

Comments to the Board of Elections for the June 23, 2022 meeting

From William Towne

Greetings! I come before you today with concerns about your counsel+ chair's underhanded strategy for dismissing election concerns from the public and even members of your own Board.

At the June 6, 2022 meeting, in front of a packed public audience, Chairman Fitzgerald attempted to dismiss concerns about the insufficient ballot printing that disenfranchised voters in the 2022 primary, especially in precincts where local Elections Boards were not knowledgeable or otherwise (e.g. due to time constraints) able to have people vote on the ExpressVote BMD. About half an hour into the meeting, Ms. Hallam moved for a resolution requiring that the Elections Division print enough Nov. 2022 ballots to cover all registered voters who had not requested a postal ballot by the time of ballot printing. Chairman Fitzgerald attempted to quash that by stating that the Board should wait for input from the Elections Division about what all would be involved doing so, and return to the question in a subsequent meeting, as would be happening in the next couple weeks for certification of the recount results and/or Republican County Committee write-in votes. Both Chairman Fitzgerald and Atty. Opsitnick (from whom this is a direct quote) were clear that **"Any meeting we have, it's never limited to one subject."**

Yet those subsequent meetings, to which the Division and Chairman wished to delay any discussion of this important topic, *were* strictly limited to one topic each, with the last meeting being introduced by Chairman Fitzgerald as "This meeting is strictly about the certification of the primary for the Republican primary for the US Senate." Public comments on other topics were generally disregarded, with even an in-person commenter asked to defer to submitting comments to a future meeting. The Board did ask staff to respond to written comments, but as with previous false promises to respond to comments, any suggestion that the Elections Division would actually respond to those comments was detached from the reality that they do not send such responses, even if commenters (including myself) continue patiently waiting for *years*. At the end of the meeting, Chairman Fitzgerald indicated that any other business should be deferred to a July meeting when the Elections Division will lay out plans for the November election (and when the Board will receive the report from the Elections Division promised at the post-primary meeting). That won't happen, according to the Board's published meeting schedule. The next Board of Elections meeting is listed as October 25. The County's practice of minimizing public notice of any other meetings, as demonstrated with the very short announcement regarding the certification of the Republican Primary for US Senate, minimizes opportunities for public presence and input, especially when the Board publishes that any input must be strictly limited to one topic. (For this meeting, that language says: "Anyone wishing to submit written comments, pertaining to the sole purpose of this meeting, should do so by 11:00 a.m. on Wednesday, June 22, to BOE@allegchenycounty.us.") Most of my comments today **do focus on the sole purpose of this meeting, specifically the fact that it is a sole purpose**, contrary to the statements at the post-primary meeting trying to dismiss real concerns until after it is too late to address them. Thank you very much to Ms. Hallam and Mr. DeMarco for standing up for voters against the Chair and Solicitor's prior attempt to dismiss concerns, seeing through lies about whether agendas and business at these subsequent meetings would be strictly limited or not and whether the Elections Division would honor its promise to present the information Chairman Fitzgerald requested.

It is concerning to see elections officials so willing to lie even about procedural matters, especially when that is done merely for the convenience of dismissing legitimate public concerns about the administration of elections. When repeatedly seeing false statements from the officials in charge of our elections, such as statements about things like:

- agenda-limiting policies or lack thereof
- when Board meetings will happen and why they can't happen more regularly/frequently/in advance of an election considered on-topic for that meeting
- whether comments will receive a response
- whether written comments will even be summarized at the meeting, or summarized accurately
- the process for selecting a partisan vendor
- the scope of a contract
- the nature of a relationship with a vendor and/or the vendor's qualifications/disqualifications
- the extent of a refund from a vendor after a serious, trust-eroding, & disenfranchising mess-up
- the extent to which the county cares about protecting ballot secrecy, & steps it takes or doesn't
- the existence of certain records, including simple things like procedural guides
- the existence of certain exceptional conditions which, if they actually existed, could support temporary and limited delays in transparency required under the law
- whether electors who sign up to be poll workers will be contacted in the event of a shortage
- whether additional ballots are actually on the way when a polling place has run out

it leads the electorate to legitimate questions about why more consequential assertions from the same officials, such as those describing election outcomes, should be believed. Others have noticed this too, but you aren't hearing pleas to change practices from most of them because they've also observed the futility of wasting time and effort in making generally-ignored public comments to the Board of Elections. Election officials and/or vendors who have the ability to affect those outcomes have and are sometimes very willing to proudly display partisan preference to some electoral outcomes over others. If dishonesty and secrecy are so deeply ingrained in the *modus operandi* of the County's Elections administration that lies about the above-listed sorts of things are commonplace and dishonesty is justified for dismissing annoyances, why should electoral outcomes not be altered to achieve higher-stakes preferred outcomes? If you continue to blow your credibility like this and continue demonstrating Board refusal to do anything about it, you will wake up one probably-November day to find you don't have enough credibility left to sustain the practices of democracy we have treasured for centuries.

The transparency-seeking suit noted in my recent public comments has been filed at GD-22-007739. You should not be requiring cost-raising Court orders before complying with elections transparency laws.

Finally, note that today is the last scheduled meeting before the November 2022 general election at which this Board could effectively pass a resolution requiring the Elections Division to ensure that ballots in the same municipality, ward, precinct, precinct split (if applicable), party (in a primary, not applicable to this fall), and method (e.g. mail-in vs. absentee) are not otherwise distinguishable before being marked by voters, & that no voter-specific markings shall be added to ballots by the County or any of its vendors, employees, or local elections boards at any time. By refusing to do so, you put the County at risk of having enough ballots to swing major races thrown out, and/or even having to repeat an election on very short notice. Please do not continue to ignore public comments or your duties to meaningfully oversee elections. Thank you for your work!

Allegheny County Elections Tabulation Center

Observation by Matthew Van Bibber on November 2, 2021

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Executive Summary

As many know there was a lot of speculation of fraud during the 2020 general election. As a concerned voter of Allegheny County, I contacted my representatives, one of which spoke with me personally, Rob Mercuri. During our conversations, we talked about how we could visit the Allegheny County Election Tabulation Center to see how it was setup. Earlier this year I also tried reaching out to Amie Downs and David Voye about visiting. I was unable to get a visit at that time. So, this election I reached out to [REDACTED], and he was able to contact [REDACTED] designated me as an authorized representative for [REDACTED] campaign and this allowed me to take a visit to the Allegheny County Election Tabulation Center. I will refer to Allegheny County Election Tabulation Center in this document as "tabulation center".

I arrived at the tabulation center parking area at about 6:52AM on November 2, 2021. I met one of the county workers in the parking lot and he showed me the way to the front where I entered through the media entrance. Upon entering they asked who I was, for my authorized letter and identification. I then was given a badge and walked through the metal detector, after which I was escorted to the observation area.

The observation area was located by the tabulation machines. As I started my observation, I did not realize there was a larger observation area in the other room where the ballots were being separated. Jerry, the county worker, told Andy, the lawyer, to let me know that there was another observation area. Andy, the lawyer, then took me to the other area and explained everything that was going on. This area is where the separation of the envelopes and ballots occurred during the day. I did end up asking if I was allowed to go between the observation areas and I was informed by people on site I was allowed to move between the two without being escorted. They also let me know where not to walk by the tabulation area.

At about 5:45PM in the day, I left the tabulation center to go vote. After I voted, I headed back to the tabulation center and was back on site around 6:56PM. I wanted to see the process of the USB drives being removed from the large tabulators but apparently that happened during the short time I was gone. I observed for a little longer, waiting to talk to IT personnel about the IT setup.

The last part of the day they were just waiting for the last mail drops and dealing with ballot/envelope issues. I observed that a white SUV in the docking area dropped off the last bit of mail, if recalled correctly it was unmarked. Also, during this time people were bringing back the bags for the polling places. The people bringing back the bags seemed to be known by the staff as they talked and thanked them. I ended up having to ask Amie Downs the last few IT questions I had before I left. I left the tabulation center at about 9:22PM.

I was the only observer for a while in the morning then later in the day, three or four other observers arrived who were [REDACTED] and another gentleman. When the other observers [REDACTED] arrived, I relayed to them some of what I observed and what I was told at that point by staff and others. [REDACTED] was very observant and [REDACTED] asked a lot of questions. [REDACTED] got a few people to explain what was going on, asking some of the staff how they were chosen to help out.

While there, I did ask several questions, and sometimes it was hard to get an answer on anything IT related. I was told I could talk to IT when they got there and I never got to; I was then told by a supervisor that was counting the 86 bad ballots, that she didn't think I was allowed and IT was not allowed to speak on the county's behalf. They then had Amie come over to try and answer my IT questions which she was NOT 100% sure of.

During my observation I did see good practices but also bad practices. In this document I have outlined some concerns that need to be addressed and also some improvements that can be made. I would like to collect some more information from the elections department, which I outlined in the questions section. Generally speaking, the experience to be allowed to observe the tabulation center was very informative.

Staff Evaluation

Observing the staff, they look to be friends and know each other. Most are having a good time while processing the envelopes. Some being goofy blowing canned air on each other by the cutting machines and others are "in the zone" wearing their ear buds and processing the ballot envelopes. They were just trying to enjoy their time the best they could while working.

Watching the envelopes and ballot separation, it looks like it is the staff's determination what to do with the envelopes and ballots. They would place the envelopes/ballots into a "good" pile or the issues box. If they were not sure what to do, they would ask an orange shirt supervisor. The first round I watched the processing of the envelopes, which were being checked for signature and date, then markings on inner envelopes. It appeared that the staff could adjust how they wanted to open the envelopes and do their own processing that worked best for them. This process was not really being watched closely. Supervisors were focused on going around collecting the good and bad envelopes.

