: Again, that is why we produce the record  
16 from the machine so that the scanner can also be used to  
17 validate that what is coming from the system is what the  
18 scanner then tabulates.

19 THE COURT: I think that the -- I mean, I'm not sure  
20 that what is happening in the field is what you are describing.  
21 But, you know, I'm just -- based on what the evidence is and  
22 the way that Mr. Harvey described it but -- and why he thought  
23 everything else was too burdensome.

24 But that is -- you know, I understand what you are  
25 saying at this juncture. I mean, I'm looking at my -- at a

1 sample ballot here. And -- and basically when we get down to  
2 number -- where we were actually thinking of four candidates,  
3 we get down to the fifth one, only one of the major leaders  
4 here who is in that first top four is Doug Collins.

5 So all the testing that would relate to other --  
6 identified at least by the polls leaders in this race are after  
7 Number 4. So testing of their -- any ballot, including them,  
8 would be -- it would be fewer. But that is if it is, in fact,  
9 the way it is indicated.

10 I'm just looking at Paragraph 6 of Mr. Harvey's  
11 affidavit and also testimony. And I can't really know at this  
12 point that what Mr. Barnes describes based on the testimony and  
13 the evidence presented is exactly what is happening.

14 But, Mr. Skoglund, did you get an opportunity to be  
15 present during any of the L&A testing? Remind me.

16 MR. SKOGLUND: No, Your Honor, I have not been  
17 present for any of it.

18 Can I offer a thought about this?

19 THE COURT: Yes.

20 MR. SKOGLUND: So I think that, as I testified  
21 before, you know, logic and accuracy testing depends on what  
22 questions you are asking. Right? And the quality of the  
23 question you ask depends on the quality of the test. So it  
24 really makes sense to think about what questions you are  
25 asking, what are you trying to find out.

1           And I think, you know, this is -- this is more logic  
2     and accuracy testing that some jurisdictions do. But I think  
3     that is not the standard. I think the question is: Does it  
4     meet Georgia statute, which I think is quite good and quite  
5     strong? I would go further, if it were me.

6           I think that the way I would do -- conduct a logic  
7     and accuracy test and the way I have seen other people do it is  
8     you create a spreadsheet essentially ahead of time with the  
9     test pattern for votes for what you plan to do. And in that,  
10    you try overvotes and undervotes and races where you vote for  
11    two and the audio ballot and trying it in Spanish language.  
12    And, you know, you try a variety of scenarios.

13           And then, you know, knowing that you have good  
14    coverage in that spreadsheet, then you go to the machine and  
15    ask each machine to accomplish that set of tests. That is  
16    closer to what I think the Georgia statute requires.

17           THE COURT: Well, I just would like to know what is  
18    actually going to be -- and whether everyone is going to be  
19    doing something different actually. That is my concern at this  
20    juncture but -- based on the evidence introduced.

21           But the other thing was simply because this was the  
22    -- the alleged tweak that involving this particular ballot one  
23    would really want to know it was -- all permutations of that.

24           It is hard for me to know without -- what I do know  
25    is what -- the issue that Mr. Cross elicited. And it might

1 behoove the State to consider whether to modify at least this  
2 in a way -- whatever the process is, if it is, in fact, like  
3 what Mr. Barnes describes as opposed to the inference that was  
4 given from the procedure as I identified and witnessed by  
5 others who were watching the L&A testing in the last election,  
6 it really behooves everyone to think about is there something  
7 you want to beef up under the circumstances since you have a  
8 software change particularly affecting that race.

9 I can't really say more at this juncture. I'm going  
10 to go back and look. But there's really some material  
11 differences between the way Mr. Barnes described it and the way  
12 it was otherwise described.

13 MR. MILLER: Your Honor, I don't have the transcript  
14 in front of me from the hearing, so I can't speak exactly of  
15 Mr. Harvey's testimony.

16 But as far as the declaration and as I recall the  
17 hearing, I think the concept was the concept that Mr. Barnes  
18 described of the difference between printed ballots versus the  
19 test on the screen. And so I don't think there is --

20 **(Unintelligible cross-talk)**

21 MR. MILLER: -- necessarily inconsistence there but  
22 different topics.

23 THE COURT: Yeah. I mean, there is no question that  
24 it was supposed to be getting at the difference as to whether  
25 there was a difference between the way it tabulated and the way

1 it printed and the ballot.

