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Maricopa County Forensic Election Audit

Volume III: Result Details

Work Performed For:

Arizona State Senate
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3 DOCUMENT OVERVIEW

The audit was designed to be a comprehensive review of the results from the Maricopa County 2020 General Election to confirm the effectiveness of existing legislation in governing elections, and to provide additional insights on possible areas of information-based legislative reform that could ensure an even greater level of integrity and accuracy in how elections are conducted.

This audit is the most comprehensive election audit that has been conducted. It involved reviewing everything from the voter history for the election, to retallying all 2.1 million ballots by hand, to performing forensic photography and review of the ballot paper, to conducting cyber forensic imaging and analysis of the provided voting equipment. This extensive process involved over 1,500 people who contributed a total of over 100,000 hours of time over the course of more than five months from when setup began, to when this report is completed.

This volume of the report serves to outline details of the results from the audit; including all the data and evidence to support the conclusions of this report.

4 TALLY RESULTS

The audit included a full hand-recount of all 2.1 million ballots from the 2020 General Election. During this process all original ballots were counted, as well as those ballots returned from duplication. Ballots that were duplicated included various categories of ballots that were not able to be run through the voting machines, such as damaged ballots or Uniformed and Overseas Citizens Absentee Voting Act (UOCAVA) ballots. The tallies from the original ballots sent to duplication, and the ballots received back from duplication were kept separate so that a comparison could occur. As can be found in audit finding, “More Duplicates Than Originals,” there were more duplicates than there were originals. For this reason, we utilized the counts of the originals for all official tallies.

This is the most important finding in the audit because the paper ballots are the best evidence of voter intent, and there is no reliable evidence that the paper ballots were altered to any material degree.

4.1 Presidential Race

The chart below summarizes the results of the hand-recount of the Presidential Race of the Maricopa County Forensic Audit. These tallies are based on the tallies from all original ballots and does not include the ballots duplicated from the originals.

	Trump	Biden	Jorgenson	Write In / Over / Under	Total
Maricopa County Forensic Audit	995,404	1,040,873	31,501	20,791	2,088,569
Official Maricopa County Canvass	995,665	1,040,774	31,705	21,419	2,089,563
DELTA	(261)	99	(204)	(628)	(994)

4.3 Senate Race

The chart below summarizes the results of the hand-recount of the Senate Race of the Maricopa County Forensic Audit. These tallies are based on the tallies from all original ballots and does not include the ballots duplicated from the originals.

NOTE: Vote totals for the presidential and senatorial elections mismatch slightly primarily due to small differences in hand counts among the 2.1M million ballots.

	McSally	Kelly	Write In / Over / Under	Total
Maricopa County Forensic Audit	983,662	1,064,336	40,398	2,088,396
Official Maricopa County Canvass	984,203	1,064,396	40,964	2,089,563
DELTA	(541)	(60)	(566)	(1,167)

5 VOTER HISTORY, BALLOT, AND CERTIFIED RESULTS FINDINGS

The following section outlines all findings related to voting history, ballots and the certified results. This section covers everything that directly impacts the counting and accounting of results.

5.1 Ballot Scoring Methodology

Ballot related findings are scored based on the total number of potential ballots impacted by the finding. Based on the range by which this falls within a Severity is assigned, as can be seen in the chart to the right. In these circumstances a severity will still be assigned to the finding based on the potential impact the finding may have had on the election.

<u>Ballots Impacted</u>	<u>Severity</u>
10,000+	Critical
5,000 – 9,999	High
1,500 – 4,999	Medium
Less than 1,500	Low

5.2 Finding Summary Table

#	Finding Name	Phase	Ballots Impacted	Severity
5.3.1	Mail-in Ballots Voted from Prior Address	Voter History	23,344	Critical
5.4.1	More Ballots Returned by Voter Than Received	Voter History	9,041	High
5.4.2	Voters That Potentially Voted in Multiple Counties	Certified Results	5,295	High
5.5.1	Official Results Does Not Match Who Voted	Certified Results	3,432	Medium
5.5.2	More Duplicates Than Original Ballots	Ballot	2,592	Medium
5.5.3	In-Person Voters Who Had Moved out of Maricopa County	Certified Results	2,382	Medium
5.5.4	Voters Moved Out-of-State During 29-Day Period Preceding Election	Voter History	2,081	Medium
5.5.5	Votes Counted in Excess of Voters Who Voted	Certified results	1,551	Medium
5.6.1	Voters Not Part of the Official Precinct Register	Voter History	618	Low
5.6.2	Duplicated Ballots Incorrect & Missing Serial Numbers	Certified Results	500	Low
5.6.3	Ballots Returned Not in the Final Voted File	Ballot	430	Low
5.6.4	Mail-in Ballot Received Without Record of Being Sent	Certified Results	397	Low
5.6.5	Voters With Incomplete Names	Voter History	393	Low
5.6.6	Deceased Voters	Voter History	282	Low
5.6.7	Audit UOCAVA Count Does Not Match the EAC Count	Ballots	226	Low
5.6.8	Late Registered Voters with Counted Votes	Voter History	198	Low
5.6.9	Date of Registration Changes to Earlier Date	Voter History	194	Low
5.6.10	Duplicate Voter IDs	Voter History	186	Low
5.6.11	Multiple Voters Linked by AFFSEQ	Voter History	101	Low
5.6.12	Double Scanned & Counted ballots	Ballot	50	Low
5.6.13	UOCAVA Electronic Ballots Double Counted	Ballot	6	Low
5.6.14	Duplicate Ballots Reuse Serial Numbers	Ballot	6	Low
5.7.1	Audit Interference	Ballot	N/A	Informational
5.7.2	Batch Discrepancies	Ballot	N/A	Informational
5.7.3	Commingle Damaged and Original Ballots	Ballot	N/A	Informational
5.7.4	Early Votes Not Accounted for in EV33	Certified Results	N/A	Informational
5.7.5	High Bleed-Through Rates on Ballots	Ballot	N/A	Informational
5.7.6	Improper Paper Utilized	Ballot	N/A	Informational
5.7.7	Inaccurate Identification of UOCAVA Ballots	Ballot	N/A	Informational
5.7.8	Missing Subpoena Items	Ballot	N/A	Informational
5.7.9	No Record of Voters in Commercial Database	Voter History	N/A	Informational
5.7.10	Out of Calibration Ballot Printers	Ballot	N/A	Informational
5.7.11	Real-Time Provisional Ballots	Voter History	N/A	Informational
5.7.12	Voter Registration System Audit Access	Voter History	N/A	Informational
5.7.13	Questionable Ballots	Ballot	N/A	Informational

5.3 Critical Findings

5.3.1 MAIL-IN BALLOTS VOTED FROM PRIOR ADDRESS

**Ballots
Impacted** 23,344

Mail-in ballots were cast under voter registration IDs for people that may not have received their ballots by mail because they had moved, and no one with the same last name remained at the address. Through extensive data analysis we have discovered approximately 23,344 votes that may have met this condition. If a registered voter does not have a secondary mailing address listed with the county and no longer lives at the address listed on their voter registration, they should not receive their mail-in ballot by automatic postal forwarding. In certain circumstances, however, it may be possible for them to receive a ballot, for example, if they know the present occupant, or if the ballot is improperly forwarded.

If ballots are being sent by forwardable mail, this would violate the Arizona Elections Procedures Manual, which requires, "A ballot-by-mail must be mailed to voters by first-class, non-forwardable mail." EPM p. 56. Therefore, this is a potentially criminal act. *See* ARS 16-452(C) (any person who violates a rule set forth in the EPM "is guilty of a class 2 misdemeanor.").

Ensuring that ballots are sent by non-forwardable mail serves an important purpose. When non-forwardable mail is returned undelivered, the County Recorder is required to initiate a process that places a voter on inactive status - meaning they will no longer automatically receive an early ballot - and may eventually remove them from the rolls entirely. ARS 16-165(A)(7), 544(E).¹

The Final Voted File, or VM55, was cross-checked against a commercially available data source provided by Melissa² called Personator. Personator is a best-in-class identity and address validation tool. It confirms that an individual is associated with an address, indicates prior and current addresses, tracks when and where the individual moves, tracks date-of-birth and date-of-death. To accomplish this, it utilized both private and government data sources such as the US Postal Service's National Change of Address (NCOA) service, and the Social Security Administration's Master Death List.

Addresses were not included in the results if there was a valid secondary mailing address as part of the voting record. Only moves prior to October 5, 2020, are included in the move numbers.

NOTE: The following chart illustrates the percentage of voters by registered party that the Ballot Impacted number represents. This should give a rough idea on the impact to the electorate if the votes were cast by the voters and not another individual that was somehow able to gain access to the mail-in ballot.

Party	%
Democrat Party	39.5%
Republican Party	33.0%
Prefer Not to Declare	26.5%
Libertarian Party	1.0%

NOTE: While high quality commercial database sources were utilized to assemble these findings, some error is expected within these results. To further validate these findings, it is recommended that canvassing be conducted.

¹ With the passage of SB 1485, going forward, voters may be removed from the rolls if they have not voted for a prolonged period of time.

² <https://www.melissa.com>

NOTE: A full list of the Voter IDs affected can be found in esB1-B3 There are potential ways that a voter could receive their ballot which in some cases would not violate the law. Additional investigation by the Attorney General is recommended for any conclusive determination.

Description	Ballots
Mail-in votes from voters who moved within Maricopa County prior to the registration deadline	15,035
Mail-in votes from voters who moved out of Arizona prior to registration deadline	6,591
Mail-in votes from voters who moved within Arizona but out of Maricopa prior to registration deadline	1,718

NOTE: Please see Appendixes B1, B2 and B3 for the details for this finding.

5.3.1.1 REFERENCES

- [A.R.S. § 16-101 – Qualifications of registrant](#)³
- [State of Arizona – 2019 Elections Procedures Manual](#)⁴
- [A.R.S. § 16-165 – Causes for Cancellation](#)⁵
- [A.R.S § 16-452 – Rules](#)⁶
- [A.R.S § 16-544 – Permanent early voting list](#)⁷

5.3.1.2 DATA FILES UTILIZED

File Name	MD5 Hash
Maricopa County-VM55 Final Voted Nov2020 PBRQ	43070bc7afdf40a37cd45092e9733654

5.3.1.3 RECOMMENDATION

Legislation should be considered that links voter roll registration to changes in driver's licenses or other state identification, as well as requiring the current voter rolls be validated against the United States Postal Service (USPS) National Change of Address (NCOA) at a predefined period prior to every election.

Laws already exist for interstate reporting of changes in residence, addresses, and driver's licenses. Tying voter roll registration to these forms of identification would greatly increase the likelihood that voter registration details would be kept up to date. Individuals are more likely to remember their license needs to be updated immediately than voter registration, and since all states now offer the ability to register to vote when getting a license, license updates could also update voter rolls.

³ <https://www.azleg.gov/ars/16/00101.htm>

⁴ https://azsos.gov/sites/default/files/2019_ELECTIONS_PROCEDURES_MANUAL_APPROVED.pdf

⁵ <https://www.azleg.gov/ars/16/00165.htm>

⁶ <https://www.azleg.gov/ars/16/00452.htm>

⁷ <https://www.azleg.gov/ars/16/00544.htm>

It is recommended that the voter rolls be validated against the NCOA both 90 days or more prior to the election, in addition to a week before mail-in ballots are sent out. This check would be utilized to determine if a mail-in ballot would be sent to the address since ballots are not allowed to be forwarded. The legislature may want to consider whether a change of address should suspend Permanent Early Voting List (PEVL) enrollment.

The Senate should consider referring this matter to the Attorney General's Office for a criminal investigation as to whether the requirements of ARS 16-452(C) have been violated.

5.4 High

5.4.1 MORE BALLOTS RETURNED BY VOTER THAN RECEIVED

**Ballots
Impacted** 9,041

9,041 more ballots show as returned in the EV33 Early Voting Returns File for a single individual who voted by mail than show as sent to that individual within the EV32 Early Voting Sent File. In most of these instances an individual was sent one ballot but had two ballots received on different dates.

Further investigation would be needed to determine the cause, but this could be explained in any of the possible ways:

- More than one ballot could have been sent out, but an entry was missed within the EV32 file.
- The same ballot could have been processed more than once on different days, resulting in two EV33s for one ballot.
- Checking into Early Vote in person may not have recognized that a mail-in ballot was already received and both the Early Vote In-Person and the mail-in may have generated an EV33.
- A counterfeit ballot was sent via mail and both the legitimate ballot sent and the counterfeit ballot generated EV33 entries.

NOTE: We've been informed shortly before the release of this report that some of the discrepancies outlined could be due to the protected voter list. This has not been able to be validated at this time, but we thought it was important to disclose this information for accuracy.

NOTE: An EV33 indicates that a ballot is received and does not necessarily mean the ballot was counted. It is assumed that only the first ballot received and validated is counted.

Ballots Sent to Voter	Ballots Received for Voter	Quantity of Voters
1	2	8,875
1	3	163
1	4	3

NOTE: Please see Appendix C1 for details on the voters who had more ballots received than sent.