Staff in orange shirts, marked supervisor, were very polite and helpful for the most part. They have at least three years' experience in the election process, help run the tabulation machines, enter data into the SURE system, and also collect good and bad envelopes/ballots at tables. Jerry Tyskiewicz was very polite and knowledgeable. He would walk over and let the observers know what was going on and what processes they were doing at times.

Staff was on shifts and clocked in and out at the table next to the tabulation machine observation area.

Another observer was asking who all the people were that were processing the envelopes/ballots. And from what I was hearing, the staff was chosen from different Allegheny County departments and were employees.

Tabulation Equipment

There are several machines and devices that are used in the envelope/ballot processing:

- **Blue Crest sorting machine** – Used to scan and sort into county areas, cut envelopes, find envelopes without barcodes, count envelopes
- **Cutting machines** – Can be used to cut and count envelopes, there are 3.

- **ES&S DS200** – Used at precincts to scan ballots producing two USB drives: one official and one unofficial, tabulation center demonstration and tabulation center counting; county has 1320 of these machines.
- **ES&S Express Vote** – Used to recreate damaged or unreadable ballots at tabulation center, demonstration and used at precincts; county has 1320 of these machines.
- **ES&S DS850** – This machine scans the ballots to a USB drive. There are ten machines.
- **Terminals with bar code readers** – Small thin client terminals for the SURE state system, Citrix based, used to check in the ballots for people to be able to look up online.
- **Wireless router** – Not sure of use, was on the tabulation machine side, may be used for area where workers could access content on the county laptops.
- **Laptops** – Wireless and were there if county workers need to do something for work.
- **Black locked boxes** – These are used in front of the observation area to process ballots that have issue. Ballots are placed in the boxes to keep ballot secrecy.
- **Large TV screens** – Used to display in three spots, in observation areas and media area. In the observation area it was displaying camera footage of each area where ballots were being processed.
- **Cameras ()** – , Pan/tilt/zoom and fixed cameras were used to capture the areas on both sides in tabulation area and envelope/ballot opening area. There were ~5 large screens displaying feeds from 12 cameras and labeled on screen. There were some older BNC/Composite cameras.
- **USB Drives** – Used in the tabulation machines like DS200, and I was told in the DS850s.

Envelopes/Ballot/Tabulation

When I arrived at the tabulation center, staff was taking the outer envelopes from the uncounted cage vault to the BlueCrest sorting machine. I was informed by staff that ahead of the 2nd these were already presorted into county areas, that way if they needed to find, say, a dead voter it would make it easier. The BlueCrest sorting machine looked to be checking barcodes and cutting the envelopes.

As the BlueCrest machine was processing, the mail trays were to its side of BlueCrest. Staff would take sorted envelopes and put them in a tray, roll it down, and four guys would move along the filled containers, placed on red carts, and take to another room. At 7:23am the vault was almost if not completely empty. At about this time the BlueCrest opener machine had about 11k envelopes run through with good %s on ballots with bar codes and at about 9:40am 90k ballots processed. The machine does do a count of each and a % that had issues, but Andy informed me that count will not be the total number of ballots as they may use the machine to also open the inner envelopes. There were also other smaller cutting machines being used that would invalidate this count. In my research, I found that the BlueCrest machine can process about 40k envelopes an hour.

Once sorted and cut they then take the envelopes to the other room to be checked for signature and date, and the inner envelope is removed. If there are issues such as naked ballot (a ballot without an inner secrecy envelope), ripped, damaged, inner secrecy envelope written on, it goes into the issue box. They do **NOT** check to see if the outer envelope signature matches the on-file signature for the voter, only checking to see that it is present.

The Supervisors would come around and look at the issue envelopes/ballots and determine if it can be placed in good pile or collected into another box and processed in a different way. I did see this happen with an inner envelope with markings and an opened one, both were approved for good pile. If everything looks good then they drop the outer envelope into a mail box on the floor and the inner goes to the good tray on table.

Supervisors would come around and empty the boxes on the floor with the outer envelopes, which they would dump in a huge box along the back wall. They are NOT stacked; they are just tossed in the huge box.

The good inner envelopes are taken over and placed on red a shelf by Supervisors. They are later removed from the red shelf and sent to tables on other side of room. In this area inner envelopes are double checked to make sure no individual or party is identified.

Inner envelopes are sent to the cutting machines and then sent back to the tables to be opened. If I recall correctly, one piece of blue painters tape is put down the center of the mail tray to indicate the inner envelope is cut. After the inner envelope and ballot are separated, the good ballots are put into mail tray and a X of blue painters tape is placed over them to indicate ballots are in the box and ready for processing. Once they have the blue X they go back to the other room to get tabulated/counted.

The supervisors on the other side take the ballots out of the mail trays and make sure creases are the same way, roll them around and bend them to try and make them as flat as possible. The ballots are then scanned on the DS850s. After scanning is done, the ballots are placed into a box and taped across the top with a strip of blue painter's tape. They are then placed on a cart and taken to the finished ballot cage area and locked up. Note: I was told there was an ES&S vendor, helping to run the machine but also doing counting, he was on the left side of the tabulators at that time.

The damaged ballots that were ripped or cut during the cutting process were taken in a box to a table in the tabulation area. Supervisors would take the ballots and tape them so they could be prepared to be sent through the large tabulator machines. They started the process a few tables back from observation where it was hard for us to see but then they came up to the front table to show us what they were doing and did the task in front of the observer area.

For the most part the main larger cage stayed locked. Someone misplaced the lock at one point and walked away looking for the lock, found the lock, and locked the cage.

There were 86 issue ballots that had over-spray where the voter-identifying bar code was put on the inner envelope. I did get to observe most of them being processed and some counted.

There were other envelopes that did not have bar codes but were manually entered into the system.

Envelopes/Ballots with Issues

I observed the processing of the 86 ballots that got barcode printed on the secrecy envelope. Jerry and a couple other supervisors brought the issues envelopes/ballots to a table in front of the observation area. They explained to us what they would use and do with the envelope/ballots so they could get counted if they were ok. They had all outer envelopes that did not have a barcode, not all had an inner envelope with a barcode.

The following steps were done to process ballots:

- Ran the secrecy envelopes through a cutter.
- They had two big black boxes for the secrecy envelopes to be placed in. One box for secrecy with barcodes and another for secrecy envelopes that did not have a barcode. The boxes were open to show they were initially empty.
- Staff put a lock on each box.
- Sorted them out into boxes by ones that did have a barcode and did not have a barcode on inner envelope.
- Took the good box away.
- Took the ones with barcodes and shook the box up.
- Envelopes removed from box
- Ballots removed with barcode/name on envelope facing down so they would not know who the voter was.
- Envelopes fed through the cutter.
- Removed ballots from the inner envelopes.

After the above steps were completed, it was time to scan/count the ballots. Staff had turned an ES&S DS200 facing us, which would be used to scan the ballots. I asked if it was zeroed out and Jerry said yes to me earlier in the process.

They started the scanning and approximately three ballots in they had a issue. I believe they tried to just cancel the two and start over, but then they got confused about if the machine was zeroed out so they decided they needed to zero out and reboot the scanner, forgot the password and locked the machine up and had to reboot again. [REDACTED] the contractor was over trying to get the password put in and finally got back into the machine. During that time, I noticed the time was around 1h off. I let [REDACTED] know and [REDACTED] fixed time, they finally got the machine zeroed out. The zero report took a long time to process because they were printing the receipt for the entire election. During this process I left to go vote and then came back.

When I got back, they were just finishing up scanning the last few ballots on the DS200. They then printed another receipt for the votes. While the receipt was doing printing, I turned around to look at the bigger tabulators and when I turned back around the machine was off and there was no USB drive in machine. I did not get to see who took the USB drive or the process that was followed to log it being taken, or where it went but I believe [REDACTED] took it. I really wanted to see that happen. It looked like there was only one USB drive that I could see when little door was open on the left side of machine where power/reset button was.

One thing to note during this process was the election password and override password was put into the machine in front of the observers. We could see what they were putting in but I turned my head so not to see it being fully put in. [REDACTED] asked questions about the password to [REDACTED] the contractor. [REDACTED] said the password is changed at each election and if I recall is the same password for everything. Also, they were running around at one point trying to remember the password and finally [REDACTED] come over and got password out of [REDACTED] email.

Information Technology

Not too long after I arrived at the tabulation center, I started inspecting the IT side of the operation. There were a few things I noticed right off and collected information throughout the day as I could. It was a challenge to find out answers to some simple questions as to what I saw. There were harder questions I asked as well, which again were hard to get answered. Staff would not let me talk to IT at the end of the day and had me ask Amie IT questions.

While on site, one of the first things I noticed was a Cisco wireless router/device by the tabulation observation area. It was about 10ft from ES&S ExpressVote and DS200 tabulators; the ten DS850s were on the other side of room from this wireless access point. The wireless access point was not connected to the switch close to it, but had its own [REDACTED] cable running up a pole going elsewhere. At a later time in the day, I asked Andy, the lawyer, about it and he got a little offended. He didn't seem to know IT stuff and claimed there are not internet connections to the machines. He did admit he didn't know all the IT stuff and would need to ask IT about it.

There was an older switch plugged into a [REDACTED] network cord that ran to the pole. There were IP phones connected through [REDACTED] patch cords and SURE terminals connected through [REDACTED] patch cords to this switch.