2 But it was -- but it was much more helter-skelter  
3 because -- as opposed to just testing one office per machine  
4 and sometimes more depending on how large the ballot was. So  
5 that -- I mean, that is exactly what -- not just through  
6 Mr. Harvey's testimony but through the affidavit of people who  
7 were witnessing it.

8 So, Mr. Harvey, are you -- is Mr. Harvey in charge of  
9 giving you instructions or -- I gather? Are his folks out in  
10 the field at all, or is it -- I'm not -- or is it your folks  
11 who are doing the L&A testing? I mean Mr. Barnes.

12 I mean, it is somebody from the county. But who is  
13 the technical adviser, if there is anyone?

14 MR. BARNES: Logic and accuracy testing is a county  
15 responsibility. So it is in the hands of the county.

16 THE COURT: And do they -- are they relying then on  
17 that 2000 -- January 2020 procedures manual in determining how  
18 to proceed?

19 MR. BARNES: To my understanding, yes, Your Honor.

20 THE COURT: And this is not something that you have  
21 given directions to anyone about in the field, I gather?

22 MR. BARNES: That would be correct.

23 THE COURT: And do you have any idea whatsoever why  
24 there was an impression that it was a database that is going to  
25 be distributed rather than software in the communication?

1 MR. BARNES: Your Honor, I do not know why they chose  
2 the word database for distribution. It was always that  
3 application install -- an application upgrade installation.

4 MR. MILLER: Your Honor, I believe we can speak to a  
5 little bit of clarity on that in that the form that you saw  
6 attached to the email that, I believe, Mr. Brown filed is a  
7 standard form that is used when databases are delivered to say,  
8 here is the schedule, here is where we're coming through.

9 And so that form didn't change because it was the  
10 same type of run. So it is the same type of thing that the  
11 counties are used to doing and that the investigators and  
12 liaisons sent out. And, you know, frankly, I think it may have  
13 been a bit of a misunderstanding amongst the county liaisons  
14 who were the direct contact as to what was being delivered but  
15 they knew something was being delivered on this schedule.

16 THE COURT: I would like to just take a short break  
17 so I can talk to Ms. Cole privately, and then -- then we'll  
18 resume.

19 MR. RUSSO: Your Honor, could we let Mr. Barnes go  
20 or --

21 THE COURT: Let him stay for just a minute. I won't  
22 keep him much more. Thank you.

23 **(A brief break was taken at 11:00 A.M.)**

24 THE COURT: Mr. Brown, Mr. Miller? Let me just say  
25 to counsel -- and I realize this is not Mr. Barnes' direct

1 responsibility. But he also described the process as he  
2 envisioned it at least and testified. So that has some value.

3 At the very least -- and I would say perhaps more  
4 than that -- the procedure that was identified on the January  
5 memo is susceptible to a very different interpretation or  
6 multiple interpretations.

7 And given the importance of the software -- the L&A  
8 testing, I can't tell you that you are mandated, but I think  
9 you would be really behooved -- it would strongly behoove the  
10 State in the interest of everyone involved here that there be  
11 clarification of what the process is.

12 You are using -- even though it has been identified  
13 as a de minimis change, even if it hadn't been a change, it  
14 would have been important for there to be -- in this first use  
15 statewide in a major election to have this strong L&A testing.

16 And even if it is construed the way Mr. Barnes says  
17 with the effect of it after you get to position four you are  
18 going to have fewer tests, you will still have a lot of tests.  
19 But, you know, it would have been -- it would be a better thing  
20 to have a different process for dealing with this wrinkle.

21 But even so, I don't think that -- from what the  
22 evidence was in the record that it is -- that the L&A testing  
23 is being pursued in the way that -- the more pristine manner  
24 described by Mr. Barnes. And maybe it is in some places, but  
25 in many places it is not.