NOTE: The following chart illustrates the percentage of voters by registered party that the Ballot Impacted number represents. This should give a rough idea on the impact to the electorate if the votes were cast by the voters and not another party that was somehow able to cast a vote.

Party	%
Democrat Party	34.4%
Republican Party	30.4%
Prefer Not to Declare	30.1%
Independent	3.7%
Libertarian Party	1.3%

5.4.1.1 REFERENCES

- A.R.S. § 16-246 – Early Balloting⁸
- A.R.S. § 16-542 – Request for ballot⁹
- A.R.S. § 16-544 – Permanent early voting list¹⁰
- A.R.S. § 16-558.01 – Mailing of Ballots¹¹

5.4.1.2 DATA FILES UTILIZED

File Name	MD5 Hash
Maricopa County-VM55 Final Voted Nov2020 PBRQ	43070bc7afdf40a37cd45092e9733654
EV33-1377-10-09-2020_101111.txt	f1daa7089f7300237f6b4ff779661cf9
EV33-1377-10-12-2020_113210.txt	72e4e6c102e3539b4dd15b4454357b69
EV33-1377-10-13-2020_111553.txt	9b14841281c031533322b50aabb86a24
EV33-1377-10-14-2020_112757.txt	1b7537d7d9b927dbf4e462ed5ee8f97c
EV33-1377-10-15-2020_121331.txt	dec7d08dde4970c26e32b8c844f4a9ab
EV33-1377-10-16-2020_113522.txt	f0a632c3fd9b5f177d48504dc119be31
EV33-1377-10-19-2020_111708.txt	db80b692a9188add0844a8974e227287
EV33-1377-10-20-2020_112351.txt	57d1795db8be71d516e29350e347fb3a
EV33-1377-10-21-2020_111843.txt	56c3b5a11651c68735164c578eade4e1
EV33-1377-10-22-2020_111714.txt	03551f170bf758efc90c013d0fe2e467
EV33-1377-10-23-2020_112614.txt	dbfdd369ac148723540c83f614cca454
EV33-1377-10-26-2020_111318.txt	0b68adff779f59c70a530000bf989aca
EV33-1377-10-27-2020_111413.txt	a6fc7377bf6c6fe6653f539c5970a6f7
EV33-1377-10-28-2020_111331.txt	43758b9290f90d0305d5ed84aa10becb
EV33-1377-10-29-2020_111300.txt	410b30b06f2ca73022f27173fe114038
EV33-1377-10-30-2020_111804.txt	5cb44e5ea214f40227e04345d4355ff7
EV33-1377-11-02-2020_111214.txt	5d15bb8686a022f53400550cfe010a07

⁸ <https://www.azleg.gov/ars/16/00246.htm>

⁹ <https://www.azleg.gov/ars/16/00542.htm>

¹⁰ <https://www.azleg.gov/ars/16/00544.htm>

¹¹ <https://www.azleg.gov/ars/16/00558-01.htm>

File Name	MD5 Hash
EV32-1377-09-18-2020_075112.txt	ab22e9ba4ad54af1b7a47f8381d506c7
EV32-1377-09-30-2020_111728.txt	2e4df9ccf2e5e64fd7e164628ff7667a
EV32-1377-10-01-2020_113125.txt	92538fe838c7c872957d155a98290874
EV32-1377-10-02-2020_125658.txt	be7d44838daa2aa758a0adb1dfe88acd
EV32-1377-10-05-2020_112338.txt	31a356a1a1826639759fc66afb812498
EV32-1377-10-06-2020_114600.txt	cb70c4468ebd51142003e46e3e1257c4
EV32-1377-10-07-2020_111951.txt	185d423606927ba15f827e19329c02aa
EV32-1377-10-08-2020_111639.txt	4f82598b6fab071300e92b8f56407451
EV32-1377-10-09-2020_112718.txt	bdf22cce7eca5eeb0b52dbb9f87a54b6
EV32-1377-10-12-2020_113153.txt	67a7ab52ab0850127528b18667eaf5c6
EV32-1377-10-13-2020_111535.txt	81af1c0b010368d0e11cc68e8a21f2e6
EV32-1377-10-14-2020_112738.txt	e88cce6a8a27b5bf755765f516710c48
EV32-1377-10-15-2020_121305.txt	2f12b801d981afc0e4e114bdfbf4241c
EV32-1377-10-16-2020_113410.txt	46a251f88fdd1d2e2352ac1dc61fffa9
Maricopa_EV32-1377-10-19-2020_111633-2020-10-20T14 53 30Z.txt	9cd6e80c07e1f33129cf98302930abb6
Maricopa_EV32-1377-10-20-2020_112309-2020-10-21T15 13 12Z.txt	e3cc25b520b5710090f4dfff2d7fce7f
Maricopa_EV32-1377-10-21-2020_111759-2020-10-22T15 08 54Z.txt	e786fec02788d0b7c4392ca5b1cd284e
Maricopa_EV32-1377-10-22-2020_111639-2020-10-23T15 03 40Z.txt	86ea315f6bce7c0c902027b5373f6e2c
Maricopa_EV32-1377-10-23-2020_112532-2020-10-26T15 00 59Z.txt	ca42553da16ea38cf2b72f29b81a990f

5.4.1.3 RECOMMENDATION

It is recommended that the Attorney General inquire of Maricopa County as to the reason for this discrepancy, and if a sufficient explanation is not received an investigation be opened to investigate this further.

**Ballots
Impacted** 5,295

5.4.2 VOTERS THAT POTENTIALLY VOTED IN MULTIPLE COUNTIES

Comparing the Maricopa County VM55 Final Voted File to the equivalent files of the other fourteen Arizona counties resulted in 5,047 voters with the same first, middle, last name and birth year, representing 10,342 votes among all the counties. While it is possible for multiple individuals to share all these details, it is not common although the incidence here (roughly one-third of one percent) may be the rate of commonalities in identifying information between legitimate, separate individual voters especially with common last names. This list should be fully reviewed.

NOTE: The Ballot Impacted was calculated by the total number of votes (10,342) and subtracting the number of maximum number of potential unique people (5,047). This yielded 5,295.

NOTE: Please see Appendix D1 for details on the potential voters who cast a vote in more than one location.

5.4.2.1 REFERENCES

- State of Arizona – 2019 Elections Procedures Manual¹²
- A.R.S. § 16-120 – Eligibility to vote¹³

5.4.2.2 DATA FILES UTILIZED

File Name	MD5 Hash
Maricopa County-VM55 Final Voted Nov2020 PBRQ	43070bc7afdf40a37cd45092e9733654
Apache County - 01_02_2021 Party CD-2021-02-09T00 22 11Z.csv	be4c0af2563848085d58ba6b35a486d9
Cochise County Voter File 01022021.csv	6839d6c54e5da7b5440018b23c239a80
Coconino County - 11-3-20 General Voter List with Voting History.csv	aa92299b3af0188e0d477d30929ff2e8
Gila County - votinghistoryexport_637454437931504987.csv	ea8475adc98ba6d488c1cf772333c750
Graham County - votinghistoryexport022021.csv	a967c66261fc118b12a7673cfc140293
Greenlee Party Report Active voters with voting history 1-6-2021-2021-01-06T17 47 47Z.csv	9f911e1249c0c6303d393e88f435057c
La Paz County - votinghistoryexport11032020-2020-12-09T19 37 25Z.csv	a94f953df2f4843ee1a753f2102ef589
Mojave County - Party File 1-2-2021.csv	427dfa3347df1c9a373d1c60250d71d3
Navajo County - Parties List January 21-2021-02-10T22 08 47Z.csv	1aea8fc97eaa284ba27de8689774315
Pima County - ActiveVoters20210105112009.csv	93bbfb0586d83cc714b8d02b2ad8d8e3
Pinal County - Active Voter List 01052021.csv	44d10afdac81cf1dea2bd5faffda50dc
Santa Cruz County - 1ST QTR ACTIVE VOTER LIST REPORT 01202021.csv	73e8599aab7c084c94605621f0c148e2
YavapaiCounty - 11-10-2020 votinghistory-Yavapai.csv	2e68ec2f922a0eda6999f3fc5b1c0638
Yuma County - Voting History Export_Include ALL Registered Voters.csv	d87c732fc069e85db4a92974bd7c689b

5.4.2.3 RECOMMENDATION

Legislation should be considered which requires a more clear schedule for cleaning up and maintaining voter rolls, including specific requirements for a county based on its size and growth.

5.5 Medium Findings

¹² https://azsos.gov/sites/default/files/2019_ELECTIONS_PROCEDURES_MANUAL_APPROVED.pdf

¹³ <https://www.azleg.gov/ars/16/00120.htm>

5.5.1 OFFICIAL RESULTS DO NOT MATCH WHO VOTED

**Ballots
Impacted** 3,432

The official result totals do not match the equivalent totals from the Final Voted File (VM55). These discrepancies are significant with a total ballot delta of 11,592 between the official canvass and the VM55 file when considering both the counted and uncounted ballots.

Official Results verses Final Voted File (VM55) – Counted Ballots

Description	Type	Official Results	Final Voted (VM55)	Delta
Early Vote	Mail In (R)	N/A	1,702,981	
	In Person (B)	N/A	209,112	
	Total	1,915,487	1,912,093	3,394
Election Day Vote	Regular	167,878	N/A	
	Provisional	6,198	N/A	
	Total	174,076	(P) 174,038	38
Total Counted:		2,089,563	2,086,131	3,432

NOTE: Please see Appendix E1 for a full break-down by precinct of the differences between the Official Results and the Final Voted File (VM55).

5.5.1.1 DATA FILES UTILIZED

File Name	MD5 Hash
<u>11-03-2020-1 Final Official Summary Report NOV2020.pdf</u> ¹⁴	321a78c74d4f442da0659014b29cb091
Maricopa County-VM55 Final Voted Nov2020 PBRQ	43070bc7afdf40a37cd45092e9733654

5.5.1.2 RECOMMENDATION

Legislation should be considered that would require the Official Canvass to fully reconcile with the Final Voted File. The number of individuals who showed up to vote should always match the number of votes cast.

¹⁴ <https://recorder.maricopa.gov/electionarchives/2020/11-03-2020-1%20Final%20Official%20Summary%20Report%20NOV2020.pdf>

5.5.2 MORE DUPLICATES THAN ORIGINAL BALLOTS

**Ballots
Impacted** 2,592

Maricopa County reported “In this election, Maricopa County had 27,869 duplicate ballots pertaining to the Presidential Electors.”¹⁵ The audit team counted 29,557 duplicate ballots. However, only 26,965 original ballots were sent to duplication.

Description	Ballots Count
Maricopa County Forensic Audit - Original Ballots Sent to Duplication	26,965
Maricopa County Forensic Audit – Duplicate Ballots Counted	29,557
Maricopa County – Reported Duplicate Ballots	27,869

A comparison of the total number of original ballots sent to duplication vs the total number of duplicate ballots shows that Maricopa County counted 2,592 more duplicate ballots than original ballots sent to duplication. The audit team attempted to resolve the discrepancies, but those efforts were impeded by the County’s failure to properly identify duplicate ballot batches and failure to assign unique serial numbers to each damaged ballot sent to duplication and then match that number to the duplicate ballot printed to replace it.

The County reported 1688 fewer ballots sent to duplication than identified by the audit team. The County provided 904 fewer original ballots than they reportedly duplicated.

These extra duplicates favored Republican candidates over Democrat candidates, and even favored the Libertarian candidate at a higher rate than the overall vote distribution.

Description	Damaged Sent to Duplication (DSD)	Duplicate Ballots (DUP)	Expected % To Candidate	% Difference To Candidate
Trump	995,404	996,896	48%	58%
Biden	1,040,873	1,041,733	50%	33%
Jorgenson	31,501	31,580	2%	3%

Description	Damaged Sent to Duplication (DSD)	Duplicate Ballots (DUP)	Expected % To Candidate	% Difference To Candidate
McSally	983,662	985,100	47%	55%
Kelly	1,064,336	1,065,266	51%	36%

NOTE: Please see Appendixes F1 and F2 for the details of this finding.

¹⁵ <https://ecf.azd.uscourts.gov>

5.5.2.1 REFERENCES

- Maricopa Clerk of Court Duplicate Ballots¹⁶
- State of Arizona – 2019 Elections Procedures Manual¹⁷
- A.R.S. § 16-621 – Proceedings at the counting center¹⁸

5.5.2.2 RECOMMENDATION

Legislation should be considered that requires regular audits of elections within a year of the election. Among the mandatory items required to perform in the audit should be a review of the duplicate ballot process.

5.5.3 IN-PERSON VOTERS WHO HAD MOVED OUT OF MARICOPA COUNTY

**Ballots
Impacted** 2,382

The VM55 Final Voted File, was cross-checked against a commercially available data source provided by Melissa called Personator and 2,382 ballots were cast voter IDs for individuals that moved outside of Maricopa County prior to 10/5/2020. Personator is a best-in-class identity and address validation tool. It confirms that an individual is associated with an address, indicates prior and current addresses, tracks when and where the individual moves, tracks date-of-birth and date-of-death. To accomplish this, it utilized both private and government data sources such as the US Postal Service's National Change of Address (NCOA) service, and the Social Security Administration's Master Death List. Only moves prior to October 5, 2020, are included in the move numbers.