The terminals were very small and open with no protection to prevent plugging something into them. They each looked to have an old-school barcode scanner. These terminals were running what looked to be [REDACTED]. I was told these are connected to the state SURE system used to track voters, ballots, and status. There were 12 of these terminals. So, the SURE connection and IP phones were run off the same switch.

Jerry let us know there is an issue with the SURE system now that is caused by the new mail-in standard. They have to make sure to choose provisional vs. absentee category or the system will not record the record properly. They have to use a sorter to sort those out into sets to be scanned in in each mode into SURE system so they get counted. To me it looks like PA was not ready to handle mail-in's and this was an oversight in the SURE system.

There were five gray laptops in the SURE area. I found out at the end of the day, from Amie that they were supposedly on the county network and used by staff if needed for work. I keep asking if they were wireless because I did not see any network wires connected to them. Again it was hard to get info on the IT side of things.

While in the observation area I put my focus on the ESS DS850 large tabulators for a little bit. They were faced away from the observer's area and only one could be seen from the front on a video screen. It was hard to see what was going on during the scanning process. I was told by a last year observer, they were turned so observers could see them from the front. Each machine looked to have a laser printer, battery backup, and dot matrix printer on its cart. There appeared to be no network cables and none connected to them. I believe there were ten machines, two on the left of the aisle and rest on right of aisle. I did not see any tamper seals, such as on doors, on these machines. I did ask Andy about it and he did not understand and/or believe it was an issue. If I recall the conversation correctly, I was told they ran a zero report on them. In the tabulation observation we were given ten sets of zero reports for the DS850 machines, 615 pages each. They apparently print off the 0 reports the day before, 11am-

12pm ish. One thing I noticed on a report set of the 615 pages, was apparently when printed it uses the same time stamp for each page.

While on site I was trying to find out how totals are reported. In the past I found some documentation but it was not clear and you had to read between the lines. So, I asked about the totals and how they are processed on election day. Again, it was hard to get the information from Andy, but I picked up bits and pieces through the day and then talked to Amie about it at the end of the day when I was leaving. Amie did know the process it seemed and she said it so fast I only caught some of the process. I would like to get this in writing.

Here is what I gathered on the total reporting. The voting polling place bags are taken to one of seven locations (not sure if tabulation center is 7 or 8) and uploaded. My understanding is that when taken to a location, staff open the bags and separate the contents out. One USB is used to upload unofficial results at the location to the tabulation center over a VPN while the other USB is physically sent to the tabulation center. Then at a later time David Voye and team compare USBs and receipt print outs to make sure they all match, offsite. Example: From the North Park area, precinct poll workers take stuff to the North Park ice skating rink and staff upload from there over a VPN (which runs over the internet). There is some documentation on this on the county website if you look hard.

https://www.alleghenycounty.us/uploadedFiles/Allegheny_Home/Dept-Content/Elections/Docs/ESS%20RESPONSE%20to%20Vendor%20Questions.pdf

Contractors have full access to voting machines from what I saw. There is one passcode used for entire election and there is an override password. [REDACTED] the contractor made it sound like there is only one master password for the entire Allegheny County election and the password only changes at each election. (Update: There are additional passwords in the systems for other functions, but a common shared password to run the elections.)

When logging into the DS200 there is no way to tell who is logging in. It does not determine if you're a contractor, election worker or other staff, it's not logged on the machine, and was not logged on paper. I watched this happen on the machine for the 86 ballots whose secrecy envelopes had over spray that were to be counted. A passcode was needed on boot at the OS level but not at the hardware level. Two password prompts were used on the DS200, one for boot and one for override, during this count. The reset/power button and a USB were in same door under lock and key in back top left of scanner. In this case, the machine looked to have only one USB drive. We were told that these machines should each have two USB drives in them one for official and other for unofficial count. I was told the machines have to have their time manually adjusted if it's off. This happened to the machine that the 86 issues ballots were scanned on. I am the one that pointed it out to [REDACTED] and [REDACTED] corrected it.

It sounds like USB drives can be reused after a certain period of time. I would like the county to provide more information on USB drive reuse.

Contractors are allowed to scan, print receipts, put in passcodes, and make system setting changes to machines such as time etc.

The ExpressVote machines were used to recreate damaged/issue ballots.

The contractor had election password(s) in [REDACTED] email. Other observers [REDACTED] may have more information.

I could not see inside the tabulation server room where the actual USBs were taken to be uploaded from the tabulator machines. I didn't get to see this process happen on election night where the USBs were removed from the DS850s and DS200 and uploaded.

I checked for network wires and as far as I could tell there were none connected to any of the ES&S Express vote, ES&S DS200 and ES&S DS850 equipment. There were just power cords, no computer networking and all were standalone as far as I could tell.

Physical Building Security

During the time at tabulation center here are some of the things I saw about physical security.

Allegheny police were present along with hired guards and other police outside dressed in uniform. The police on the outside were guarding the dock entrance. The media entrance is where I entered into the building and there were guards at the check-in. By the tabulation area there was another entrance that looked to be for employees. There were metal detectors and some type of guard/police presence.

I walked up the steps inside to the check-in area where I showed my paperwork and ID, and they gave me a lanyard badge to identify me. It didn't have my party, name, or who I was representing on the badge. The guard had me walk through the metal detector. I then was escorted to the observation area. I did not realize there were two observation areas. We were allowed to walk between the observation areas without an escort. We were allowed to stop by the media table that was between the observation areas.

Camera systems were mostly hung high to where they could not be reached [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED] They had some higher end cameras that looked to do a 360 view and PTZ and a few standard cameras in the tabulation area. In the large room they had a few standard IP cameras, and one PTZ camera on the far end.

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

Staff was not overly worried about observers and others because it seemed like a lot of people knew each other. At the end of the day one of the people bringing bags of voting stuff back got lost and they were like hey such and such we are over here like they knew them. It seemed like if you wanted to you could move around pretty easy at certain times. At certain times it felt like it was more of a relaxed environment. This could be good and bad. The police were walking around keeping an eye on things but I am not sure if the police really knew who was who.

Information Technology Security Concerns

Contractors have the passcode and override passcodes for the entire election.

Contractors and or other staff have the passcodes and override codes in their email. (I observed the contractor accessing the information this way while on site)

Who else has access to these passwords and are they in people's emails and written down on paper unsecured? Is one password shared with many people?

Having only one election code/passcode for the entire election is a concern. (We were told this by the contractor)

I observed the password being put into the DS200 while other observers were watching. I turned my head on password entry so I did not see it completely put in. They kind of were standing in front of the machine but you could still see the screen if you really wanted to. When passwords are being put in they should be turned away from unauthorized parties and cameras.

Observers are not allowed to observe the USB drives being plugged into the tabulation system and uploaded. This needs to be a transparent process and viewable by observers. Observers need to be able to make sure IT is uploading all drives and doing so properly. Observers are allowed to know about and see the complete process of the paper side but not the complete side on IT. There is a great example during this election how this could have helped. There is now a statement on the election web site about how all drives were not dealt with correctly and uploaded. Observers could have counted the drives as they were coming in and being uploaded, and the issue may have been found quicker and questioned.

There needs to be more public high-level documentation on the IT setup. The bad guys will always find a way to get to stuff. You can't hide behind not telling the public about your IT process and this could be a red flag. Are your systems really secure then?

The zero reports are printed the day before, this should be done on the same day, because the machines could be tampered with between the time reports are printed and the machines are used.

The zero reports for the DS850s, on all 615 pages have the same time stamp, and were printed the day before. One could argue there are cameras but this only works well IF you know to look at the footage.

The DS850s do not have tamper tags on them, so if you are printing out the zero report the day before say 11/1 at noonish, like they did this time around, you have opportunity for machines to have changes done overnight. So, are the machines really zeroed out? I can understand doing this to try and save time from a slow laser printer that takes a long time to print, but there are concerns here.

When the 86 issue ballots were uploaded, were there two USB drives and how did the totals get uploaded to the unofficial system if there was only one USB drive?

The machines have to have their time manually adjusted if it's off/incorrect. This could be set to make whatever time someone wanted on a reprint of a receipt.

After reading the below document on what happened to the machines and USB drives in this election, one could question if issues like this could be used to make modifications to the ballots and counts.

[Latest News 11.05.21.pdf \(alleghenycounty.us\)](https://www.alleghenycounty.us/uploadedFiles/Allegheny_Home/Dept_Content/Elections/Docs/Latest%20News%2011.05.21.pdf)
https://www.alleghenycounty.us/uploadedFiles/Allegheny_Home/Dept_Content/Elections/Docs/Latest%20News%2011.05.21.pdf

"After all materials from the 1,323 precincts were turned in at the regional reporting centers on Election night, there were 30 precincts that were not reporting. This is due to a variety of reasons including flash drives being left in the scanners, errors in reading one of the drives, or the drives simply being missed on Election night. As of today, the results from all but five (5) of those precincts have been added to the results page. The remaining flash drives are locked inside of the sealed scanners that are being picked up from polling places and returned to the elections warehouse. Pick-ups will span into next week and as that equipment is returned to the polling place, the flash drives will be removed from the machines and the returns added to the results page. Please note that all results remain unofficial until the Board of Elections certifies the results, and all results are audited through the Return Board process."

Envelope/Ballot Concerns

Not having outer envelope signatures compared is a concern because this could introduce fraud as any signature could be placed on an envelope. However, staff would need to be trained in handwriting analysis, as signatures do change from time of an initial registration. If staff made an incorrect mismatch judgment, this could disenfranchise voters. Even if someone is in the SURE system with a barcode, barcodes are not always on the envelopes and have to be entered into the SURE system manually.