1           So, you know, to the extent that, you know, it is  
2     still in process, which it definitely is -- it is just  
3     beginning -- I would really encourage the State to think about  
4     providing clearer directions, you know, thinking about  
5     having -- not just relying on a written one but having some  
6     sort of video conference to discuss it. And maybe you-all feel  
7     like it is not necessary and that is -- but I think the  
8     evidence might point to the contrary and --

9           MR. MILLER: Your Honor, I would want to say that,  
10    you know, the memorandum that Mr. Barnes drafted that was  
11    distributed by the elections director, that is not in a vacuum.  
12    They conduct monthly webinars. They send various instructions  
13    through Firefly. And those kind of things just haven't come  
14    into evidence in this case because it, frankly, wasn't at that  
15    point as much of a disputed issue.

16           We, frankly, thought we were talking about malware on  
17    ballot-marking devices. But suffice it to say, Your Honor,  
18    that there is a significant amount of additional kind of  
19    guidance and instructive material to the county superintendents  
20    throughout the election process through webinars and things of  
21    that nature.

22           THE COURT: Well --

23           MR. MILLER: And it touches on this and other issues.  
24    And, again, I could go into things that, frankly, are  
25    definitely not an issue in this case as to candidate

1 qualification challenges, things of that nature.

2 THE COURT: I think that this case deals with a  
3 variety of things that relate to the machine translating the  
4 vote cast by the citizen that walks into the booth or cast in a  
5 different way. So I'm just -- that is -- I'm just making these  
6 comments.

7 I encourage you because of the way the evidence came  
8 in and what it shows. I'm not saying -- I'm not in any way  
9 obviously in a position to say that you -- Mr. Miller, that the  
10 individual messages haven't gone out.

11 But the -- I still have the testimony in front of me.  
12 I have the January procedures, which are the official  
13 procedures from the Secretary of State about doing this --  
14 preparing for an election that were in front of me. And then I  
15 have voters as well as others who were on the board -- on the  
16 boards' affidavits. So that is what I'm relying on in just  
17 mentioning it to you. But, you know --

18 MR. MILLER: I understand, Your Honor. I'm not  
19 trying to add additional evidence now.

20 THE COURT: I'm talking about the long run here. My  
21 interest is not -- you know, even though it is described as I'm  
22 interfering, my interest is in seeing that the voting system  
23 works and the voters' votes are counted and that there are no  
24 screwups on elections that end up having you back in court.  
25 That is -- and to deal with the case in front of me and to deal

1 with it in an honest and straightforward way.

2 And I wouldn't be having this conference otherwise so  
3 I can really understand what is going on. And --

4 MR. MILLER: We understand.

5 THE COURT: So this is a change. So that is what I'm  
6 dealing with.

7 I still would -- as soon as you do have the --  
8 whatever the submission is from Pro V&V, I would like it to be  
9 submitted on the record so that we have it. And the same  
10 thing -- and what the submission is to the EAC.

11 And if there is any further clarification that is  
12 provided on L&A testing, I would like to be notified of that.  
13 Because right now I have -- I mean, this is exactly what I'm  
14 dealing with. I have to issue an order, and I don't want my  
15 order to be inaccurate in any respect factually.

16 You may contest the conclusions. But I don't want it  
17 to be inaccurate. And we have all worked really long enough to  
18 know that is a concern always.

19 All right. Now --

20 MR. MILLER: Yes, Your Honor. I apologize. And I do  
21 just to -- as we started off today, I do just want to reiterate  
22 that we are appreciative of that and your attention to this.  
23 And, frankly, the Secretary has the same goal of ensuring that  
24 the election can go forward in the most efficient and effective  
25 manner.

1 And, Your Honor, we are appreciative and will remain  
2 responsive to the Court's requests. But it is truly a -- you  
3 know, we are at crunch time. And our local election officials  
4 are trying to administer elections while they are performing  
5 inspections for the Coalition plaintiffs. Our State election  
6 officials are trying to help out. And in practical  
7 realities -- and I understand the Court did not intend -- and  
8 we did not intend to have a negative tone towards the Court.

9 THE COURT: All right. We'll look at -- when  
10 Ms. Welch gets her transcript out, I'll determine if there are  
11 any -- what portions of the video could be made available on  
12 the public docket.