NOTE: While high quality commercial database sources were utilized to assemble these findings, a small percentage of error is expected within these results. To further validate these findings, it is recommended that canvassing be conducted.

Description	Ballots
In-Person votes from voters who moved out of Arizona prior to registration deadline	1,528
In-Person votes from voters who moved within Arizona but out of Maricopa prior to registration deadline	854

NOTE: Please see Appendixes G1 and G2 for additional details on the individuals that show as moved.

NOTE: The following chart illustrates the percentage of voters by registered party that the Ballot Impacted number represents. This should give a rough idea on the impact to the electorate if the votes were cast by the voters and not another party that was somehow able to cast a vote.

Party	%
Republican Party	43.37%
Democrat Party	25.06%
Prefer Not to Declare	26.87%
Independent	3.27%
Libertarian Party	1.18%
Green Party	0.25%

¹⁶ <https://www.clerkofcourt.maricopa.gov/home/showpublisheddocument/1902/637425888214000000>

¹⁷ https://azsos.gov/sites/default/files/2019_ELECTIONS_PROCEDURES_MANUAL_APPROVED.pdf

¹⁸ <https://www.azleg.gov/ars/16/00621.htm>

5.5.3.1 REFERENCES

- Maricopa County – 11-03-2020 - General Election Canvass Summary¹⁹

5.5.3.2 DATA FILES UTILIZED

File Name	MD5 Hash
Maricopa County-VM55 Final Voted Nov2020 PBRQ	43070bc7afdf40a37cd45092e9733654

5.5.3.3 RECOMMENDATION

Legislation should be considered that links voter roll registration to changes in driver's licenses or other state identification, as well as requiring the current voter rolls be validated against the United States Postal Service (USPS) National Change of Address (NCOA) at a predefined period prior to every election.

Laws already exist for interstate reporting of changes in residence, addresses, and driver's licenses. Tying voter roll registration to these forms of identification would greatly increase the likelihood that voter registration details would be kept up to date. Individuals are more likely to remember their license needs to be updated immediately than voter registration, and since most states now offer the ability to register to vote when getting a license, license updates could also update voter rolls.

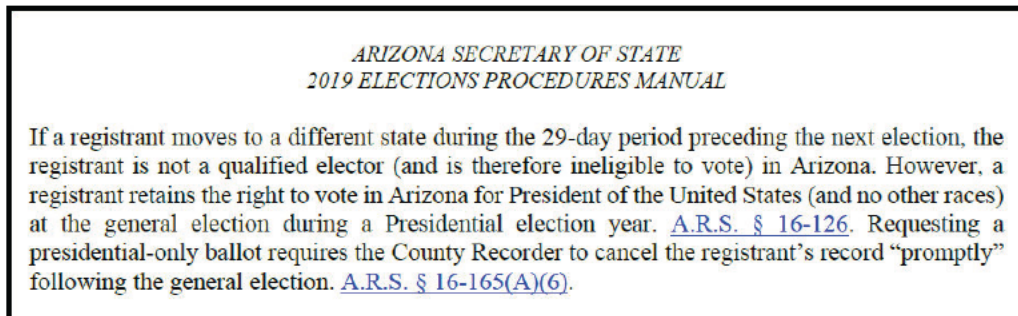
It is recommended that the voter rolls be validated against the NCOA both 90 days or more prior to the election, in addition to a week before mail-in ballots are sent out. This check would be utilized to determine if a mail-in ballot would be sent to the address since ballots are not allowed to be forwarded. The legislature may want to consider whether a change of address should suspend Permanent Early Voting List (PEVL) enrollment.

¹⁹ <https://recorder.maricopa.gov/electionarchives/2020/11-03-2020-1%20Final%20Official%20Summary%20Report%20NOV2020.pdf>

5.5.4 VOTERS MOVED OUT-OF-STATE DURING 29-DAY PERIOD PRECEDING ELECTION

Ballots
Impacted 2,081

Arizona law and the 2019 Election Procedures Manual address the specific voting eligibility of a person who moves out of Arizona during the 29-day period before the election. A person that moved out of Arizona between 10/5/2020 and 11/03/2020, was no longer legally considered a “resident,” however was eligible by law to vote a presidential-only ballot. See the image below taken from the 2019 Elections Procedure Manual (pg. 30).



The 2019 Elections Procedure Manual states “A registrant is a “resident” if they have physical presence in the county along with an intent to remain. A registrant may be temporarily absent from the jurisdiction without losing their residency status, as long as they have an intent to return. A.R.S. § 16-103.” (pg. 12)

The Final Voted File, or VM55, was cross-checked against a commercially available data source provided by Melissa²⁰ called Personator. Personator is a best-in-class identity and address validation tool. It confirms that an individual is associated with an address, indicates prior and current addresses, tracks when and where the individual moves, tracks date-of-birth and date-of-death. To accomplish this, it utilized both private and government data sources such as the US Postal Service's National Change of Address (NCOA) service, and the Social Security Administration's Master Death List.

The cross-check resulted in 2,081 instances of a voter that moved out of the state of Arizona during the 29-day period before the election who cast a ballot in the 2020 general election. It cannot be determined whether these voters undervoters all the races on their ballots other than the presidential race, thereby creating a *de facto* Presidential-Only ballot.

The ballot definitions on the Dominion EMS do not include a “Presidential-Only” ballot. The Dominion voting machines would not be able to read a ballot for which a ballot definition does not exist. Additionally, in examining the EV33 sent ballot files for ballot codes, the ballot images, and the cast vote record, no presidential-only ballots as specified by A.R.S. § 16-126 and the 2019 Election Procedures Manual were found to be cast in this election.

²⁰ <https://www.melissa.com>

NOTE: The following chart illustrates the percentage of voters by registered party that the Ballot Impacted number represents. This should give a rough idea on the impact to the electorate if the votes were cast by the voters and not another individual that was somehow able to cast a vote.

Party	%
Republican Party	41.28%
Democrat Party	31.57%
Prefer Not to Declare	21.96%
Independent	4.32%
Libertarian Party	0.82%
Green Party	0.05%

NOTE: Please see Appendix H1 for details on the voters who moved out-of-state during the 29-day period preceding the election.

5.5.4.1 REFERENCES

- Arizona State - 2019 Elections Procedure Manual²¹
- A.R.S. § 16-126 – Authority to vote in a presidential election after moving from state²²
- A.R.S. § 16-103 – Qualified person temporarily absent from the state²³

5.5.4.2 DATA FILES UTILIZED

File Name	MD5 Hash
Maricopa County-VM55 Final Voted Nov2020 PBRQ	43070bc7afdf40a37cd45092e9733654

5.5.4.3 RECOMMENDATION

Legislation should be considered that links voter roll registration to changes in driver's licenses or other state identification, as well as requiring the current voter rolls be validated against the United States Postal Service (USPS) National Change of Address (NCOA) at a predefined period prior to every election.

Laws already exist for interstate reporting of changes in residence, addresses, and driver's licenses. Tying voter roll registration to these forms of identification would greatly increase the likelihood that voter registration details would be kept up to date. Individuals are more likely to remember their license needs to be updated immediately than voter registration, and since most states now offer the ability to register to vote when getting a license, license updates could also update voter rolls.

It is recommended that the voter rolls be validated against the NCOA both 90 days or more prior to the election, in addition to a week before mail-in ballots are sent out. This check would be utilized to determine if a mail-in ballot would be sent to the address since ballots are not allowed to be forwarded. The legislature may want to consider whether a change of address should suspend Permanent Early Voting List (PEVL) enrollment.

²¹ https://azsos.gov/sites/default/files/2019_ELECTIONS_PROCEDURES_MANUAL_APPROVED.pdf

²² <https://www.azleg.gov/ars/16/00126.htm>

²³ <https://www.azleg.gov/ars/16/00103.htm>

5.5.5 VOTES COUNTED IN EXCESS OF VOTERS WHO VOTED

**Ballots
Impacted** 1551

The number of votes cast in an election should not exceed the number of voters who participate in the election. An analysis of the Maricopa County Official Canvass and the VM55 Final Voted file from November 2020 show that multiple precincts counted votes in excess of the number of voters who participated in the 2020 General Election.

Reconciliation of the voters who participated to ballots cast is first required at a every vote center for election day voting. The County Audit Board is required to reconcile the voters who participated with the ballots cast for each precinct prior to certifying the Official Canvass. The expected delta should be more voters who voted than votes cast because some ballots were undervoted or overvoted. There were 277 precincts with a voter deficit, 65 precincts with an equal number of voters who voted, and cards cast. There were 401 precincts with the expected surplus.

NOTE: We've been informed shortly before the release of this report that some of the discrepancies outlined could be due to the protected voter list. This has not been able to be validated at this time, but we thought it was important to disclose this information for accuracy.

NOTE: The following chart illustrates the percentage of voters by registered party that are given within the precincts that the Ballot Impacted number represents. Understanding why there is more votes than voters in this precinct would be required before any determination could be made as to whether the precinct breakouts would influence how this finding impacted the votes.

Party	%
Republican Party	42.25%
Democrat Party	30.02%
Prefer Not to Declare	22.34%
Independent	4.41%
Libertarian Party	0.90%
Green Party	0.0%

From the Arizona Election Procedure Manual, the Audit Board has several responsibilities:

- “1. Receives the Official Ballot Reports for each voting location and any supplemental information from the election boards that could explain any discrepancies.*
- 2. Receives the signature rosters, poll lists (or scanned copies), or reports from e-pollbooks that show voter check-ins and signatures...”*
- “9. Identifies discrepancies in the reports following final tabulation of duplicated ballots and provisional ballots.*
- 10. Resolves problems that appear to be of major significance in the presence of political party observers; and*
- 11. Resolves and documents all discrepancies. The functions of the Audit Board must be completed prior to the acceptance of the canvassing.”*

Note that the Audit Board must consider discrepancies after the final tabulation which would include discrepancies in the number of votes counted vs. the number of voters who participated in the election. This would include mail ballots, duplicated ballots and provisional ballots for voters in every precinct. Maricopa County failed to resolve these discrepancies prior to acceptance of the canvass.

NOTE: Please see Appendix I1 for the full list broken out by precinct.

5.5.5.1 REFERENCES

- State of Arizona – 2019 Elections Procedures Manual²⁴

5.5.5.2 DATA FILES UTILIZED

File Name	MD5 Hash
11-03-2020-2b Final SOV and Official Canvass Report NOV2020.csv	e907163ef4b0d99e116c24fcb98a6969
Maricopa County-VM55 Final Voted Nov2020 PBRQ	43070bc7afdf40a37cd45092e9733654

²⁴ https://azsos.gov/sites/default/files/2019_ELECTIONS_PROCEDURES_MANUAL_APPROVED.pdf

6.5.5.3 RECOMMENDATION

Maricopa County Election Officials and Audit Board should examine all records and resolve all discrepancies prior to certification of election results. Each legal voter should be permitted to vote one and only one time.

5.6 Low Findings

5.6.1 VOTERS NOT PART OF THE OFFICIAL PRECINCT REGISTER

**Ballots
Impacted** 618

The list of individuals who are eligible and able to vote in an election, also known as the official precinct register, is established 10 days prior to the election. This means that for the 2020 General Election this was established on October 22nd. At that point in time everyone who was officially on the voter rolls for the election should have been on the rolls. It should not require an earlier or a later voter roll file to find a complete list of everyone who was eligible and actually voted in the election. However, a review of the VM55 Final Voted File for the 2020 General Election shows voter IDs that do not show on either the October 2, 2020 voter rolls or on the November 7, 2020 voter rolls. To match up all the voter IDs that show on the VM55 Final Voted File for the 2020 General Election it requires that you look back to the April 9, 2017, voter rolls to find all the IDs: in addition to also requiring the December 4, 2020, rolls. In total it takes 12 different months VM34 Monthly Voter Roll files to find and match-up all voters in the 2020 General Election. This can be seen in the diagram below.

<u>VM34 File Date</u>	<u># Of Matched Voters</u>
12/4/2020	605
11/7/2020	2,089,465
9/5/2020	1
8/8/2020	1
7/3/2020	1
6/6/2020	1
12/6/2019	2
10/5/2019	3
4/5/2019	1
2/2/2019	1
5/6/2017	1
4/9/2017	1

NOTE: It is expected that the official precinct registration might be missing a few people who hadn't provided proof of citizenship prior, and has until 7pm on election day to provide this information; or those who qualify for UOCAVA who are allowed to register to vote up until 7pm on election day. However, in both cases you would expect these individuals to be in the November 7th rolls, which occurs after the election.

NOTE: Please see Appendix A for a copy of the VM55 Final Voted File joined to the appropriate rows of data from all of the above VM34s. This file is utilized as the basis for every finding that requires both VM55 and VM34 data.