Outer envelopes being tossed in a huge box and not neatly placed in an order for later use/audits.

Tamper tape is not placed on the ballot boxes that are complete, just expensive blue painter's tape. Anyone could easily remove and put back the tape. This could be a chain of custody issue and if there was ever an audit, how would an auditor know if the box was tampered with or not or if a ballot was replaced with another. One argument could be that we have it in a locked cage, or use security cameras or guards, but ballot security should not count on those alone.

Improvements

Get the staff some nicer chairs to sit in, at least in the ballot recreation and SURE area. They spent a good while in the ballot recreation area.

Cameras were high resolution and even though monitors were large, it was still hard to see details from observation areas.

The collection of outer envelopes needs attention. The current process is to collect them in bins scattered and then dumped into huge cardboard boxes. So, I see a couple issues with this process. If one would need to find an outer envelope it would take a long time to find it. If there were an audit it would take longer to process these because they are not stacked neatly or sorted.

I didn't get to see the DS850 process where USB(s) were removed and taken to the tabulation office on the other side of the observation area. We did not get to see the results uploaded to the unofficial or official system. This process should be seen and staff should let observers know when it will be and is happening.

If true, explain to the public the machines that are at the polling places are not connected to the internet and use two USB drives, one for unofficial and other for official totals.

Explain which machine are connected to the VPN to do the unofficial or official uploads.

Explain which devices are connected to the internet, even if it is through a VPN because a VPN DOES go across the internet.

Explain what actually connects back to the tabulation center to upload results.

Explain on the tabulation center side, what is on the other side of the VPN and what the firewall does or does not have access to, Election Management System server etc.

Have a few more staff at the end to help recreate ballots, because it took quite a while to recreate them. There were about eight people recreating them. It looks like write-ins slow down the process. There should be a written procedure that staff can follow for recreation of the ballots.

During the end of the day about 4 to 5k ballots came in and there should have been a few more staff to help process them to get it done quicker.

IT transparency: processes need to be documented and provided to the observers, every other process is somewhat transparent, but not IT.

Ballot boxes should be sealed with tamper-evident tape and not blue painter's tape.

There should be some type of outer envelope point signature check system. A suggestion may be to look into how other states/county's, such as Maricopa County, AZ, do their signature verifications. The system should allow voters to be notified if there is an issue.

The SURE system needs to be updated to handle the ballots correctly if PA is keeping the new standard of having mail-ins. Staff has to make sure to choose the proper type such as mail-in, provisional, absentee category and take extra steps to use a sorter to make sure ballots are recorded correctly.

If it doesn't already, the SURE system should have a place to store signatures so they can be compared at the time of barcode scans for outer envelopes.

When logging into the DS200 there needs to be an audit trail of the person using the machine and logging in.

Stream the observation cameras to a public video CDN for online observation. Other states are now doing this and it is very nice and transparent for voters to see what is going on with their vote.

Separate passwords and identification on machines. It should be logged on paper or machine who had access to machines and were using the machines, as part of tracking the chain of custody.

There should be an observation area on the far end in the larger room where envelopes and ballots are being processed by staff. It was hard to see for observers but also does not give staff the presence that they are being watched.

Cameras are not directly over the tables, they are behind/in between, so if there was an issue it may not be captured in detail or at that angle. Add a few cameras in areas to capture more of the details in the rooms.

There should be two parties observing the recreation of ballots at the tabulation center. There is one person per machine. As an observer it's hard to see this process even as close as we were because print on ballots is so small.

When passwords are being put into machines they should be turned away from unauthorized parties and cameras within any of the locations, including tabulation center.

As nice as it was to be able to move around there may need to be a little more control on people walking around, on election day.

Lawyers for the county should be more open and/or when they say they will find out information, do it. I was told by Andy when IT got there, we could ask them questions but that didn't really happen. I was able to talk to an IT contractor about a few things.

Questions

- USB Drives
 - Are two USB drives used in the DS850? **No there is only one USB drive per DS850. This USB drive is used in both the official and un-official Electionware clients. Then this drive is reused.**
 - Can contractors transport USB drives?
 - Can ES&S transport USB drives?
 - Are contractors allowed to remove USB drives from election machines? **Yes**
 - Are contractors allowed to remove official USB drives from election machines? **Yes**
 - Can ES&S remove official USB drives from election machines? **Yes**
 - Are ES&S employees allowed to remove USB drives from election machines? **Yes**
 - Is there a written document on how USB drives are processed and their chain of custody/logging?
 - On election night and after, are there two parties watching the election workers upload and plug in the official USB drives? **No, this is not allowed to be viewed by observers or parties.**
 - Are official and unofficial USB drives plugged into the same machine when they are verified and uploaded? **Official and Unofficial drives are only plugged into their corresponding system. They are labeled to indicate what system they should be plugged into.**
- Official Count/Election Certification Day
 - When David Voye and a few others take the USB drives and compare them, where do they do this? **The Election Office?**
 - Why are the USB drives and receipts taken offsite and not completed at the tabulation center instead?
 - Are there two observing parties?
 - Are the official and unofficial drives compared at certification? **USB drives are not compared. The tabulator reports/printouts are compared to the official system.**
 - If USB drives are compared, are they placed in the same machine or is there an official and unofficial machine they are separately plugged into to compare?
 - Is there a written document on how the certification process is done?
- Ballots/Envelopes
 - Are contractors allowed to scan official ballots? **Yes**
 - Are ES&S employees allowed to scan official ballots? **Yes**

- There was an inner ballot envelope that was not sealed and open, is that allowed to be counted?
- Are ballots moved off site after election for storage? If so, at what point in the retention period are they moved and to what location(s)? **All ballots remain onsite and are not removed. Once certified, they are moved from the locked ballot cage and will be placed in long term storage at the tabulation center. Once the retention period is met, a destruction truck will be brought on site and records will be destroyed.**
- Passwords
 - Are contractors allowed to log in and out of systems with passcodes on the tabulators for staff? **Yes**
 - Are contractors allowed to log in and out of systems with passcodes on the tabulators to make machine configuration changes such as time settings and etc.? **Yes**
 - Are ES&S employees allowed to login and out of systems with passcodes on the tabulators?
 - When logging in to the machines with password fail or success, on the DS200's, do we keep paper written or digital logs? If digital, are the failed and success logins printed on the end of day report?
 - When logging in to the machines with password fail or success, on the DS850's, do we keep paper written or digital logs? If digital, are the failed and success logins printed on the end of day report?
 - Are the DS200s protected against incorrect password attempts? **If an incorrect password is put in to many times the machine will lock and need to be rebooted before more attempts.**
 - What passwords are sent/provided to the polling places to bring the DS200's online? **Election password only**
 - How are polling places' passwords sent through email and/or paper? **On paper but the Judge of elections pick them up, in a pouch, on the weekend before the election.**
 - Is the password at the polling locations the same for all of the DS200 machines? If no, how many are the same vs not the same across the polling locations? **Yes, all passwords are the same across the machines.**
 - Devices of the Allegheny County staff that have passwords for the election in their email? **The election department does not have a policy of storing passwords in their email and passwords should NOT be stored in email.**
- Risk Assessments
 - Has Allegheny County perform(ed) a risk assessment on the following and last date if so?
 - ES&S vendor
 - ES&S equipment
 - [REDACTED] the contractor's email that [REDACTED] stores election passwords on
 - Devices [REDACTED] the contractor has email on
- Election Day Machine Support
 - Can ES&S/Contractor/Allegheny County IT provide remote support to the DS200's at the polling locations? If so, what are ALL support options? **Onsite or phone support only, no remote-control software support, no modem or internet connections. PA is not**

allowed to have remote connections to the machines. Election staff, not ES&S or Contractors, will be on standby to go to the locations as needed, if broken tabulator will need to be replaced with a spare.

- Was ES&S on site helping with machines on Nov. 2nd 2021? **Yes**
- Who were the contractors on site on Nov 2nd 2021?
- Who were the ES&S employees on site on Nov 2nd 2021?
- Who is the contractor [REDACTED], who does [REDACTED] work for and contracted by? Sub contract? [REDACTED]
- Are contractors allowed to run official O reports? **Yes**
- Are ES&S employees allowed to run official O reports? **Yes**
- When the 86 inner envelope issue ballots were scanned on the DS200 was there an official and unofficial USB drive removed?
- Election day drop off seven locations
 - Are there observers at locations?
 - What machines are used to upload the unofficial totals? **A laptop**
- Machine night USB drives not returned
 - Which USB drives were left in the machines: unofficial, official, or both?
 - Was a paper recount done?
 - Was there a chain of custody broken?
 - https://www.alleghenycounty.us/uploadedFiles/Allegheny_Home/Dept-Content/Elections/Docs/Latest%20News%2011.05.21.pdf

“After all materials from the 1,323 precincts were turned in at the regional reporting centers on Election night, there were 30 precincts that were not reporting. This is due to a variety of reasons including flash drives being left in the scanners, errors in reading one of the drives, or the drives simply being missed on Election night. As of today, the results from all but five (5) of those precincts have been added to the results page. The remaining flash drives are locked inside of the sealed scanners that are being picked up from polling places and returned to the elections warehouse. Pick-ups will span into next week and as that equipment is returned to the polling place, the flash drives will be removed from the machines and the returns added to the results page. Please note that all results remain unofficial until the Board of Elections certifies the results, and all results are audited through the Return Board process.”
- Where are the tamper evident seals located on the DS850's? **The DS850s do not have tamper seals. There are lockable doors on the ports. The USBs on the printers could be unplugged and another device plugged in in its place.**
- What is the county's disaster recovery plan?