13 I don't want to get myself in another problem with  
14 not having a hearing being in public that should be. And  
15 that's really again -- and there might be nothing here that is  
16 confidential.

17 But you are welcome to send me, just having  
18 participated in this, any of your position about this and about  
19 what portion should be in the public or if all of it can be in  
20 the public.

21 If you are going to do that, just simply so I can  
22 proceed on a timely basis, I would appreciate your letting me  
23 know -- let's see. It is 11:00 today. If you could let us  
24 know by 4:00.

25 MR. RUSSO: Your Honor, are we going to get a copy --

1 how do we go about doing that? Do we get a copy of the video?

2 I mean, I do think probably Dr. Coomer's testimony is  
3 something that may not need to be public. However, I just want  
4 to make sure we understand the process here. We review the  
5 video and send something to you or just --

6 THE COURT: Well, I think at this point I'm not sure  
7 we're going to be able to -- I have to find out from IT. If we  
8 have the video, we'll give it to you. And if not, you're going  
9 to have to just simply go by your recollection -- your joint  
10 recollection --

11 MR. RUSSO: Okay.

12 THE COURT: -- of counsel there.

13 MR. RUSSO: You say by 4:00 today?

14 THE COURT: By 4:00. But I'll let you -- we'll let  
15 you know right away whether we can get you a video.

16 MR. RUSSO: Okay. I didn't know how that -- I have  
17 never had a recording.

18 THE COURT: It is either yes or no that we can do it.  
19 All right.

20 MR. CROSS: Your Honor, could I ask just -- because  
21 it is something that may be breaking, we have heard a lot of  
22 new information today. Could we just have Dr. Halderman just  
23 briefly respond to a couple of points? Because it sounds like  
24 this is stuff you are considering for Your Honor's order.

25 THE COURT: All right. But I would like to release

1 Mr. Barnes so that he can go back to work, unless you have an  
2 objection.

3 MR. CROSS: No.

4 MR. BROWN: No objection.

5 THE COURT: All right. Mr. Barnes, you are -- you  
6 can go on with life.

7 MR. BARNES: Thank you, Your Honor.

8 THE COURT: All right. Thank you very much.

9 Go ahead.

10 MR. MILLER: Your Honor, before Dr. Halderman begins,  
11 because I don't want to interrupt, we just do want to state our  
12 objection on the record to the continued expansion of the  
13 evidence at issue.

14 THE COURT: Well, I think that to the extent that he  
15 has something useful that helps me understand what has been  
16 said, I think the plaintiffs have an opportunity to --

17 MR. RUSSO: It may be -- you know, to the extent that  
18 Dr. Coomer needs to listen to this -- and I don't know --

19 THE COURT: You can show -- you are welcome to try to  
20 reach Dr. Coomer. But it seemed like he had a conflict.

21 MR. RUSSO: I guess I could show him the video maybe.

22 THE COURT: Or you could get Ms. Welch --

23 MR. RUSSO: And he could respond to any --

24 THE COURT: You could see if you could get her to  
25 give you just his portion of the testimony.

1 MR. RUSSO: Okay. I just want to make sure we get to  
2 respond since there was a disputed issue earlier between the  
3 two.

4 THE COURT: Ms. Welch, are you able just to -- just  
5 produce Mr. Halderman's -- we don't know how long it is. But  
6 let's say it is 20 minutes. Are you able to do that -- turn  
7 that around fairly quickly?

8 COURT REPORTER: I can turn it all around very  
9 quickly, Judge. Whatever they ask of me, I do.

10 **(There was a brief pause in the proceedings.)**

11 THE COURT: All right. We'll get it to you one way  
12 or the other. Very good.

13 Can we unmute Dr. Halderman?

14 DR. HALDERMAN: Hello. Can you hear me, Your Honor?

15 THE COURT: Yes.

16 Mr. Cross, did you want to structure this and give  
17 him some questions?

18 MR. CROSS: Yeah. I mean, I think he's been  
19 listening.

20 Probably the easiest way is: Dr. Halderman, it  
21 sounds like there are a few points that you had to respond to.  
22 Go ahead.