NOTE: The following chart illustrates the percentage of voters by registered party that the Ballot Impacted number represents. This should give a rough idea on the impact to the electorate if the votes were cast by the voters and not another individual that was somehow able to cast a vote.

Party	%
Republican Party	37.06%
Democrat Party	34.79%
Prefer Not to Declare	26.54%
Libertarian Party	1.13%
Independent	0.49%

5.6.1.1 REFERENCES

- A.R.S. § 16-168 - Precinct registers²⁵

5.6.1.2 DATA FILES UTILIZED

File Name	MD5 Hash
Maricopa County-VM55 Final Voted Nov2020 PBRQ	43070bc7afdf40a37cd45092e9733654
Maricopa County-VM34 Voter Registration Oct 2, 2020	99a4440ae9bab7f0de96d7656b4e739d
Maricopa County-VM34 Voter Registration Nov 7, 2020	d7bfc018296832836d2bd8de440cba53
Maricopa County-VM34 Voter Registration Dec 4, 2020	255f69007b253c7f2737b050c439f269

5.6.1.3 RECOMMENDATION

Legislation should be considered that will require that the precinct registers be complete and comprehensive of every individual who could legally vote for the election.

²⁵ <https://www.azleg.gov/ars/16/00168.htm>

5.6.2 DUPLICATED BALLOTS INCORRECT & MISSING SERIAL NUMBERS

Ballots
Impacted ~500

Damaged Ballots sent to duplication must have a serial number that can be matched to the duplicate (replacement ballot). Many damaged ballots sent to duplication do not have a serial number, and multiple duplicated ballots have incorrect serial numbers that do not match the original ballots. The County must “record an identical serial number on both the original and duplicate ballot (including spoiled duplicates) – this ties the ballots together and creates a paper trail as required by statute, A.R.S. § 16-621(A)”

In addition, there are hundreds of damaged ballots with unreadable serial numbers like these examples below:



Of those original ballots that had a readable serial number, several of them had incorrect serial numbers. In some cases, as shown in the example below, the audit team was able to identify the original ballot and the duplicate ballot based on a series of precinct, ballot type and presidential selection. The five ballots in the table below had incorrect serial numbers on the duplicate ballot.

Duplicate Ballot Serial Number	Precinct	Ballot Type	Presidential Selection	Original Damaged Ballot Serial Number
DUPBOARD3HAND0214	643	0	Biden	Board 1 Hand Dup 214
DUPBOARD3HAND0215	239	99	Trump	Board 1 Hand Dup 215
DUPBOARD3HAND0216	391	99	Biden	Board 1 Hand Dup 216
DUPBOARD3HAND0217	144	99	Biden	Board 1 Hand Dup 217
DUPBOARD3HAND0218	492	0	Biden	Board 1 Hand Dup 218



Segment Trailer Sheet showing precinct and ballot type



UOCAVA Ballot Image showing precinct, ballot type

5.6.2.1 REFERENCES

- State of Arizona – 2019 Elections Procedures Manual²⁶
- A.R.S. § 16-621 – Proceedings at the counting center²⁷

5.6.2.2 RECOMMENDATION

Legislation should be considered that requires regular audits of the duplicate ballot process.

²⁶ https://azsos.gov/sites/default/files/2019_ELECTIONS_PROCEDURES_MANUAL_APPROVED.pdf

²⁷ <https://www.azleg.gov/ars/16/00621.htm>

5.6.3 BALLOTS RETURNED NOT IN THE FINAL VOTED FILE

Ballots show as returned in the EV33 Early Voting Returns File but there is no matching record in the VM55 Final Voted File. All entries in the EV33 file show with a ballot status of “Returned” and the only other status of “Voided Early Ballot” is not used anytime in the 2020 General Election.

The most likely explanation is that these ballots represent rejected ballots. However, the number of ballots in question, 2,472, does not match the 2,976 ballots that were rejected (2,042) or late (934). It is expected there should be a full accounting of all ballots received and voted that can be matched up to individual voter participation.

NOTE: Please see Appendix K1 for a list of all the EV33 entries that cannot be found in the VM55 file.

NOTE: The following chart illustrates the percentage of voters by registered party that the Ballot Impacted number represents. This should give a rough idea on the impact to the electorate if the votes were cast by the voters and not another individual that was somehow able to cast a vote.

Party	%
Republican Party	33.25%
Democrat Party	32.12%
Prefer Not to Declare	29.41%
Independent	3.84%
Libertarian Party	1.05%
Green Party	0.25%
Independent	0.08%

5.6.3.1 REFERENCES

- A.R.S. 16-542 – Request for ballot²⁸
- A.R.S. 16-246 – Early Balloting²⁹

²⁸ <https://www.azleg.gov/ars/16/00542.htm>

²⁹ <https://www.azleg.gov/ars/16/00246.htm>

5.6.3.2 DATA FILES UTILIZED

File Name	MD5 Hash
Maricopa County-VM55 Final Voted Nov2020 PBRQ	43070bc7afdf40a37cd45092e9733654
EV33-1377-10-09-2020_101111.txt	f1daa7089f7300237f6b4ff779661cf9
EV33-1377-10-12-2020_113210.txt	72e4e6c102e3539b4dd15b4454357b69
EV33-1377-10-13-2020_111553.txt	9b14841281c031533322b50aabb86a24
EV33-1377-10-14-2020_112757.txt	1b7537d7d9b927dbf4e462ed5ee8f97c
EV33-1377-10-15-2020_121331.txt	dec7d08dde4970c26e32b8c844f4a9ab
EV33-1377-10-16-2020_113522.txt	f0a632c3fd9b5f177d48504dc119be31
EV33-1377-10-19-2020_111708.txt	db80b692a9188add0844a8974e227287
EV33-1377-10-20-2020_112351.txt	57d1795db8be71d516e29350e347fb3a
EV33-1377-10-21-2020_111843.txt	56c3b5a11651c68735164c578eade4e1
EV33-1377-10-22-2020_111714.txt	03551f170bf758efc90c013d0fe2e467
EV33-1377-10-23-2020_112614.txt	dbfdd369ac148723540c83f614cca454
EV33-1377-10-26-2020_111318.txt	0b68adff779f59c70a530000bf989aca
EV33-1377-10-27-2020_111413.txt	a6fc7377bf6c6fe6653f539c5970a6f7
EV33-1377-10-28-2020_111331.txt	43758b9290f90d0305d5ed84aa10becb
EV33-1377-10-29-2020_111300.txt	410b30b06f2ca73022f27173fe114038
EV33-1377-10-30-2020_111804.txt	5cb44e5ea214f40227e04345d4355ff7
EV33-1377-11-02-2020_111214.txt	5d15bb8686a022f53400550cfe010a07

5.6.3.3 RECOMMENDATION

Legislation should be considered that requires that the various election related systems to properly integrate in order to give accurate and consistent counts between the mail-in ballots cast, mail-in ballots received, mail-in ballots accepted, mail-in ballots rejected, and be able to reconcile these details with who voted in the final voted file.

5.6.4 MAIL-IN BALLOT RECEIVED WITHOUT RECORD OF BEING SENT Ballots Impacted 397

Ballots show as returned in the EV33 Early Voting Returns File for a voter who voted by mail but there is no matching record in the EV32 Early Voting Sent File showing that a ballot was ever sent. This most likely means that there was a clerical error in the EV32 Early Voting Sent Files and ballots that were sent out legitimately were not recorded.

NOTE: At an earlier hearing it was stated that there were 74,243 entries in EV33 Early Voting Returns Files without a corresponding entry in the EV32 Early Voting Sent Files. This was brought up in the context of justification for performing canvassing to further validate the reasoning for this discrepancy. While this discrepancy is accurate, it was unintentionally misleading. All but 397 of those entries were Early Voting in-person votes which also generate an EV33 entry in addition to mail-in ballots.

NOTE: The following chart illustrates the percentage of voters by registered party that the Ballot Impacted number represents. This should give a rough idea on the impact to the electorate if the votes were cast by the voters and not another individual that was somehow able to cast a vote.

Party	%
Democrat Party	33.25%
Republican Party	31.49%
Prefer Not to Declare	29.72%
Independent	3.53%
Libertarian Party	2.02%
Green Party	0.08%

NOTE: Please see Appendix L1 for a complete list of the voters who had a ballot received, but there is no record of a ballot being sent.

5.6.4.1 REFERENCES

- [A.R.S. 16-542 – Request for ballot](#)³⁰
- [A.R.S. 16-246 – Early Balloting](#)³¹

5.6.4.2 DATA FILES UTILIZED

File Name	MD5 Hash
Maricopa County-VM55 Final Voted Nov2020 PBRQ	43070bc7afdf40a37cd45092e9733654
EV33-1377-10-09-2020_101111.txt	f1daa7089f7300237f6b4ff779661cf9
EV33-1377-10-12-2020_113210.txt	72e4e6c102e3539b4dd15b4454357b69
EV33-1377-10-13-2020_111553.txt	9b14841281c031533322b50aabb86a24
EV33-1377-10-14-2020_112757.txt	1b7537d7d9b927dbf4e462ed5ee8f97c
EV33-1377-10-15-2020_121331.txt	dec7d08dde4970c26e32b8c844f4a9ab
EV33-1377-10-16-2020_113522.txt	f0a632c3fd9b5f177d48504dc119be31
EV33-1377-10-19-2020_111708.txt	db80b692a9188add0844a8974e227287
EV33-1377-10-20-2020_112351.txt	57d1795db8be71d516e29350e347fb3a
EV33-1377-10-21-2020_111843.txt	56c3b5a11651c68735164c578eade4e1
EV33-1377-10-22-2020_111714.txt	03551f170bf758efc90c013d0fe2e467
EV33-1377-10-23-2020_112614.txt	dbfdd369ac148723540c83f614cca454
EV33-1377-10-26-2020_111318.txt	0b68adff779f59c70a530000bf989aca
EV33-1377-10-27-2020_111413.txt	a6fc7377bf6c6fe6653f539c5970a6f7
EV33-1377-10-28-2020_111331.txt	43758b9290f90d0305d5ed84aa10becb
EV33-1377-10-29-2020_111300.txt	410b30b06f2ca73022f27173fe114038
EV33-1377-10-30-2020_111804.txt	5cb44e5ea214f40227e04345d4355ff7
EV33-1377-11-02-2020_111214.txt	5d15bb8686a022f53400550cfe010a07
EV32-1377-09-18-2020_075112.txt	ab22e9ba4ad54af1b7a47f8381d506c7
EV32-1377-09-30-2020_111728.txt	2e4df9ccf2e5e64fd7e164628ff7667a

³⁰ <https://www.azleg.gov/ars/16/00168.htm>

³¹ <https://www.azleg.gov/ars/16/00246.htm>

File Name	MD5 Hash
EV32-1377-10-01-2020_113125.txt	92538fe838c7c872957d155a98290874
EV32-1377-10-02-2020_125658.txt	be7d44838daa2aa758a0adb1dfe88acd
EV32-1377-10-05-2020_112338.txt	31a356a1a1826639759fc66afb812498
EV32-1377-10-06-2020_114600.txt	cb70c4468ebd51142003e46e3e1257c4
EV32-1377-10-07-2020_111951.txt	185d423606927ba15f827e19329c02aa
EV32-1377-10-08-2020_111639.txt	4f82598b6fab071300e92b8f56407451
EV32-1377-10-09-2020_112718.txt	bdf22cce7eca5eeb0b52dbb9f87a54b6
EV32-1377-10-12-2020_113153.txt	67a7ab52ab0850127528b18667eaf5c6
EV32-1377-10-13-2020_111535.txt	81af1c0b010368d0e11cc68e8a21f2e6
EV32-1377-10-14-2020_112738.txt	e88cce6a8a27b5bf755765f516710c48
EV32-1377-10-15-2020_121305.txt	2f12b801d981afc0e4e114bdfbf4241c
EV32-1377-10-16-2020_113410.txt	46a251f88fdd1d2e2352ac1dc61fffa9
Maricopa_EV32-1377-10-19-2020_111633-2020-10-20T14 53 30Z.txt	9cd6e80c07e1f33129cf98302930abb6
Maricopa_EV32-1377-10-20-2020_112309-2020-10-21T15 13 12Z.txt	e3cc25b520b5710090f4dfff2d7fce7f
Maricopa_EV32-1377-10-21-2020_111759-2020-10-22T15 08 54Z.txt	e786fec02788d0b7c4392ca5b1cd284e
Maricopa_EV32-1377-10-22-2020_111639-2020-10-23T15 03 40Z.txt	86ea315f6bce7c0c902027b5373f6e2c
Maricopa_EV32-1377-10-23-2020_112532-2020-10-26T15 00 59Z.txt	ca42553da16ea38cf2b72f29b81a990f

5.6.4.3 RECOMMENDATION

It is recommended that the Attorney General inquire of Maricopa County as to the reason for this discrepancy, and if a sufficient explanation is not received an investigation be opened to investigate this further.