Requests

I would like to be provided the footage of the DS200 and the 86 issues (barcode on inner envelope) ballots so we can see what happened to the USB drive(s) and when it was shut down. Were there two drives removed from this machine for official and unofficial? I recall only seeing one USB drive.

When the 86 issues ballots (barcode on inner envelope) were uploaded, where there two USB drives and how did the totals get uploaded to the unofficial system if there was only one USB drive?

I would like to see video footage of the USB drives and where they were taken when removed from the DS850 tabulators. Were there two drives removed?

Which polling location USB drives were left in the machines unofficial or official? Please list the machines and what USB drives that were left in them. And the supporting chain of custody that shows how they were and were not handled correctly, with supporting USB Drive serial numbers.

https://www.alleghenycounty.us/uploadedFiles/Allegheny_Home/Dept_Content/Elections/Docs/Latest%20News%2011.05.21.pdf

Allegheny Elections Tabulation Center

Observation by Matthew Van Bibber on March 7, 2022

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Executive Summary

This observation report will cover the Logic and Accuracy (L and A) testing process that is used for elections in Allegheny County. I was contacted by one of the election board members, Sam DeMarco, to see if I would like to observe the L and A process. This L and A process was for the April 5, 2022 special election in the 19th and 24th district. I was provided documentation needed to be an observer and the place to observe, which was 8AM March 7, 2022 at the Allegheny County Tabulation center. The L and A in this case was for the digital central count ballot tabulating equipment, which covered DS850 ballot counters, DS200 ballot counters, Express Vote ballot marking devices and equipment for uploading tabulator counts to the Election Management System (EMS) client workstations for the tallies.

Going to this and other observations, I am seeing that with the new rules around mail-in ballots, it has increased the workload for our election staff, and causes delays in getting the numbers out quickly. Unfortunately, there are many steps, hours of preparation, and a large number of staff required to process mail-in ballots. The delays have and will cause questions and issues with our results now that large parts of society want the results on election night. This observation is a great tool to allow one to see the work that goes into preparing for an upcoming election, which the public does not get to see. Overall, the L and A observation was a very good experience but I do have some security concerns and I think there are a few improvements that could be made which will be outlined.

Key observations:

- Election staff were polite and very hard workers.
- Election staff would answer questions the best they could and would find out any unanswered questions from others if needed.
- There are a lot of tasks that are involved with just the L and A testing. It takes hours to complete, to make sure things are correct and the machines are working correctly and ready for the polling locations.
- More transparency on the IT side is desirable. As noted in my last observation and report, in November 2021, I was not provided very many details.
- This document gives a high level of the election system equipment and software layout.
- This document describes the basic network setup and layout for the EMS “air gapped” system.
- I did not observe the SURE system, ballot envelopes, BlueCrest machine, or cutter machines as part of this L and A process.

Staff Evaluation

When I first arrived, I was greeted by staff at the door and let into the tabulation center. While I was on site the staff members were very polite and walked me around to the different areas. When I would have questions, they would answer my questions, and if they were not sure they would ask someone that would usually know the answer. Watching and talking to staff, I have learned there is a lot of time, steps and detail that goes into setting up even small elections. They took their time and focused on their tasks to make sure that things were done correctly, correcting issues as they went along. Some of the staff spent

many hours walking up and down aisle of machines, testing and setting them up. When needed, they would explain what was going on in the part of the process they were working on.

Tabulation Equipment and Software

There are several machines and software that are used in the processes:

- **ES&S DS200** – Used at precincts to scan ballots. The County has 1320 of these machines. There are about 300 additional extras for backup as needed.
- **ES&S ExpressVote** – Used to mark ballots at precincts, the county has 1320 of these machines.
- **ES&S DS850** – For this election four of the ten were tested for use to tabulate mail-in ballots. These machines scan the ballots to a USB drive.
- **USB Drives** – Used in the tabulation machines like DS200, and I was told in the DS850s.
- **Electionware Client** – Client machines used to read the USB drives and tabulate the votes.
- **ScytI** – Where totals are uploaded for the counts on election night for public to see unofficial results.

Ballot/Tabulation

Not too long after I arrived, I went to observe the DS850 tabulators. They printed out the zero reports on the DS850s to show the observers that they were reporting correctly. The zero reports I reviewed looked correct. Staff did several different scans on these machines. They ran full ballot sheets and the smaller half sheets (ExpressVote cards) through the machines and did counts as if it was election day. They ran ballots filled with dots all over the page except for the candidate area. The reasoning was to show that when tabulated only candidate areas were looked at and none of the other areas, which would return in the system as a “blank” ballot with no votes. They did overvote as well. They ran hundreds of ballots through four of the DS850s to show that they were counting correctly.

When running ballots through the DS850s, they had to run the ballots through multiple times to get a few of the ballots to read correctly, because there were some stray markings that appeared to cause the issues.

On one of the half cards, printed on the thermal printer of an ExpressVote machine, had part of the barcode missing and the DS850 rejected the ballot. Staff went to look at the ExpressVote that the ballot was created on to see what needed done to correct the issue with its printer. I did not get a chance to see what was done to correct the printing issue.

On the DS200s, staff scanned about five or so large and a few half sheet (ExpressVote cards) ballots on each of the machines, with the ballot and candidates that would be used in the special election. One of the workers, if I recall correctly, ran the ballots different ways through one of the DS200s, to make sure scanning was working properly. The DS200s are programmed to allow the ballots to be read in different directions. Once the scanning was done, they would go back and close the poll on the machines.

After the poll is closed, the machines were shutdown. The yellow USB drive in back and the green USB drive in front were removed from the machines. The reason there are two USBs is because there is an official and unofficial count. The green gets copied to yellow as backup. Staff then took the USB drives, both yellow and green, to the tabulation room where the ES&S Electionware client software could tabulate the results and run reports.

In the tabulation room the USB drives are taken and inserted into the Electionware clients to tally the counts. The green USB drives are inserted into the official system and the yellow USB drives are inserted into the unofficial system. When removing the USB drives from the Electionware client machines, IT would put the drives back in the box flipped the opposite direction to indicate read completion. There were one or two USB drives that were not readable and they ended up either replacing or reformatting them to correct the issues. IT staff then did mock exports/reports of what the data would look like with the totals, and did a quick comparison/calculation to what they scanned on the DS200s.

On election night, the next step would be to export the tallied unofficial numbers to a onetime use USB drive, and then upload that data to Scytl. Again, the Allegheny County tabulation center does the tally on the Electionware system for our county and then sends out those tallies to Scytl. Scytl does not do our calculations. On election night the unofficial numbers are sent to Scytl, not official, as the election has NOT been certified at that point. The election has to go through a certification process for official numbers.

Once the tallies are completed at the L and A, on the Electionware clients, the yellow and green USB drives are taken and reinserted into the proper DS200, based on ID/label on the USB drives. The DS200s are then booted up and the USB drives are formatted and a report is printed. The machines are then powered down and the printing receipt paper checked/set for printing at the polling place. The staff used a checkoff sheet to mark which steps were completed for each machine.

Before the Logic and Accuracy testing started, I was not provided any paper work that would show what all the totals should look like at the end. I did ask about the totals at one point, but it was still foggy on what we would end up with at the end.

During the machine scanning of ballots and the handling of the USB drives, I did not see any chain of custody paper logs when going from person to person. I did see a worker put some USB drives in his pocket, I believe they just need a place to put them while they were doing their tasks. I did not stay for the last part, where they prepare the needed materials for polls, put the material in the locked DS200 machine cabinet, and then seal and wrap the machines.

After the official counts are all loaded into the EMS clients from the USB drives, the USB drives are no longer needed for reporting. The official tabulation reports are done through the Electionware system and compare to the tabulation machine receipts.

Tabulation machines

During the L and A I was able to observe the DS850s closer than my last observation back on November 2, 2021. I was able to see up closer that even though they have a physical wired network port, they are not hooked up to a network and the port is empty. Their network ports and USB ports are covered and protected by plexiglass locked access doors. The way counts/data is/are transferred from the DS850s to the Electionware clients is by USB drives.

The DS850s are very quick at scanning hundreds of ballots but they have to be kept clean and in good running order. This is why people should take care when marking their ballots and try not to put stray marks on them, coffee stains, other markings, or extra folds, as it can cause issues with the machines and reading the ballots.

There were thousands of machines all out and opened in the warehouse (DS200 and ExpressVote). We were walked over to observe the few hundred of the DS200s that would be used in this special election. These machines were already location-labeled, open, setup, preloaded with the USB drives and ready for the Logic and Accuracy testing.

Staff went down the rows and turned on the 100 or so machines that were being used in the special election. Once the machines are booted, they go to a password prompt, the proper password is put in, and the staff runs the needed machine configuration and zero reports. The configuration report shows a lot of information on hardware and firmware/software versions, a statement that no modem was detected, and etc. The zero report shows the overall total counts over the life of the machine and counts for the election are zeroed out. Once the reports are run, the staff activate the machine as if it were at the polling place ready to scan ballots.

When logging into the DS200 there is no way to tell who is logging in other than maybe the area you are logged into on the machine. So, if you're a contractor, election worker or other staff, that distinction is not logged on machine. Basically, shared passwords across all machines.

DS850's and DS200's are password protected. The DS200 have multiple passwords to access different areas within the machine, [REDACTED]. I did not however see the password prompt window for the DS850's. The DS200's I was able to see the password prompts, before I had to move from sight of the screens so they could put in passwords.