23 DR. HALDERMAN: Yes, of course. And however I can be  
24 helpful to the Court in this manner.

25 First, just to respond to the point that Dr. Coomer

1 made about my suggestion in my most recent affidavit that  
2 procedural remedies could cure this problem, I think his  
3 response seems to indicate that the problem that we're  
4 attempting to or the State is attempting to fix here is a  
5 complex one, that it is possible to reproduce it but  
6 reproducing it reliably, he testified, requires operating with  
7 a simpler version of the ballot.

8 And that just gives me further concern about whether  
9 the software fix can be adequately tested given the time that  
10 is available.

11 Now, beyond that, I would like to reiterate the  
12 substance of the security concerns that I have. We have to be  
13 clear that even if the change to the source code is a small  
14 one, as Dominion says it is, the process of updating this  
15 software requires replacing completely the core of the Dominion  
16 software on every BMD.

17 We know that because the update instructions are to  
18 uninstall the APK, that is, the package that contains almost  
19 all of the Dominion software that runs on the ballot-marking  
20 device, and install a new APK, a new copy of all of that  
21 software.

22 So this is, frankly, quite alarming from a security  
23 perspective. Replacing the BMD software at this juncture so  
24 close to the election is an ideal opportunity for attackers who  
25 might want to infiltrate the machines.

1           If attackers have gained access to Dominion's  
2       systems, to Pro V&V's systems, to the CES systems, or to the  
3       county systems that are going to be creating and distributing  
4       this software change, that would be an opportunity for the  
5       attackers to subvert the software that runs on election day.  
6       And, frankly, none of the procedures I have heard described  
7       here today would be adequate to stop that.

8           So beyond the security questions, the change at this  
9       point seriously concerns me from an accuracy and correctness  
10      standpoint. As I said, the software change is fixing a problem  
11      that is complex to reproduce. It is difficult to test to  
12      ensure that the fix actually does correct that problem and  
13      that -- and it is virtually impossible at this last minute to  
14      thoroughly test that it doesn't create new problems.

15           So quite often last-minute changes to complex systems  
16      do create other unknown consequences. And while the previous  
17      version of the BMD software at least had been tested through  
18      use in elections, as Dr. Coomer testified millions of voters in  
19      aggregate, this new software has only existed for a matter of  
20      days.

21           I myself personally have spent more time testing the  
22      old version of the software than anyone has spent testing the  
23      new version of the software because it has only existed for  
24      such a short time.

25           Pro V&V hasn't even had an opportunity to write up

1 its findings. Those finding have not been reviewed by EAC,  
2 which has introduced this de minimis testing categorization for  
3 emergency fixes in small -- that are small in nature. But the  
4 State isn't even following that -- that special case process  
5 that has been put in place by EAC. It seems that that process  
6 itself is being circumvented. It just seems quite extreme  
7 in -- under these circumstances to forgo even that level of  
8 compliance.

9 I wanted to just briefly address the L&A procedures  
10 that we heard described. I think two key points about that are  
11 that the L&A testing we have heard about would be trivial for  
12 malware to detect and bypass. It has a very clear signature  
13 that the BMD can see, that ballots are being printed, that are  
14 being marked in the same position across every race.

15 It would be absolutely simple if you were programming  
16 malware for the BMDs to have it avoid cheating on ballots that  
17 are marked in the same position across each race.

18 So the security value of this L&A testing is minimal.  
19 And we have also heard -- and I think this point came out  
20 clearly for the first time today -- that the L&A testing isn't  
21 even checking to make sure that each BMD correctly produces a  
22 ballot for each -- for the entire set of candidates in every  
23 race.

24 You don't have to test necessarily every permutation  
25 of candidates in order to check that. But the least that I

1 would expect from an L&A procedure would be that it checks that  
2 each BMD can correctly mark a ballot for each candidate.

3 And as we have heard today, because of the length of  
4 the Senate race, many BMDs apparently will not even be tested  
5 to make sure that they can print a ballot that is marked for  
6 each candidate in the presidential race. And that concerns me  
7 because a particular BMD might have a corrupted somehow copy of  
8 the database -- of the programming that goes into it.