5.6.5 VOTERS WITH INCOMPLETE NAMES

**Ballots
Impacted** 393

A.R.S. 16-152 requires that the form used for the registration of electors shall contain the registrant's given name, middle name, if any, and surname.

The 11/07/2020 VM34 contains 720 voters with incomplete names. 393 of these voters voted in the 2020 General Election.

Examples of incomplete names include:

- Voters with only a last name
- Voters with only an initial for their last name
- Voters with an initial for their first name and last name
- Voters with no last name
- Voters with only an initial for their first name

NOTE: It is possible to have a legal name that is just an initial, or to not have a surname. However, this is extremely rare, and the list should be reviewed to determine its accuracy.

Description	Number of voters
Last name only	15
Last name is an initial only	9
No last name	45
First name is an initial only	324
Total	393

The 2019 Elections Procedure Manual addresses failure to provide name. "If the State Form, Federal Form, FPCA, or FWAB does not contain the registrant's name, residence address or location, DOB, or signature (or assisting person's signature), but the County Recorder has the address, telephone number, or email address to contact the registrant to request the incomplete information, the registrant should be entered into the voter registration database in a "suspense" status until the incomplete information or a new voter registration form is received. A.R.S. § 16-134(B); A.R.S. § 16-121.01(A)." (pgs. 18-19)

If the registrant does not provide the missing, incomplete, or illegible information by 7:00 p.m. on the date of the next regular general election, the registration form is invalid and the registrant's status may be changed from "suspense" to "not registered," with the reason code "pending expired" (or functional equivalent). The registrant would need to submit a new voter registration application to be eligible to vote in future elections. (pg. 19)

NOTE: The following chart illustrates the percentage of voters by registered party that the Ballot Impacted number represents. This should give a rough idea on the impact to the electorate if the votes were cast by the voters and not another individual that was somehow able to cast a vote.

Party	%
Democrat Party	34.35%
Republican Party	32.57%
Prefer Not to Declare	24.43%
Independent	6.87%
Libertarian Party	1.27%
Green Party	.51%

NOTE: Please see Appendixes M1 and M2 for a list of voters with incomplete names who voted, and a list of all incomplete names on the November 7, 2020 voter rolls.

5.6.5.1 REFERENCES

- A.R.S. 16-152 – Registration Form³²
- State of Arizona - 2019 Elections Procedure Manual³³

5.6.5.2 DATA FILES UTILIZED

<u>File Name</u>	<u>MD5 Hash</u>
Maricopa County-VM55 Final Voted Nov2020 PBRQ	43070bc7afdf40a37cd45092e9733654

5.6.5.3 RECOMMENDATION

Legislation should be considered that requires the voter registration entries be a direct match with any acceptable form of government identification, and always checked against that identification to validate compliance. If existing laws are sufficient that this should be occurring, additional legislation should be considered to increase the likelihood of compliance such as penalties.

5.6.6 DECEASED VOTERS

**Ballots
Impacted** 282

The Final Voted File, or VM55, was cross-checked against a commercially available data source provided by Melissa³⁴ called Personator, and it was found that 282 individuals who were flagged as deceased prior to October 5, 2020, voted in the election.

Personator is a best-in-class identity and address validation tool. It confirms that an individual is associated with an address, indicates prior and current addresses, tracks when and where the individual moves, tracks date-of-birth and date-of-death. To accomplish this, it utilized both private and government data sources such as the US Postal Service's National Change of Address (NCOA) service, and the Social Security Administration's Master Death List.

NOTE: It is recommended that the Attorney General further investigate this finding to confirm the validity of this finding, and if applicable, determine who cast the vote on behalf of the deceased individual.

³² <https://www.azleg.gov/ars/16/00152.htm>

³³ https://azsos.gov/sites/default/files/2019_ELECTIONS_PROCEDURES_MANUAL_APPROVED.pdf

³⁴ <https://www.melissa.com>

NOTE: The following chart illustrates the percentage of voters by registered party that the Ballot Impacted number represents. This should give a rough idea on the impact to the electorate if the votes were cast by the voters and not another individual that was somehow able to cast a vote.

Party	%
Republican Party	49.65%
Democrat Party	30.14%
Prefer Not to Declare	12.77%
Independent	7.09%
Libertarian Party	0.35%

NOTE: Please see Appendix N1 for a complete list of individuals who show as being dead in Melissa.

5.6.6.1 DATA FILES UTILIZED

File Name	MD5 Hash
Maricopa County-VM55 Final Voted Nov2020 PBRQ	43070bc7afdf40a37cd45092e9733654

5.6.6.2 RECOMMENDATION

Legislation should be considered to require the voter rolls to periodically be compared against the Social Security's Master Death List, or other commercially available tools that gives access to this information. A minimum frequency on to conduct this should specifically be required.

5.6.7 AUDIT UOCAVA COUNT DOES NOT MATCH THE EAC COUNT

**Ballots
Impacted** 226

The Uniformed and Overseas Citizens Absentee Voting Act (UOCAVA) requires all counties in the United States to report data related to the ability of civilian, military, and overseas citizens to register to vote and successfully cast a ballot. Analysis of the data submitted by Maricopa to the US Election Commission shows discrepancies in the number of ballots reported by the County to the EAC and the number of ballots observed during the audit. The audit team found 226 more electronically submitted UOCAVA ballots than the County reported to the EAC. Any UOCAVA ballots returned by mail were not identified as UOCAVA. Therefore, the audit team used the County mail numbers reported to the EAC. A Public Records Request for UOCAVA data was submitted to the Arizona Secretary of State but as of this date, no records have been provided in response to that request.

Election Administration Voting Survey 2020 vs Audit Counts

UOCAVA Type	EAVS 2020	Audit Count	Discrepancy
Electronically	8,988	9,214	-226
Mail	1,420	Comingled	Unknown
Total	10,408	-	-

While many people believe that UOCAVA is a law that primarily enables active-duty military men and women to vote, it is used more often by non-military voters. See below table of the total number of Civilian vs Military voters who were UOCAVA eligible in Maricopa County based on the November 07, 2020, VM34 Monthly Voter Rolls.

Military Returned Ballots	Military % of UOCAVA	Civilian Ballots Returned	Civilian % of UOCAVA
4,359	35%	7,934	65%

The law allows military voters who are out of their home county to vote electronically. However, non-military voters (civilians) who are not out of the country are not eligible to vote electronically. According to Maricopa County's UOCAVA Map website, more than 140 civilians – who were not UOCAVA eligible due to being in the United States--were permitted to vote via UOCAVA in the 2020 General Election.

The Uniformed and Overseas Citizens Absentee Voting Act defines eligibility as:

- A member of a uniformed service on active duty who, by reason of such active duty, is absent from the place of residence where the member is otherwise qualified to vote;
- A member of the merchant marines who, by reason of service in the merchant marine, is absent from the place of residence where the member is otherwise qualified to vote; or
- A spouse or dependent of a member referred to above who, by reason of the active duty or service of the member, is absent from the place of residence where the spouse or dependent is otherwise qualified to vote.
- An absent uniformed services voter who, by reason of active duty or service is absent from the United States on the date of the election involved;
- A person who resides outside the United States and is qualified to vote in the last place in which the person was domiciled before leaving the United States; or
- A person who resides outside the United States and (but for such residence) would be qualified to vote in the last place in which the person was domiciled before leaving the United States

Maricopa County shows that there are 12,293 eligible UOCAVA voters based on the November 7, 2020, VM34 Monthly Voter Rolls. Of these UOCAVA ballots transmitted, 85% or 10,408 were reported as returned. Historically, approximately 68% of UOCAVA voters return their ballot.

5.6.7.1 REFERENCES

- State of Arizona – 2019 Elections Procedures Manual³⁵
- Maricopa County UOCAVA Map Website³⁶
- US Election Commission 2020 Survey Results³⁷
- US Election Commission 2016 Survey Results³⁸

³⁵ https://azsos.gov/sites/default/files/2019_ELECTIONS_PROCEDURES_MANUAL_APPROVED.pdf

³⁶ <https://recorder.maricopa.gov/uocavamap/>

³⁷ <https://www.eac.gov/research-and-data/studies-and-reports>

³⁸ https://www.eac.gov/sites/default/files/eac_assets/1/6/2016_EAVS_Comprehensive_Report.pdf

5.6.7.2 DATA FILES UTILIZED

<u>File Name</u>	<u>MD5 Hash</u>
11-03-2020-0 Canvass COMPLETE NOV2020	ce62cc061b6bb56b4fd40aa4866adb16
Maricopa County-VM34 Voter Registration Nov 7, 2020	d7bfc018296832836d2bd8de440cba53

5.6.7.3 RECOMMENDATION

Legislators should consider auditing the UOCAVA voting system to determine whether any changes are required to ensure the integrity of the vote.

5.6.8 LATE REGISTERED VOTERS WITH COUNTED VOTES

**Ballots
Impacted** 198

Individuals who registered to vote after the October 15th deadline were allowed to cast a vote and these votes were counted. The Final Voted File, or the VM55, is the official record of who cast a vote for a given election. This file does not contain the Date of Registration for individuals who voted in the election, but it does include each person's Voter ID which can be cross referenced against the Full Voter File, or VM34, to get the registration date value.

It would be expected that either the October or the November VM34 file would contain all of the registered voters that voted in on the November 2020 General Election, but this was not the case. It took 12 different VM34 files ranging from April 9, 2017, to December 4th, 2020, to find all of the Voter IDs found in the Final Voted VM55 File for the 2020 General Election.

When utilizing multiple Full Voter Files that span multiple years it can get complicated to determine which data for a given Voter ID should be utilized when that Voter ID is found in more than one file. For the purpose of our analysis for this and other findings we assumed that the November 7, 2020, VM34 file would be the most accurate since it was right after the election, and the only VM34 officially provided by Maricopa County as part of a subpoena.

As a result, we loaded the data from VM34 files for every month from January 2017 through December 2020 into a database. First, we loaded the December 4, 2020, VM34 file. We then subsequently loaded the VM34 files from the oldest to the newest, with each subsequent VM34 file replacing the stored data for any Voter ID that had existed in a prior load and finishing with the November 7, 2020, file. This ensured that we always had the most current data for a given Voter ID, and the latest data from the last time a given Voter ID showed up in a VM34 file would always be utilized.

This composite VM34 file was then matched up with the VM55 file to provide additional details for all voters within the Final Voted VM55 file.

In all, it required data from the following VM34 files to match all the data:

<u>VM34 File Date</u>	<u># Of Matched Voters</u>
12/4/2020	605
11/7/2020	2,089,465
9/5/2020	1
8/8/2020	1
7/3/2020	1
6/6/2020	1
12/6/2019	2
10/5/2019	3
4/5/2019	1
2/2/2019	1
5/6/2017	1
4/9/2017	1

When building this file in this manner there were 198 voters registered after October 15th who voted in the election and had their vote counted, according to the Final Voted File.

NOTE: Individuals who register according to the Uniformed and Overseas Citizens Absentee Voting Act (UOCAVA) were not included in this list as the rules for UOCAVA allow registration up to 7:00pm on election day.

NOTE: Publicly, we had stated that there were 3,981 individuals who had registered after October 15th and voted. This was based on a wrong assumption by one of our data analysts who concluded that the only way the Official Canvass could match the Final Voted VM55 file was if those voters flagged as "Q," or uncounted provisional ballots, were in fact counted in the Official Canvass. While the discrepancy between the Official Canvass and the VM55 numbers are very similar to that number, assumptions should not have been made as to the reasoning for that.

NOTE: The following chart illustrates the percentage of voters by registered party that the Ballot Impacted number represents. This should give a rough idea on the impact to the electorate if the votes were cast by the voters and not another individual that was somehow able to cast a vote.

Party	%
Republican Party	33.84%
Democrat Party	31.82%
Prefer Not to Declare	33.33%
Independent	0.51%
Libertarian Party	0.51%

NOTE: Please see Appendix A for the complete VM55 Final Voted File with all of the various VM34 files.

NOTE: Please see Appendix O1 for a list of the late registered voters who voted.

5.6.8.1 REFERENCES

- A.R.S. § 16-152 – Registration Form³⁹
- A.R.S. § 16-120 – Eligibility to vote⁴⁰
- A.R.S. § 16-101 – Qualifications of registrant⁴¹

5.6.8.2 DATA FILES UTILIZED

File Name	MD5 Hash
Maricopa County-VM55 Final Voted Nov2020 PBRQ	43070bc7afdf40a37cd45092e9733654
Maricopa County-VM34 Voter Registration Oct 2, 2020	99a4440ae9bab7f0de96d7656b4e739d
Maricopa County-VM34 Voter Registration Nov 7, 2020	d7bfc018296832836d2bd8de440cba53
Maricopa County-VM34 Voter Registration Dec 4, 2020	255f69007b253c7f2737b050c439f269

5.6.8.3 RECOMMENDATION

Legislation should be considered that would require applications developed and utilized for voter rolls or voting to be developed to rigorous standards that ensure the confidentiality and integrity of the systems. This would prevent the entry of invalid data. Specifically, its recommended that the Open Web Application Security Project (OWASP) Application Security Verification Standard (ASVS) Level 3 be applied to all applications associated with voter rolls or voting and that it be required that this be fully validated no less than once every two years.