When setting up the DS200s it will warn the user if there is an issue with the backup USB drive. It gives the user the option to bypass it using a on screen prompt, if needed, or to alert so it can be fixed/replaced.

Users MUST wait for the DS200s to be fully powered off or it may corrupt or not copy USB data properly.

A worker stated that the DS200s had their firmware updated and it had a new logo seal on screen. The firmware version printed on the receipt was VT-6070-R2.

To find out more about the process and equipment (DS200 and Express Vote) at the polling locations, please see the following documentation provided by the county:

https://pollworkertraining.alleghenycounty.us/wp-content/uploads/2021/04/EO-Manual-04_14_2021.pdf

IT Information

This L and A allowed me to see the rest of the camera security system which is a very high-end system as stated in my last report.

There are four or so computers in the room outside of the tabulation room that are connected to web browsers for the displays for viewing by the observers on the large TV screens in observation areas.

The client systems in the server room that have the Electionware client I heard were just upgraded to a newer version, I believe Windows 10.

When a USB drive was inserted into the client system with Electionware, the Antivirus would pop up saying it was keeping auto run from running explorer.

When uploading the results to Electionware, there are no passwords that need to be entered when uploading the USB drives. Basically, open Electionware software, setup up Electionware to accept the USB totals, plug in a USB drive, Electionware reads and downloads the USB drive results, Electionware will show % completed of USB drive download, once completed 100%, the USB drive is removed and they keep following that process till all USBs drives are completed. There are multiple Electionware official and unofficial client machines to do the uploads. Each system has its own common share between its own clients back to the Electionware servers.

[REDACTED], a large rack that holds the routers and switching gear for official/unofficial/normal/ [REDACTED]

Servers are no longer at the tabulation center but are located downtown in the election office.

There was a new IT hire that started about a month ago learning the new system so I was able to get a quick overview of how they were loading the USBs and show creation of unofficial reports for the L and A.

It appears that the official and unofficial network wires are all bound together that run from the switches to the Electionware clients. I noticed wiring looked as if it may have been at one time separated into [REDACTED] being the official network and [REDACTED] being the unofficial network but they are now mixed.

Envelope and ballots are kept for the statutory retention period but USB drives are not.

Physical Building Security

During the time at tabulation center, some of the things I saw about physical security were:

Camera systems were mostly hung high to where they could not be reached

I entered the tabulation center through what is the employee entrance during the elections. [REDACTED]

Staff allowed closer observation of the L and A process than that was permitted during election-night tabulation. This was nice because it allowed me to see what was going on and not from a far way distance where it would have been impossible to see what was going on.

IT Security Concerns

It was concerning to hear that the official and unofficial servers were at the election office and not at the election tabulation center, with the Electionware client machines that use them for a file share. This is a concern because looking at the other county communication documents, they would not appear to be on a "air gapped" network and may be using communications infrastructure shared with other businesses or departments. A "air gapped" network typically would have all of the equipment in the same room and not connected to shared infrastructure, so the communications would stay in the same

room and not leave that room. Here is a good example of DHS and how communications may also be setup for election equipment communications.

<https://www.publicpurchase.com/con/docviewer/renewaldoc?docid=29188073&renewalId=49043>

Network wires were not following the wiring color schema and appeared mixed up for official and unofficial machines. If wiring is not currently color coded then it should be set up that way to identify the network wires. It could be very easy to move wires around from official to unofficial machines.

After the DS200s are opened, there is no tamper tape on the doors where the USB drives are located to indicate if anyone opened them. This could be a concern even though they do have a lock, as all locks appear to be on common shared keys. It also appears these common keys, which numbers and cuts can be seen in public documentation, may be able to be purchased on the internet. Basically, if you have the keys, you have access to the USBs, but this may be a non-issue if the machines are always being watched by poll workers. If the machines are wrapped and the doors are serial tagged, which I believe is done, then during transportation it would make it harder for tampering to go undetected. However, these keys provide access to ballots and many forms that are located in the DS200 cabinets. Tag serial numbers would need to be checked before and after the DS200s were opened and closed, which I believe is part of the process at polling locations. Polling location instructions and page 11 shows example of keys: https://pollworkertraining.allegHENYcounty.us/wp-content/uploads/2021/04/EO-Manual-04_14_2021.pdf

After my observation I was able to find out additional information on keys and passwords. The Judge of Elections picks up a clear plastic tote, including an orange pouch, on the weekend before the election. The pouch contains two keys on a lanyard, the password on paper, and security seals for closing the polls. There are general return sheets, the paysheet, and some returns envelopes in the tote. I would say the main concern here is having one shared password and this shared password could be known ahead of the election.

Staff did a pretty good job of making sure that when entering passwords, that observers were not in view of screens and if the observers were, staff would ask them to move to where they could not be seen. I would say be just a little more aware of observers when entering passwords as there were a few times I would just walk away so they didn't have to ask.

I talked to David V. about the past November 2021 election and improper storage of passwords in emails. He explained to me that was not policy and he would address the issue. [REDACTED]

[REDACTED] This was also an issue that needs improved and we talked about how [REDACTED]

The DS850s do not have tamper seals, however there are lockable doors on the ports. The USBs on the printers could be unplugged and another device plugged in in its place. If the machines are setup a day or weeks before, someone could tamper with the machines and it could go undetected.

After the polls close each election day, the local Judge of Elections returns bags to either a regional site or to the tabulation center by themselves. I would recommend that there be two parties when transferring materials and USB drives, for example maybe have the Majority or Minority Inspector tag along for drop off.

Chet let me know that they manually enter in the registrations for people in Allegheny County even when third party orgs submit it to them. Sometimes third parties register people that already are registered to vote and the elections staff have to voided those requests since they already in the system.

The unofficial USB drives are put back into the DS200 machines after being put into the unofficial system, which is connected to the seven regional locations over a VPN on their internet. So, if the unofficial system gets compromised, does this allow the DS200 to get compromised? Should the unofficial USBs be no longer used in official systems like the DS200 once plugged into the unofficial systems? A great talking point for this is Stuxnet. <https://www.mcafee.com/enterprise/en-us/security-awareness/ransomware/what-is-stuxnet.html>

Improvements

Election passwords should be stored in some type of a password vault. If at all possible, with two-factor authentication. Passwords should not be improperly stored [REDACTED] in emails or [REDACTED] of the passwords. This is a risk to the county elections system because others may have access to employee's personal devices and also those devices may sync to cloud which may not be properly secured or compromised. Criminals and state actors will usually target individuals to acquire unauthorized access to systems. **The elections department should be following the NIST standards such as [REDACTED]**

Some type of chain of custody paper log of the USB drives at L and A when going from person to person in the process.

Upon arrival at a L and A test, it would be good practice to have a handout for the observers that gives totals for how many ballots will be scanned and what the predetermined outcomes should be. I would like to see number totals up front written down on paper for what ballots were, to make it a little easier to understand what is going on.

It would be good to think about the process of uploading USB drives into Electionware. When uploading the USBs, instead of flipping the drives over in the box, it may be a better to have two boxes, one for completed and the other uncompleted. That way if someone drops a box then they're not going to be all mixed up, completed verses uncompleted.

Over 200 ballots should be run on some of the DS200s instead of just 5 during the L and A to give it a higher success/failure/count rate. Basically, what was done on the DS850s should also be done on the DS200s, even though this will require printing many more test ballots.

Show observers a few of the digital copies of the ballots that are scanned on DS200s and DS850s, to make sure they are taking images of ballots properly and to prove that they are there.

Setup an area where observers can have a spot to view into the window where the USB drives are being processed on the Electionware client machines on election day. This should be doable based on layout of current walk ways.

The DS850s should be faced towards the observer's area to be more transparent on the ballot scanning.

The DS850s should have tamper tags put on the doors after the USB drives are inserted for the official usage. This would allow the tags to be checked before scanning starts on election day.

There are four or so computers in the room outside of the server room that are connected to the displays for viewing by the observers on the large screens. A streaming device should be connected to HDMI video splitters to allow this video to be streamed on the internet during the election for transparency like other states. There should not be a security concern because a streaming device would push the video to a streaming provider. And the streaming device if connected by video splitter should not be a security concern if setup correctly.

There is not the much equipment in the larger rack but it has unofficial and internet facing equipment so a suggestion would be to have two smaller racks: one for the official and one for the unofficial system. This would keep them totally separated from one another. By placing them in their own small rack it shows a more “air gapped” system and does not allow any questions of wires being plugged into the wrong systems. Also, if a VPN or other connection is needed on the unofficial system, then it would be easy to see the few wires, these could be red or yellow.

The wiring to and from the switches and the Electionware client machines, for unofficial and official, should be corrected. The wiring should not be bundled together but should be separated between the official and unofficial systems to denote what is going where easily and to keep systems from being plugged into the wrong network at any point.