9 And the L&A procedures, as described, because they  
10 don't involve printing a ballot from each BMD that has been  
11 marked for every candidate, wouldn't be able to pick up that  
12 problem. You have to actually test that each candidate has  
13 been marked and can be tabulated correctly.

14 THE COURT: Wait a second.

15 DR. HALDERMAN: Apparently someone is sawing on the  
16 outside of my building, and I may have to quickly move to  
17 another room.

18 But I think I have addressed the points that I had in  
19 mind. But I'm very happy to answer any questions.

20 MR. CROSS: Dr. Halderman, just a couple of follow-up  
21 questions. And the Court may have questions or Mr. Russo.

22 In your experience looking at elections over the  
23 years, is there any election that comes to mind where a state  
24 was replacing the software with new software less than two  
25 weeks before the --

1 DR. HALDERMAN: No, nothing comes to mind. This  
2 is -- this is not a typical procedure to be going through. In  
3 an emergency, perhaps you would need to. But even then, it  
4 would be an extremely risky thing to be doing both from a  
5 correctness standpoint and from a security standpoint.

6 MR. CROSS: And just two final questions. Are there  
7 real world examples you have seen where a software change that  
8 even had been fully vetted and was intended to fix one discrete  
9 problem that that then had unintended consequences that were  
10 quite significant?

11 DR. HALDERMAN: Well, the most significant recent  
12 example, of course, is the 737 MAX aircraft where after most of  
13 the testing had been completed Boeing introduced what they  
14 believed was a relatively small design change to the control  
15 system that they didn't believe needed to be rigorously tested  
16 because it was the equivalent of de minimis.

17 But that unfortunately reportedly had fatal  
18 consequences and has been tied to crashes that have killed  
19 several hundred people. But I think that is an illustration.  
20 I think it is a good parallel because both the Georgia election  
21 system and the aircraft are examples of complex software  
22 systems.

23 Georgia's election system is millions of lines of  
24 source code that are in the Dominion products. And for that  
25 reason, small, even seemingly trivial changes can have

1 consequences that are difficult to understand.

2 It is just -- it is why we normally in the voting  
3 system testing and certification process demand such extended  
4 testing for accuracy. That kind of testing can't necessarily  
5 rule out security problems. But it does a lot to help ensure  
6 that votes are going to be counted correctly in the absence of  
7 an attacker.

8 And it is those processes that are being bypassed  
9 here and substituted with apparently less than a week of -- of  
10 very rapid-fire testing of some sort. Nothing like the testing  
11 that goes into a voting system in the course of a normal  
12 software change.

13 MR. CROSS: Last question, Dr. Halderman. You  
14 mentioned that the LAT, the logic and accuracy testing --

15 **(There was a brief pause in the proceedings.)**

16 MR. CROSS: Dr. Halderman, you said that there is a  
17 clear signature of testing under this L&A process. For  
18 example, the candidates are selected in the same position.

19 DR. HALDERMAN: Yes.

20 THE COURT: Does anyone have somebody speaking in the  
21 background?

22 **(There was a brief pause in the proceedings.)**

23 MR. CROSS: It seems like it got quieter. Is this  
24 better?

25 Okay. Let me try it again.

1 Dr. Halderman, the question was: You said that there  
2 is a clear signature for the machine to see that it is being  
3 tested during the logic and accuracy testing. One example, of  
4 course, is all the candidates are in the same position; right?  
5 They are all selected in Position 3.

6 Just to show the Court this is not a hypothetical  
7 concern, that the malware can trick the machine during testing,  
8 is there a real world example of where that has happened?

9 DR. HALDERMAN: Of where malware would -- of malware  
10 detecting such a thing?

11 MR. CROSS: Yes. Testing and then --

12 DR. HALDERMAN: Detecting testing. Well, of course,  
13 the prominent example of that is the BMW -- excuse me -- the  
14 Volkswagen emissions testing scandal, Dieselgate scandal, where  
15 Volkswagen programmed its emission systems to detect -- they  
16 were going through EPA testing and emit less pollutants under  
17 those circumstances.