5.6.9 DATE OF REGISTRATION CHANGES TO EARLIER DATE

**Ballots
Impacted** 193

Dates of Registration in the Full Voter File, also known as a VM34, are periodically changing, including changing to earlier dates. Dates of Registration are significant because they can determine if someone is eligible to vote in an election, or if they're not eligible. Based on communications with the Maricopa County Recorder's Office, Dates of Registration should never change except for fixing the occasional mistake.

A review of the November 7, 2020, VM34 file and subsequent VM34 files for the remainder of 2020 and into 2021 show 891 dates of registration changes that would have made someone eligible to vote in the November 2020 General Election when their date of registration shown on the November 7th file would have prohibited it. Out of these 890 dates of registration, 193 had their votes counted in the 2020 General Election despite still having an ineligible date of registration on the November 7th VM34.

³⁹ <https://www.azleg.gov/ars/16/00152.htm>

⁴⁰ <https://www.azleg.gov/ars/16/00120.htm>

⁴¹ <https://www.azleg.gov/ars/16/00101.htm>

NOTE: The following chart illustrates the percentage of voters by registered party that the Ballot Impacted number represents. This should give a rough idea on the impact to the electorate if the votes were cast by the voters and not another individual that was somehow able to cast a vote.

Party	%
Prefer Not to Declare	34.20%
Republican Party	33.16%
Democrat Party	31.61%
Independent	0.52%
Libertarian Party	0.52%

NOTE: Please see Appendix P1 for more details on the voters whose registration dates were changed to an earlier date.

----- Forwarded Message -----
From: voterinfo - RISCX <voterinfo@risc.maricopa.gov>
To: [REDACTED]
Sent: Friday, September 3, 2021, 04:51:57 PM MST
Subject: RE: Customer Website Comments - Voter Information

Hello [REDACTED]

Thank you for your questions.

Are there any circumstances in which someone's registration date can change?

Generally, a voter's date of registration does not change outside of correcting a mistake. The date of registration is the date where the voter first registered to vote in the county, while any updates to a voter's registration is tracked separately.

The only time a voter may have two dates of registration is if their registration has previously been cancelled and the voter registers again. The original record could be cancelled for a variety of reasons, including death of the voter, voter request, or the voter has moved outside Maricopa County. Only the latest voter registration record is considered valid and a voter cannot use their cancelled record.

Does it always reflect the original registration in Maricopa County or can someone transfer a registration from another county?

The date of registration will always reflect the original date of registration in the county where the voter lives. Voter rolls are maintained at the county level, so counties only keep records of the voters in their jurisdiction. For example, Maricopa County can process and access records for our 2.6 million voters, but we do not keep records of Pima County voters.

If a voter moves to another county or state, that voter will have to reregister in their new location. We cannot transfer a voter registration between counties or states.

5.6.9.1 REFERENCES

- A.R.S. § 16-152 – Registration Form⁴²
- A.R.S. § 16-120 – Eligibility to vote⁴³
- A.R.S. § 16-101 – Qualifications of registrant⁴⁴

5.6.9.2 DATA FILES UTILIZED

File Name	MD5 Hash
Maricopa County-VM55 Final Voted Nov2020 PBRQ	43070bc7afdf40a37cd45092e9733654
Maricopa County-VM34 Voter Registration Oct 2, 2020	99a4440ae9bab7f0de96d7656b4e739d
Maricopa County-VM34 Voter Registration Nov 7, 2020	d7bfc018296832836d2bd8de440cba53
Maricopa County-VM34 Voter Registration Dec 4, 2020	255f69007b253c7f2737b050c439f269

5.6.9.3 RECOMMENDATION

Legislation should be considered that would require applications developed and utilized for voter rolls or voting to be developed to rigorous standards that ensure the confidentiality and integrity of the systems. Specifically, its recommended that the Open Web Application Security Project (OWASP) Application Security Verification Standard (ASVS) Level 3 be applied to all applications associated with voter rolls or voting and that it be required that this be fully validated no less than once every two years.

⁴² <https://www.azleg.gov/ars/16/00152.htm>

⁴³ <https://www.azleg.gov/ars/16/00120.htm>

⁴⁴ <https://www.azleg.gov/ars/16/00101.htm>

5.6.10 DUPLICATE VOTER IDS

Individuals were found within the voter rolls that had the same first name, last name, shared an address at one point in the past, and their birth years were within 10 years; suggesting they're the same person, but multiple Voter IDs. In all 186 cases both VoterIDs voted in the 2020 General Election.

NOTE: All Voter ID's associated with this finding can be found in Appendix Q1. This finding is not any clear indication of wrongdoing, and if wrongdoing occurred it may or may not have been the result of the individual whose Voter ID is listed in this report. It is recommended that the Attorney General follow-up further and determine if any additional action is needed.

NOTE: The following chart illustrates the percentage of voters by registered party that the Ballot Impacted number represents. This should give a rough idea on the impact to the electorate if the votes were cast by the voters and not another individual that was somehow able to cast a vote.

Party	%
Democrat Party	46.15%
Republican Party	30.77%
Prefer Not to Declare	15.93%
Independent	5.49%
Libertarian Party	1.65%

5.6.10.1 DATA FILES UTILIZED

File Name	MD5 Hash
Maricopa County-VM55 Final Voted Nov2020 PBRQ	43070bc7afdf40a37cd45092e9733654
Maricopa County-VM34 Voter Registration Nov 7, 2020	d7bfc018296832836d2bd8de440cba53

5.6.10.2 RECOMMENDATION

Legislation should be considered that requires the periodic review of the voter rolls for duplicate entries by the same name and year of birth. Legislation should also be considered that would require voter registration to validate that no other registered voter on the rolls registered with the same valid identification. This would prevent both accidental and purposeful multiple registrations.

5.6.11 MULTIPLE VOTERS VINKED BY AFFSEQ

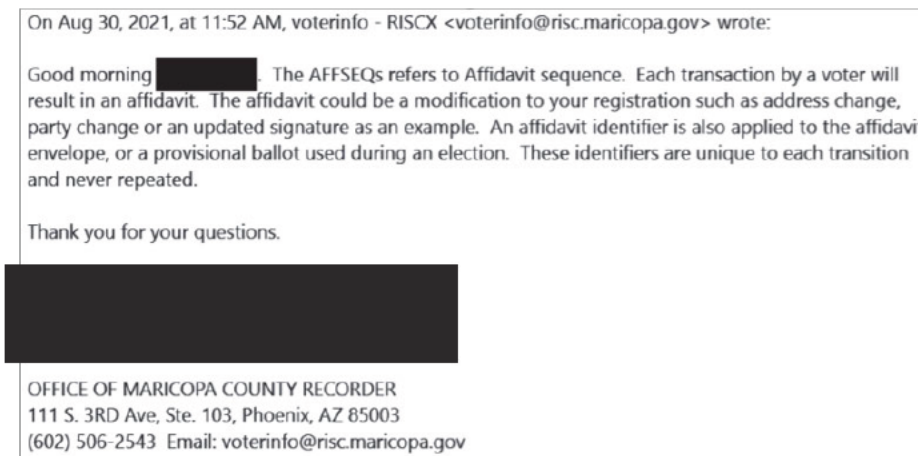
Each voter registration form has a unique, preprinted number on it much like a serial number on paper currency. This number is called an affidavit sequence number or AFFSEQ. It is preprinted, usually in the upper right-hand corner of every registration document. Each unique AFFSEQ number represents the specific registration document it is preprinted on.

Below is an example of an actual AFFSEQ number preprinted on a voter registration document. This specific AFFSEQ number [REDACTED] should only ever be associated with the voter and voter ID that filled out and signed this registration form this number was printed on.



The County uses AFFSEQ numbers and their corresponding registration documents to record any changes or updates to an individual voter's registration record. Every time a voter fills out a registration document, whether it be to register for the first time or to update their registration information with an address change, party change or signature update, the AFFSEQ number preprinted on their form is recorded in their voter record along with the date the form was signed by the registrant. A digital image of each registration document is created. The image is titled with the AFFSEQ number of the document it represents. The AFFSEQ identifier number is unique to each transaction, unique to the voter, and should never be repeated. As with paper currency, if more than one bill is found with the same serial number, then the bills are examined to determine which bill is the original and which is the duplicate.

Comparing the VM55 Final Voted file to the Maricopa County monthly VM34 files across time, between January 6, 2018-June 6, 2021, resulted in 5,711 instances where an affidavit sequence number was shared by multiple voters. It was confirmed with the County that AFFSEQ numbers are unique to the voter and should never be repeated.



Of the 5,711 instances of AFFSEQ numbers shared by multiple 2020 General Election voters, at least one vote was cast.

- In 101 of these instances, BOTH voter IDs linked by AFFSEQ voted in 2020 General Election.

160,223 AFFSEQ images were provided which is an extremely small percentage of the total AFFSEQ images that are recorded over time.

Upon examining hundreds of these AFFSEQ registration document images of voters sharing the same AFFSEQ number, it was found that:

- The same person is being assigned more than one voter ID number.
- Voter identities and their voter ID are being associated with other individuals with different names, addresses, identifying information and even of the opposite gender

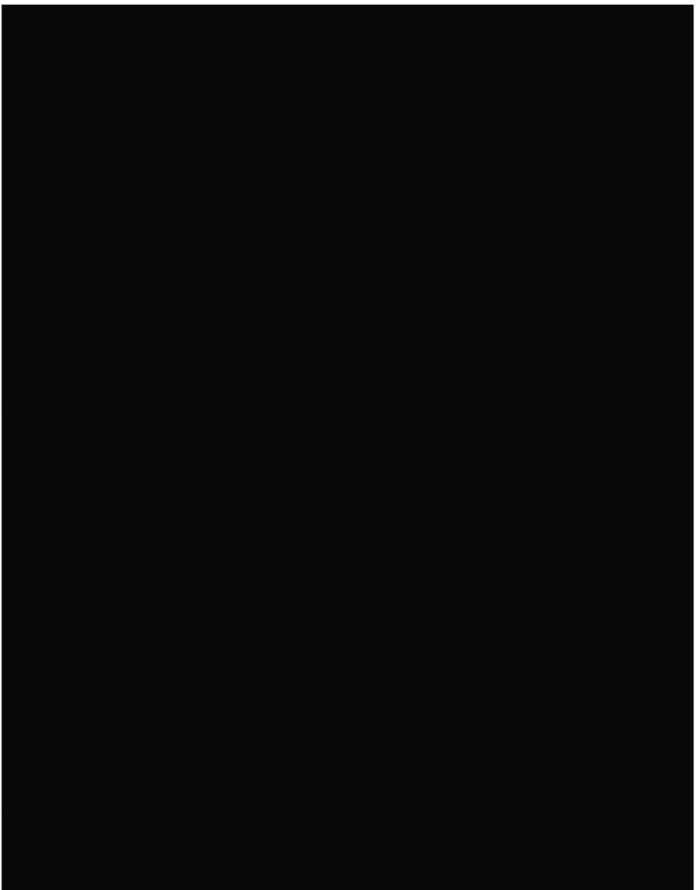
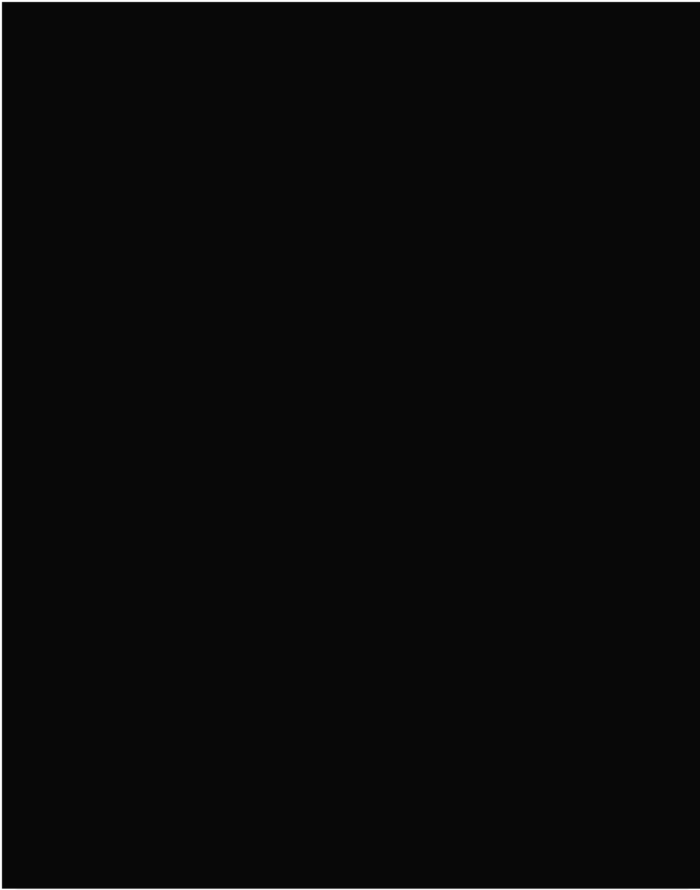
The registration document images of all shared AFFSEQ numbers need to be examined to determine which associated voter is correctly associated with the document.