Questions

- USB Drives
 - Are the green official USB drives kept for a retention period? **No, they can be reused after each election.**
 - Are the yellow unofficial USB drives kept for a retention period? **No, they can be reused after each election.**
 - Where are the official and unofficial USB drives formatted after they are done being used?
 - Are the models of the USB drives used at the tabulation center the ones in the certification documentation? ES&S 4/8GB and non ES&S USB drives?
 - Are the onetime non ES&S USB drives (Scytl export) formatted and used again in official systems?
 - Are the onetime non ES&S USB drives (Scytl export) formatted and used again in unofficial system?
 - For the official count, what is taken from the tabulation center to be compared at the election office?
- Machines
 - How do the results get to the election office servers? **The Electionware client at the tabulation center sends it to the server at elections office. System Diagram PDF Page 40**
<https://www.dos.pa.gov/VotingElections/Documents/Voting%20Systems/ESS%20EVS6030/EVS%206030%20Secretarys%20certification%20report%20Final%20with%20attachm ents%2008312020.pdf>

- When firmware/software on the DS200s or DS850s need updated, who must approve this? SOS, election board, EAC?
- Do the DS200s or DS850s machines have to be recertified when firmware/software is updated?
- When were the Electionware client machines updated to Windows 10? What was the version of Windows before they were updated? Did the SOS, board, EAC all approve the update?
- After Electionware client machines OS is updated does it have to be recertified?
- Do the machines have the option to do ranked choice?
- Is the Electronic adjudication module enabled on Electionware systems?
- Counts
 - How do official numbers get to SOS? Are there two parties when this is sent to verify?
 - Are the official counts sent to Scytl? **Yes**
 - Election night is only unofficial sent to Scytl? **Yes**

Conclusion

On January 6, 2017 Secretary Jeh Johnson stated, “I have determined that election infrastructure in this country should be designated as a subsector of the **existing Government Facilities critical infrastructure** sector.” “By “election infrastructure,” we mean storage facilities, polling places, and **centralized vote tabulations locations used to support the election process**, and information and communications technology to include voter registration databases, voting machines, and **other systems to manage the election process and report and display results** on behalf of state and local governments.”

<https://www.dhs.gov/news/2017/01/06/statement-secretary-johnson-designation-election-infrastructure-critical>

There are several improvements that can be made that are outlined in the document above but I would say my top three concerns are password management, USB drive usage and servers not being located at the tabulation center with client machines. These are very important areas that need to be looked at closer and issues need to be resolved to make sure we have free and fair elections and are treating our elections as critical infrastructure as stated above.

The election staff work very hard and long hours to provide us the tools and systems to vote in our elections.

Resources Links for Allegheny County Elections

<https://www.alleghenycounty.us/elections/election-security.aspx>

<https://scytl.us/>

<https://www.alleghenycounty.us/elections/election-results.aspx>

<https://www.vote.pa.gov/readytovote/Pages/Allegheny-County-Voting-System.aspx>

<https://www.alleghenycounty.us/elections/index.aspx>

<https://www.pavoterservices.pa.gov/pages/ballottracking.aspx>

<https://www.alleghenycounty.us/elections/frequently-asked-questions.aspx>

https://pollworkertraining.alleghenycounty.us/wp-content/uploads/2021/04/EO-Manual-04_14_2021.pdf

<https://data.pa.gov/browse?q=elections&sortBy=relevance>

<https://www.dos.pa.gov/VotingElections/Documents/Voting%20Systems/ESS%20EVS6030/EVS%206030%20Secretarys%20certification%20report%20Final%20with%20attachments%2008312020.pdf>

Allegheny Elections Tabulation Center

Observation by Matthew Van Bibber on April 18, 2022

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Executive Summary

This observation report will cover the Logical and Accuracy (L and A) test process that is used for elections in Allegheny County. I was contacted again by Sam DeMarco, to see if I would like to observe the L and A process and I accepted. This L and A process was for the May 17, 2022 General Primary election. I was provided documentation needed to be an observer and the place to observe, which was 8 AM April 18, 2022 at the Allegheny County Tabulation center. The L and A in this case was for the digital central count ballot tabulating equipment, which covered DS850 ballot scanners, DS200 ballot scanners, Express Vote ballot-marking device and uploading tabulator counts to the EMS client workstations for the tallies.

Each visit there is always something new or more to learn about. Mail-in ballots are still increasing the workload for our election staff and has required additional ES&S staff to be onsite. This L and A will require many man hours because there are over 2,600 machines, that will be programmed and tested using over 35,000 test ballots. As stated in my last report, the observations are a great tool to allow the public to see the work that goes into preparing for an upcoming election. I would encourage citizens to get more involved in these processes and to show some gratitude to the election workers. Overall, this L and A observation was again a very good experience but I still see improvements that can be made, such as password and machine security and others, which will be outlined in this observation report.

Key observations:

- Election staff were polite and very hard workers.
- Election staff would answer questions the best they could and would find out any unanswered questions from others if needed.
- There are a lot of tasks that are involved with L and A testing. In the larger ones it can take a week to complete and to make sure machines are correctly working for the polling locations.
- Staff was as transparent again, as they could be.
- I was able to observe at a high level the equipment and software layout of the election system.
- I made new observations of the setup and layout for the EMS “air gapped” system, different from the last L and A observed for a special election in March.
- I did not observe the SURE system, BlueCrest machine, or cutter machines used in this L and A process.

Staff Evaluation

When I first arrived to the tabulation center, I was greeted by staff at the door. The person that came to the door verified what I was there for, the L and A test, and connected me with Chet to be let in to do the observation. As always, the staff was very polite and guided me around to the different areas where I could observe. When I would have questions, they would answer my questions, and if they were not sure they would try and point me to a person that would know the answer.

Watching and talking to staff, I have learned there is a lot more time that goes into the larger elections. Basically, staff complete the same steps as smaller elections, just on a more massive scale, that can take up to a week to complete. They appeared to be taking their time and focused on their tasks to make sure that things were done correctly, correcting issues as they went along. I only stayed for part of the day but

when I left, they were in the process of walking up and down rows of Express Vote machines that had to each be configured and tested.

The workers consisted of county employees from the election department and other departments. Also, there were three contractors on site for ES&S, two of which were there to help with extra mail-in ballot work load prep. Watching some of the contractors, you could see they were very involved in the process of making sure things were running correctly.

Tabulation Equipment and Software

There are several machines and software that are used in the processes:

- **ES&S DS200** – Used at precincts to scan ballots. The County has about 1320 of these machines. There are about 300 extras for backup as needed.
- **ES&S ExpressVote** – Used to mark ballots at precincts, the county has 1320 of these machines.
- **ES&S DS850** – For this election nine of the ten were tested. The tenth one was being held until the special election is certified. Then it will be tested and used in this upcoming primary. These will be ready for a machine recount if there is a need to recount mail-in ballots. These machines scan the ballots to a single USB drive, that is put in them.
- **USB Drives** – Used in the tabulation machines like DS200s, and the DS850s but also in the Express Vote machines. They will hold configurations for the machines and also ballot information. There are different color coded and labeled drives.
- **Electionware** – Is an ES&S software package that runs on Microsoft Windows. This allows the county to create/manage ballots, tabulate the votes and run election reports. The Electionware client machines are used to read the blue, green, and yellow USB drives.

Ballot/Tabulation

When I arrived, I went to observe the DS850 tabulators. They already had completed the scanning by the time I arrived and I did not get a chance to see the printed out zero reports. Staff was sorting out the ballots that were scanned into groups so they could be taken to the DS200s and scanned by the proper precinct. I was told by staff they ran about 35,000 test ballots through the DS850s. The blue labeled USB drives were removed from the machines and taken to the tabulation room.

During this observation I watched the testing and creation of ballots on the Express Vote machines. The workers used the headsets, touch screens and key pads to create ballots. The workers were instructed to create one Democratic ballot and one Republican ballot each, having the worker doing one write-in with their initials, and vote for one candidate for that party. The machine then would print out a ballot summary card ballot that would then later be collected and ran through the DS200s.

I did not have the time to observe the configurations, zero reports, scanning of ballots, or tabulations at this L and A observation for the DS200s. There were hundreds of DS200s all out and opened in the warehouse waiting to be tested.

In the tabulation room the blue USB drives that were removed from the DS850s were taken and inserted into the green official Electionware client machines to tally and run reports. IT staff put in each USB drive one by one uploading the data. Once the data from the DS850s were uploaded, exports/reports

were run to show the results/totals of the data. The results/totals were then compared to the results they believe they should have had to make sure they match.

I was not provided any paperwork that would show what all the totals should look like at the end for the ballots. There were also questions of what the totals should be once the reports were run. The contractor ended up going out to the DS850s to get the totals and added them up.

Tabulation machines

During this visit I was able to observe the Express Vote machine setups and testing. The staff were in the back tabulation room programming the blue USB drives that would be inserted into the ExpressVote machines. The staff that I talked to explained how they would double check the labels and what was on the screen to make sure they were programming the correct data on the USB drive. They explained that if they needed to, even though it was locked on the screen after the first programming, they could reprogram the USB again if needed. They had several boxes of USB drives that they were being programmed. The USB drives were flipped one way to show they had not been programmed. Once programmed, they would be flipped the other way and put back in the box.

Going to the area where the ExpressVote machines were, most had been setup and powered up and sitting at the password prompt. There were power issues where the circuits were getting overloaded and kicking the breakers, so they could only do so many machines powered on at a time. There was not a configuration report that was printed out for these machines because Allegheny County does not tabulate votes on these machines, but just print the voters selection on a half card ballot. They gathered the staff up, about 16 or so, that was at the election center, to have them start testing the Express Vote machines. They had everyone gather around to get a quick rundown on the tests and how to perform the tests. I was asked by a worker to step away for a moment, while they showed the shared password with staff. This password was used to unlock the machines so staff could do the needed testing.

When logging into the ExpressVote machines, there is no way to tell who is logging in other than maybe by the area you are logged into on the machine. So, if you're a contractor or election worker or other staff, the distinction is not logged on the machine. Basically, shared passwords are used across all machines.