18 So the parallel here is detect that the ballot has  
19 been marked in the same position across all races and in that  
20 case don't cheat; otherwise, cheat with some probability. That  
21 would be -- for malware running on a BMD, that would be  
22 absolutely a simple thing to program.

23 MR. CROSS: Thank you, Your Honor.

24 THE COURT: Let me just make sure I understand from  
25 your perspective what this meant in terms of the testing

1 that -- in terms of the printing of ballots. Any time -- any  
2 ballots -- let's say that there were -- because we were using  
3 the example previously of four, that there would not be ballots  
4 printed with -- that would reflect any other ballot choices as  
5 you -- as they -- for any of the -- any of the times where  
6 people had cast ballots for candidates five and onward.

7 DR. HALDERMAN: Yes, Your Honor. My understanding of  
8 the testimony we heard today is that one BMD would be used to  
9 print a ballot marked in the first position across every race,  
10 another the second position, another the third position, et  
11 cetera and that races that had fewer than that number of  
12 positions the race would just be left blank on the BMD that was  
13 being tested.

14 So each BMD produces one printout that is marked in  
15 one equivalent position across every race. And that, of  
16 course, has the problem that for a given BMD most of the  
17 possible positions that could be marked are not going to be  
18 exercised all the way through being printed and being  
19 tabulated.

20 So if a particular BMD has a database that is somehow  
21 corrupted and programmed differently from the other BMDs under  
22 testing, the problem would not be discovered.

23 THE COURT: All right. Anything else, Counsel?

24 MR. CROSS: Not for us, Your Honor. This is David  
25 Cross. If they want to ask questions, they are welcome to.

1 MR. RUSSO: Your Honor, I don't think we have any  
2 questions.

3 THE COURT: All right. Well, thank you-all very  
4 much.

5 MR. CROSS: Your Honor, I'm sorry. There was one  
6 final thing that we wanted to clear up if we could. Mr. Brown  
7 sent an email in this morning. I don't know if you saw it.

8 THE COURT: No, I did not.

9 MR. CROSS: We're just trying to confirm -- Mr. Tyson  
10 sent in an email indicating that there was a message that went  
11 out from Mr. Harvey clarifying that there were no new databases  
12 coming out as opposed to a software change. He indicated that  
13 message went to the counties on Tuesday. The copies that we  
14 have -- we have multiple copies from the counties -- indicated  
15 it went yesterday around the same time of Mr. Tyson's email.

16 Vincent or Carey, do you know when that actually went  
17 out to the counties?

18 MR. RUSSO: I mean, I believe that it is -- so we  
19 looked at it earlier -- what Bruce sent. Buzz is a webface.  
20 It is a web portal. So I think Mr. Harvey posted it on Buzz in  
21 accordance with what Mr. Tyson represented. And the email went  
22 out the following day due to however Buzz, the program,  
23 populates the email that automatically goes out.

24 MR. CROSS: Okay. Thank you.

25 That is all, Your Honor. Thank you.

1 THE COURT: All right. Thank you very much. And  
2 we'll be -- we'll be in touch. I mean, I'm trying to get an  
3 order out this week. So I appreciate everyone scurrying to get  
4 this in front of me.

5 MR. CROSS: Thank you, Your Honor.

6 MR. RUSSO: Thank you, Your Honor.

7 **(The proceedings were thereby concluded at**  
8 **11:32 A.M.)**

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## C E R T I F I C A T E

UNITED STATES OF AMERICA

NORTHERN DISTRICT OF GEORGIA

I, SHANNON R. WELCH, RMR, CRR, Official Court Reporter of the United States District Court, for the Northern District of Georgia, Atlanta Division, do hereby certify that the foregoing 76 pages constitute a true transcript of proceedings had before the said Court, held in the City of Atlanta, Georgia, in the matter therein stated.

In testimony whereof, I hereunto set my hand on this, the 1st day of October, 2020.

*Shannon R. Welch*

SHANNON R. WELCH, RMR, CRR  
OFFICIAL COURT REPORTER  
UNITED STATES DISTRICT COURT

UNITED STATES DISTRICT COURT  
OFFICIAL CERTIFIED TRANSCRIPT