Three samples of the types of issues we found in the 5,711 instances are documented below.

Same Person with Two Different Voter ID's Linked by AFFSEQ-Both Voter IDs Voted in GE2020:

In this sample instance, the same person, with her name misspelled in the voter registration database, shares an AFFSEQ with herself and also has two voter IDs. In the images below you can that the same person filled out two registration forms 10 days apart, she was given a unique voter ID in each instance even though both forms were filled out with the same name, address, birth date and phone number. A vote was cast by mail-in ballot for both voter IDs.

VOTER ID	Name	Address	DOB Year	Date of Registration	VM 34 File Name	Initial AFFSEQ	Initial Change Effective Date	Linked AFFSEQ	VM55 BALTYPE



Same Person with the Secondary Voter ID Given a Different Name and Address-Both Voter IDs Voted GE2020:

The first image below shows the voter information for two voters that share the same AFFSEQ number, [REDACTED]. County records show that in the 1/6/2018 VM34 file that [REDACTED] shared the same AFFSEQ number with [REDACTED]. These two voters have different names, addresses, and birth years.

In the registration image below, you can see that J Lancaster filled out a registration form on 4/10/2018. The preprinted AFFSEQ number on the form was [REDACTED]. [REDACTED] lists his birthyear as 1978 on this form. It is listed as 1975 in his voter record. He included his driver's license number as identifying information. On this form in the lower right-hand corner, a county employee wrote the voter ID number [REDACTED], identifying the connection with that voter ID. In row 1 of the voter record below, you see that voter ID number [REDACTED] belongs to [REDACTED], not [REDACTED]. The County employee identified that J Lancaster was connected with [REDACTED] in some way. The date the County employee stamped this form is April 23, 2018. Both voter IDs were used to vote in the 2020 General Election.

In row 2 you can see that J Lancaster has a voter ID number of [REDACTED]. [REDACTED] address in the VM34 record is in Phoenix. This corresponds with his voter registration form below.

VOTER ID	Name	Address	Birth Year	Date of Registration	VM34 File Date	Initial AFFSEQ	Initial Change Effective Date	Linked AFFSEQ	VM55 BALTYPE

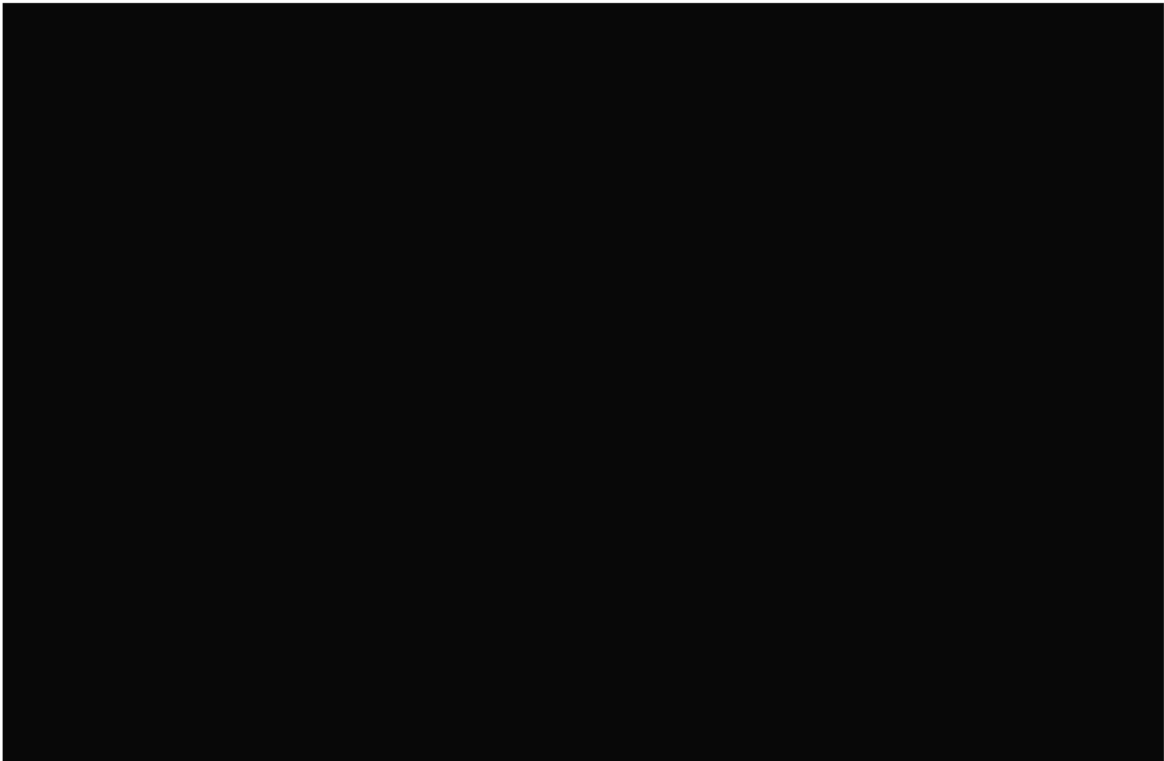
Male Voter Filled Out Registration Form but a Female is Recorded as Associated with His Registration Form, Both Are Linked by AFFSEQ-Both Voter IDs Voted GE2020:

Just as no two voters should share an AFFSEQ number, no two voters should share a voter ID number. The County confirmed that voter IDs are generated automatically and that they are never reused. It was found that not only are two voters sharing an AFFSEQ number, but they are also sharing a voter ID number.

██████████ registered to vote on 9/25/2018. The AFFSEQ on his registration form is ██████████. He was given voter ID number of ██████████. In row 1 below you can see that his voter ID number is now associated with ██████████, a female, at a different address in Phoenix. This unknown person who is using ██████████ original voter ID voted in the 2020 General Election using a mail in ballot. ██████████ voted in person on election day.

██████████ filled out a registration form again on ██████████. He was given voter ID number ██████████. ██████████ voted in 2020 General Election in person at the polls. We do not have an image of this voter registration as it was not in the limited AFFSEQ images supplied to us by the County.

VOTER ID	Name	Address	Birth Year	Date of Registration	VM34 File Date	Initial AFFSEQ	Initial Change Effective Date	Linked AFFSEQ	VM55 BALTYPE



NOTE: The following chart illustrates the percentage of voters by registered party that the Ballot Impacted number represents. This should give a rough idea on the impact to the electorate if the votes were cast by the voters and not another individual that was somehow able to cast a vote.

Party	%
Democrat Party	42%
Republican Party	33%
Prefer Not to Declare	22%
Independent	2%
Libertarian Party	1%

NOTE: Please see Appendix R1 for a complete list of users who have shared an AFFSEQ.

5.6.11.1 REFERENCES

- State of Arizona – 2019 Elections Procedures Manual⁴⁵

5.6.11.2 DATA FILES UTILIZED

File Name	MD5 Hash
Maricopa County-VM55 Final Voted Nov2020 PBRQ	43070bc7afdf40a37cd45092e9733654
VM34_20170107_113131.txt	fb675c6b6ad9757759a1e686ce87a17f
VM34_20170204_104417.txt	02a1003bf8ddc1a0cc547032c73505db
VM34_20170305_102136.txt	708ea30d01595f1552892a13e1c11eeb
VM34_20170409_044850.txt	9b25f73a824589bd70e20fe02cb1f703
VM34_20170506_094005.txt	d8bbaacbaaffba5321ac4b22d7aaebf5e
VM34_20170604_014543.txt	ecb6f6760b313b135c6a9ba7e4d6369a
VM34_20170708_091800.txt	76c897e712aba76072dff3fb68e8d29c
VM34_20170805_111659.txt	ad9f1e228123d67c9774d5c4de3a4442
VM34_20170903_031323.txt	05cfd1aa1f82392f99c65e394d526470
VM34_20171008_021223.txt	6e199b2b3fc9a98c78d4c3ee76727720
VM34_20171103_103144.txt	c7890363fbaf1de622af2f589d0a48d4
VM34_20171203_070930.txt	b796c93976f7d89cd53d09a26406fcf
VM34_20180106_024335.txt	74823063c6c04beb0ae2ba94789992b8
VM34_20180203_063848.txt	6b55c00202aa4edb39bb47bac27e7545
VM34_20180302_095453.txt	8c6e9e7edaaff58b2b4635c3ad56369c
VM34_20180406_081509.txt	fc3f8d71d9cdfefbc10aeaf7fb5c4290b
VM34_20180504_093125.txt	fa683fa02fd0d9bfcabc52a106af6873e
VM34_20180602_102915.txt	c99fd11d76648af61948842161d1d197
VM34_20180707_024237.txt	b6141774c149ea2f7695e230d5f78eb9
VM34_20180803_115351.txt	351a3107ef1a7e5a907c1137393216ee
VM34_20180907_091404.txt	62e7d11db59dbb5be078b7a3374125be
VM34_20181005_112120.txt	1b07988566c762821d625a0477269d3c
VM34_20181102_105026.txt	cb73855d70509a13a52beedde18666a3
VM34_20181209_032523.txt	9838a26c37f016d0e87adb43a9501707
VM34_20190106_084008.txt	6f4be0c41404d12bb0f6ff69d8f27a28
VM34_20190202_063949.txt	cc8a7b9b1cf66a9b8fce0905df71af74
VM34_20190302_090830.txt	15ec5c127b37ec91c1c14708e7a9421d
VM34_20190405_074946.txt	fb6ecbf069154cbb8149d4af8348c6c4
VM34_20190503_080954.txt	b130edae7a4ae04afcf8e459c085fc2d
VM34_20190608_035533.txt	301287923fc8327b259c286712f0b38c
VM34_20190705_102047.txt	b89551ec6616a148a0a6eb0d9a9eb9a4
VM34_20190802_093213.txt	b2517193b03f9820c3588789890cd505
VM34_20190906_115511.txt	7fe4f70c92e995a87cd67c69feac348a
VM34_20191005_075436.txt	30cd819a5b53759ebd9b35fcf4f2f515

⁴⁵ https://azsos.gov/sites/default/files/2019_ELECTIONS_PROCEDURES_MANUAL_APPROVED.pdf

File Name	MD5 Hash
VM34_20191206_062132.txt	4d7d56540c50bcb9efd53882f65dafa9
VM34ALL_20201107_003451.txt	d7bfc018296832836d2bd8de440cba53
VM34_20200103_062658.txt	ea5eb36acb1f3a20204fc860578755bc
VM34_20200208_124009.txt	cb840187d01b8d26f4a192a29de0729a
VM34_20200306_114048.txt	92b41e30958182e994ff86b5600c9002
VM34_20200403_113114.txt	5460b45b91f6709ee118e2385020b102
VM34_20200502_014453.txt	c44bf7968e9bf4fde446f5c43da584ef
VM34_20200606_001100.txt	1d8b12eea610b5b55f07d9fad1d8af80
VM34_20200703_213734.txt	47afb6e874c859a08c4105f912981330
VM34_20200808_004341.txt	8cb279714659f945f154129ea757f677
VM34_20200905_001156.txt	11ec4b2896389484429edbab5a717bd
VM34_20201002_235246.txt	99a4440ae9bab7f0de96d7656b4e739d
VM34_20201204_214820.txt	255f69007b253c7f2737b050c439f269
VM34_20210101_194641.txt	55e2e5308c1c818ab64e58b2952d63cc
VM34_20210205_184914.txt	3c1a1c1a8400464de6a4730d4e50f6c3
VM34_20210305_191848.txt	af6f78181173c9e7cad7e5f17029dd20
VM34_20210402_214448.txt	2fa8f197af888c6e0604ac9ca849aa1b
VM34_20210507_194658.txt	3a7e950b1d9e0d657a4a45e0b22506a5
VM34_20210604_190336.txt	30f1fe36c5ad4eac2a7ca5508663b9bf

5.6.11.3 RECOMMENDATION

Legislation should be considered that would require applications developed and utilized for voter rolls or voting to be developed to rigorous standards that ensure the confidentiality and integrity of the systems. Specifically, its recommended that the Open Web Application Security Project (OWASP) Application Security Verification Standard (ASVS) Level 3 be applied to all applications associated with voter rolls or voting and that it be required that this be fully validated no less than once every two years.

5.6.12 DOUBLE SCANNED & COUNTED BALLOTS

While examining batch discrepancies between the hand count and the Maricopa County Cast Vote Record (CVR) totals, we discovered that the county double counted ballots. We continue to review the Dominion images to identify the total number of double counted ballots. EVC4/10-26 thru 10-28/3385 which has a 50-ballot discrepancy is presented as an example below. The image shows one of 50 ballots that were tabulated twice giving each associated voter – two votes.