During the L and A I was able to observe that the DS850s do have multiple USB ports and only one USB drive is removed from the machines. The way counts/data are transferred from the DS850s, to the Electionware clients, is by a USB drive. There are not two USB drives for unofficial vs official, only an official USB drive. The official USB drive is put in the official Electionware client machine first, and then it is put in the unofficial Electionware client machines. It is then later reformatted and reused.

For this election, nine of the ten DS850s were tested. The tenth one was being held until the special election is certified on April 25th. Then it will be tested and used in this upcoming primary. These will be used for mail-in ballots and if a recount is required.

During the handling of the USB drives I did not see any chain of custody paper logs for handoffs from person to person. Workers were walking boxes of USB drives from the tabulation room to the ExpressVote machines by themselves.

I did not stay for the last part, where they prepare the needed materials for polls, put the material in the locked machine cabinets, sealing and wrapping the machines as this would probably not happen for a week or more.

IT Information

I did notice again that on the client systems with Electionware, when a USB was inserted, the Antivirus would pop up saying it was keeping auto run from running explorer.

When downloading the configurations to the USB drives and when the results are uploaded to Electionware there are no passwords that need to be entered. When uploading the USB drives with results it will show % completed. Once completed 100%, USB drive is removed and they keep following that process till all USBs are completed. There are multiple Electionware official and unofficial client machines to do the uploads and download the configurations and they have a common share between them that connect back to either the unofficial or official servers so the totals get put together.

There were two [REDACTED] VPN/Firewalls (primary and secondary). These appeared to be connected to Network switches: one managed, the other unmanaged. And the server sitting on the desk where they were, appeared to be connected to them. This information was provided by ESS in question 1 in the following document as well. [REDACTED]

[REDACTED] Based on documentation provided by vendor it appears that this device may have a built-in wireless card that could be enabled [REDACTED]

[REDACTED] I did not check to see if the wireless light on the box was active.

The server sitting on the desk did not appear to have a dedicated iDRAC (Integrated Dell Remote Access Controller) remote card connected. It had only one network card plugged in. But an iDRAC could possibly still be used depending on how the network card was setup on the system, for example configured with VLANs. I could not see the configuration of the network cards on the server in the large rack. *I know iDRACs were a concern of the public, as it is listed on the server contracts.* See the following on more information about iDRAC <https://dl.dell.com/manuals/common/dell-emc-idrac8-9-feature-comparison.pdf>

The Department of Information Technology (DIT) in Allegheny County takes care of setting up the election servers.

Network wire color is not consistent in the network setup and it is hard to identify what is connected to the unofficial vs the official networks.

The servers reappeared in the tabulation center from my last L and A visit. One was in the large rack and the other was sitting out on a desk with its VPNs, switches and cabling exposed. Apparently, the elections department is moving offices downtown and moved the servers back to the tabulation center.

The database is copied from the official to the unofficial system and then they test uploading the data from the USB drives from the tabulation machines.

The Electionware clients appeared to be labeled with yellow as unofficial and green as official to match the USB drive colors that are in the DS200s.

Physical Building Security

Nothing new to report.

IT Security Concerns

I talked to David V. about the sharing of passwords and he said he would take care of the issue.

I talked to David V. about how they are handling the USB drive re-usage and gave some suggestions so they are not reusing drives across unofficial and official machines, even though they are reportedly reformatting them.

A concern that I have with the type of VPN/firewall being used on the election system is a built-in wireless access point, that could be activated at any time. A VPN/Firewall that is connected to the election system should not have wireless capability.

Users did not lock the Electionware screens in the tabulation room when they left. David V. came in a little while after them and locked the screens. See **NIST SP 800-171 Requirement 3.1.10**

<https://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.800-171r2.pdf>

One strange thing that happened while a report was being generated for the DS850s on the Electionware client was the monitor disconnected went black and then a few seconds later it came back on with the report on screen.

The servers should NOT be moved back to the election offices so that the servers are located in the same room as the Electionware clients. This gives the official a true "Air-Gap" network, as it is not crossing over VPN or VPLS (Virtual Private LAN Service) connections across the river between downtown and the tabulation center for the official server and clients. The unofficial network will, of course, will still have to have internet/VPN connections to the seven drop off locations on election day.

There are no port blockers on the Electionware client machines. Anyone could plug a USB Drive or device in.

Improvements

Another camera should be added to the tabulation room on the other side to get a full view of the room or the current camera should be moved up higher to get past the large rack so the full view of the room is in the frame.

The server, VPNs and switches on the desk that are exposed should be put into a rack. It looks as if the official server is placed in the large rack with other unofficial devices and the internet facing firewalls and switching. I would suggest that there be two smaller racks, one for the official and one for the unofficial systems that physically separates the equipment, so there are no questions asked as to what goes where. The wiring of the Electionware clients needs to be cleaned up and moved up off of the floor that is going back to the switches/servers, so it is visible and easily traceable. The color coding of the unofficial vs unofficial should each have their own identifiable color, so it is easy to identify what

system the wires are going to. The wires should be separated and bundled by color and not all bundled together. In the setup right now, one could not tell how some of the equipment is plugged in because the colors are off on the network cords, [REDACTED] intermixed between unofficial and official machines. It would be very easy to unplug a network wire on the client machines and switch the network cords around.

I did point out to David V. about the shared password being shared with quite a few people and he said he would take care of it. When workers, especially if not from the election department, are testing the machines, instead of giving the shared password to 16 or more people, there should be say two runners putting in the passwords on the machines ahead of the people testing, out of view of others.

The past two times I went to the L and As they had power issues with the breakers being overloaded and kicking. This slows down the process and only allows so many machines to be on at a time. Improving this could allow machines to be completed quicker. The county should have an electrician come on site during machine setup to better understand what kind of power circuits need to be set up.

USB drive usage: While talking to staff I learned that the USB drives are reused. The ES&S USB drives are expensive and that is one reason the county reuses the USB drives. One issue with the reuse is how they are managing the USB drives because they are taking them from official to unofficial, formatting them, but again reusing them in the official machines. Once a USB drive touches any unofficial machine it should ideally never again be used in the official machines, even if they are formatted. If reformatting and USB drive reuse must continue, then the official and unofficial systems should have a dedicated offline machine for formatting and only official USB drives should be used in official networks and unofficial drives used in unofficial network. A great example why drives should not be shared would be something like Stuxnet <https://www.mcafee.com/enterprise/en-us/security-awareness/ransomware/what-is-stuxnet.html>. I did provide David V. some information on Stuxnet for his review.

Pre-determined ballot counts/numbers for the L and A should be provided to the observers and staff so they know what the results should be once the data is ran through the Electionware reporting system at the end. While on site this time and last time they didn't really have the numbers and had to go and check a few things to make sure things were adding up correctly. The contractor at one point went to the DS850s to get all the numbers to check the counts on reports.

Reinforce to staff the importance of locking the Electionware screens when walking out of a room.

Put some type port of blockers, either software or hardware, on the Electionware client machines. This will help keep USB drives or devices that should not be plugged off of the machines.

Some type of chain of custody paper log of the USB drives at L and A when going from person to person in the process should be kept, as these are the USBs that will be used for the election.

The DS850s should be faced towards the observer's area to be more transparent on the ballot scanning.

Election passwords should be stored in some type of a password vault. If at all possible, this should be with two-factor authentication. Passwords should not be improperly stored [REDACTED]

[REDACTED] This is a risk to the county elections system because others may have access to [REDACTED] which may not be

properly secured or compromised. Criminals and state actors will usually target individuals to acquire unauthorized access to systems. A good standard to follow is NIST with passwords and password storage. [REDACTED]

Questions

- USB Drives
 - The USB drives when formatted, for reuse at a later time, how is the formatting done?

Other Items Learned

Any Right to Know requests for ballot digital images will be denied by the county because of a statement sent out by the Pennsylvania Department of State.

Any Right to Know requests for ballot envelope digital images will be denied because all of the voter's information is on one side of the envelope.

Conclusion

In this observation and my past two observations I have outlined many concerns. The top three again are password management/sharing, USB drive usage, and server location. As called out in past observations, elections are considered critical infrastructure and the technology which supports them should not be treated as a common day to day computer system. It is possible if improvements are not made and these issues are not corrected, something could occur in the future if it has not already. Again, the election staff work very hard and long hours to provide us the tools and systems to vote in our elections.

Resources Links for Allegheny County Elections and Other Information

<https://www.alleghenycounty.us/elections/election-security.aspx>

<https://scyt1.us/>

<https://www.alleghenycounty.us/elections/election-results.aspx>

<https://www.vote.pa.gov/readytovote/Pages/Allegheny-County-Voting-System.aspx>

<https://www.alleghenycounty.us/elections/index.aspx>

<https://www.pavoterservices.pa.gov/pages/ballottracking.aspx>

<https://www.alleghenycounty.us/elections/frequently-asked-questions.aspx>

https://pollworkertraining.alleghenycounty.us/wp-content/uploads/2021/04/EO-Manual-04_14_2021.pdf

<https://data.pa.gov/browse?q=elections&sortBy=relevance>



<https://dl.dell.com/manuals/common/dell-emc-idrac8-9-feature-comparison.pdf>

<https://www.dos.pa.gov/VotingElections/OtherServicesEvents/Pages/Voting-Systems.aspx>

<https://www.dos.pa.gov/VotingElections/Documents/Voting%20Systems/Directives/Conduct%20Directive%20Att%20E%20-%20PA%20Voting%20System%20Security%20Standard%20v06122018.pdf>

https://www.juniper.net/documentation/en_US/release-independent/nce/topics/concept/vpls-understanding.html