Tabulator 6004, BIC 288, Image 0154 (EV Batch 1377)

5.6.12.1 DATA FILES UTILIZED

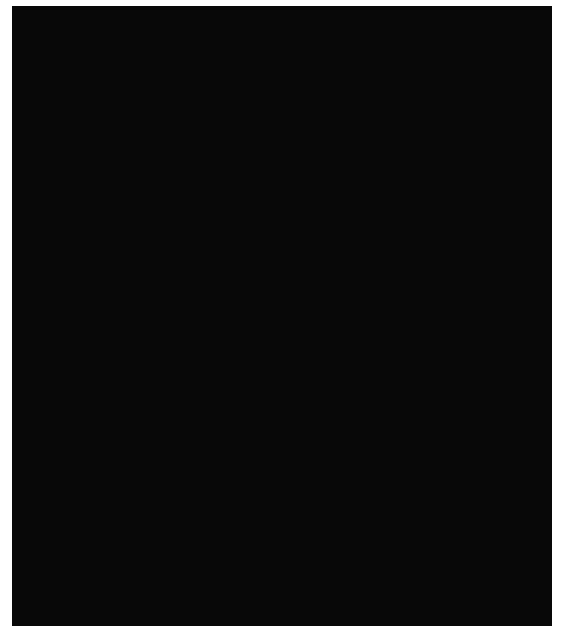
File Name	MD5 Hash
Maricopa County Transfer Manifests	N/A
Maricopa County Daily Ballot Summary	N/A
Maricopa County 2020 General Election Cast Vote Record	c31a2f34714b7582cb17e907be3152e0

5.6.12.2 RECOMMENDATION

Maricopa County officials should audit the tabulation process daily to ensure no batches are scanned and tabulated multiple times.

5.6.13 UOCAVA ELECTRONIC BALLOTS DOUBLE COUNTED	Ballots Impacted	6
---	-----------------------------	---

During our hand count, we identified multiple UOCAVA ballots that had been printed and duplicated more than once (e.g., Double Votes). Below is one example of one double printed UOCAVA ballot that was assigned two different serial numbers and submitted for duplication. This would result in two votes being counted for this one voter.



5.6.13.1 REFERENCES

- EAC - 2018 UOCAVA Data Set⁴⁶

5.6.13.2 RECOMMENDATION

Legislation should be considered which would require that systems utilized for UOCAVA would keep track of and help prevent the double-printing of ballots.

⁴⁶ <https://www.eac.gov/research-and-data/datasets-codebooks-and-surveys>

5.6.14 DUPLICATE BALLOTS REUSE SERIAL NUMBERS

Duplicate Ballots were found reusing serial numbers. Without unique serial numbers its near impossible to match an original ballot (DSD) with its duplicated ballot (DUP).

Below is an example of a serial number used multiple times:

BOX ID	TYPE	SERIAL NO.
EVH1/11-11/DUP 175044	DUP	DUP294104
Original Damaged Ballots SD 8	DSD	DUP294104
Original Large Print Sent to Duplication 2	DSD	DUP294104
DSD RANDOM SAMPLE REVIEW 2	DSD	DUP171329
EVH1/11-07/DUP9582	DUP	DUP171329
Original Damaged Ballots SD 8	DSD	DUP171329

5.6.14.1 REFERENCES

- State of Arizona – 2019 Elections Procedures Manual⁴⁷
- A.R.S. § 16-621 – Proceedings at the counting center⁴⁸

5.6.14.2 RECOMMENDATION

Legislation should be considered that would explicitly require each damaged ballot to have a unique serial number in order to match it up with its original.

⁴⁷ https://azsos.gov/sites/default/files/2019_ELECTIONS_PROCEDURES_MANUAL_APPROVED.pdf

⁴⁸ <https://www.azleg.gov/ars/16/00621.htm>

5.7 Informational Findings

5.7.1 AUDIT INTERFERENCE

Ballots
Impacted N/A

Runbeck Election Services is a privately owned company that provided election services including the printing of all mail ballots for Maricopa County in the 2020 General Election. Prior to the start of the audit, members of the audit team conducted research into the paper, ink, toner and format of the official ballots. As part of that research, the audit team contacted Runbeck CEO, to ask several general questions about the ballots used in the 2020 General Election. Initially, the CEO agreed to a call but then asked for the questions in writing. As requested, the audit team sent Mr. Ellington 5 general questions via email. Mr. Ellington responded to that email and said that Maricopa County instructed him that vendors, even private companies, should not speak with auditors. Maricopa County refused to provide the information about the ballot paper and ballot printing and then interfered with the auditor's communication with Runbeck, a private company that does business with hundreds of other jurisdictions and entities.

5.7.1.1 RECOMMENDATION

Legislators should consider legislation that would prohibit interference with legislative investigations under a criminal penalty.

5.7.2 BATCH DISCREPANCIES

Ballots
Impacted N/A

A comparison of our hand count totals to the CVR totals has revealed numerous discrepancies. We are in the process of comparing the Dominion images of ballots to determine the cause of the discrepancy. Below are two examples of discrepancies.

7	EVC1/10-31/6841 ✓	6841, 6835, 6553, 6875, 6966, 6717, 6807
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Above: Maricopa County Ballot Transfer Manifest showing EV batches in the box.

Operator: <i>RSN/ANA</i> MARICOPA COUNTY ELECTIONS DEPARTMENT <i>10/31</i>					
Starting #: <i>6375</i> Page <i>1</i> of <i>10</i>					
GENERAL ELECTION NOVEMBER 3, 2020	EV BATCH #	EV COUNT	BTC BATCH #	TOTAL BALLOTS	TO DUPE
<i>1371 Hand Count</i>	<i>6207</i>	<i>199</i>	<i>33</i>	<i>199</i>	
<i>-6</i>	<i>6891</i>	<i>198</i>	<i>34</i>	<i>198</i>	
	<i>6835</i>	<i>199</i>	<i>35</i>	<i>199</i>	
	<i>6841</i>	<i>200</i>	<i>36</i>	<i>200</i>	
	<i>6553</i>	<i>199</i>	<i>37</i>	<i>199</i>	
	<i>6875</i>	<i>200</i>	<i>38</i>	<i>200</i>	
	<i>6966</i>	<i>200</i>	<i>39</i>	<i>199</i>	
<i>Accidentally split</i>	<i>6717</i>	<i>199</i>	<i>40</i>	<i>95</i>	<i>1</i>
<i>Batch</i>	<i>6717</i>	<i>199</i>	<i>41</i>	<i>104</i>	
	<i>6807</i>	<i>200</i>	<i>42</i>	<i>200</i>	
	<i>6811</i>	<i>198</i>	<i>43</i>	<i>198</i>	
	<i>6948</i>	<i>200</i>	<i>44</i>	<i>200</i>	
	<i>6791</i>	<i>199</i>	<i>45</i>	<i>199</i>	

Above: Maricopa County Daily Ballot Summary for 10-31-2020 Tabulator C1. Note that BTC Batch 40 has 95 ballots and BTC Batch 41 has 104 ballots which combine to make up EV Batch 6717 which should have 199 total ballots.

tabulatorbatch d	tabulator d	batch d	f e	ba ots
06001_00033	06001	00033	566	199
06001_00034	06001	00034	577	199
06001_00035	06001	00035	595	198
06001_00036	06001	00036	608	200
06001_00037	06001	00037	789	200
06001_00038	06001	00038	791	191
06001_00039	06001	00039	795	200
06001_00040	06001	00040	801	200
06001_00041	06001	00041	782	199
06001_00042	06001	00042	786	199
06001_00043	06001	00043	792	199
06001_00044	06001	00044	796	199

The CVR summary, pictured above, shows that BTC Batch 40 had 200 ballots tabulated and BTC Batch 41 had 199 ballots tabulated. These numbers do not match the Blue Sheet totals. Pallet 7 Box EVC1/10-31/6841 has only 1396 ballots but the CVR shows 1500 ballots. This results in a discrepancy of -104 ballots.

5.7.2.1 DATA FILES UTILIZED

File Name	MD5 Hash
Maricopa County Transfer Manifests	N/A
Maricopa County Daily Ballot Summary	N/A
Maricopa County 2020 General Election Cast Vote Record	c31a2f34714b7582cb17e907be3152e0

5.7.2.2 RECOMMENDATION

Maricopa County officials conduct daily audits and quality control measure to reduce errors.

5.7.3 COMMINGLED DAMAGED AND ORIGINAL BALLOTS

The 2019 Election Procedure Manual requires that all original damaged ballots sent to duplication be placed in an envelope or container labeled “Ballots that have been duplicated.” The County delivered boxes of ballots that were commingled and incorrectly identified. Batches identified on the manifest as original ballots were, in fact, machine duplicated ballots. The auditors could not rely on the County’s description of ballot boxes or batches identified on the manifest. Hours of careful examination were required to unravel the inaccurate documents provided to ensure that votes were not counted twice.

As an example, in Box EVH1/11-07/MC17349, the manifest shows that there are 14 batches of original ballots. When the auditors opened the boxes to count the ballots, they observed 7 batches of original ballots, 8 batches of duplicate ballots and one batch missing from the manifest. Batches of duplicate ballots in boxes of original undamaged ballots is a difficult issue to unravel. During the hand count, we also identified several instances of damaged ballots in boxes with original ballots. We are unable to determine if the damaged ballots had been duplicated and tabulated as duplicates. The Election Procedures Manual makes it clear that damaged ballots sent to duplication must be separated and the County did not consistently adhere to this rule.

The Arizona Secretary of State claims that duplicate ballots and the original damaged ballots sent to duplication are to be segregated. In case No. CV2020-015285, Roopali Desai represented Arizona Secretary of State Katie Hobbs and said:

THE COURT: And those are segregated? I'm -- those-- they don't get put in the pile where we're not going to be able to find them anymore, right? We know where those are?

MS. DESAI: Duplicated ballots are -- those are --the original as well as the duplicated ballots are, by statute, segregated and preserved.

5.7.3.1 REFERENCES

- [Arizona Supreme Court Case – CV2020-015285](#)⁴⁹
- [State of Arizona – 2019 Elections Procedures Manual](#)⁵⁰

5.7.3.2 RECOMMENDATION

All duplicated ballots should be separated and properly identified as duplicates. All original damaged ballots sent to duplication should be separated and properly identified in compliance with the EPM.

⁴⁹ https://www.supremecourt.gov/DocketPDF/20/20-809/163521/20201211121632424_12-11-20%20Appendix%20Ward%20v%20Jackson.pdf

⁵⁰ https://azsos.gov/sites/default/files/2019_ELECTIONS_PROCEDURES_MANUAL_APPROVED.pdf

5.7.4 EARLY VOTES NOT ACCOUNTED FOR IN EV33

Ballots
Impacted N/A

The EV33 Early Voting Return Files do not contain entries for 255,326 Early Voters which are recorded in the VM55 Final Voted File. Individuals that vote as part of Early Voting, either by mail or in person, should have an EV33 entry related to their casting of a vote containing details as to when and how that vote was cast. Without an EV33 these details are unavailable, and it could make some types of audits impossible.

Ballot Type	Number of Voters
B – Early Vote - In-Person	38,817
R – Early Vote - Mail-In	187,823

NOTE: Please see Appendix S1 for a complete list of the entries from the VM55 file without EV33s.

5.7.4.1 REFERENCES

- A.R.S. § 16-558.01 – Mailing of Ballots⁵¹
- A.R.S. § 16-246 – Early Balloting⁵²
- A.R.S. § 16-542 – Request for ballot⁵³

5.7.4.2 DATA FILES UTILIZED

File Name	MD5 Hash
EV33-1377-10-09-2020_101111.txt	f1daa7089f7300237f6b4ff779661cf9
EV33-1377-10-12-2020_113210.txt	72e4e6c102e3539b4dd15b4454357b69
EV33-1377-10-13-2020_111553.txt	9b14841281c031533322b50aabb86a24
EV33-1377-10-14-2020_112757.txt	1b7537d7d9b927dbf4e462ed5ee8f97c
EV33-1377-10-15-2020_121331.txt	dec7d08dde4970c26e32b8c844f4a9ab
EV33-1377-10-16-2020_113522.txt	f0a632c3fd9b5f177d48504dc119be31
EV33-1377-10-19-2020_111708.txt	db80b692a9188add0844a8974e227287
EV33-1377-10-20-2020_112351.txt	57d1795db8be71d516e29350e347fb3a
EV33-1377-10-21-2020_111843.txt	56c3b5a11651c68735164c578eade4e1
EV33-1377-10-22-2020_111714.txt	03551f170bf758efc90c013d0fe2e467
EV33-1377-10-23-2020_112614.txt	dbfdd369ac148723540c83f614cca454
EV33-1377-10-26-2020_111318.txt	0b68adff779f59c70a530000bf989aca
EV33-1377-10-27-2020_111413.txt	a6fc7377bf6c6fe6653f539c5970a6f7
EV33-1377-10-28-2020_111331.txt	43758b9290f90d0305d5ed84aa10becb
EV33-1377-10-29-2020_111300.txt	410b30b06f2ca73022f27173fe114038
EV33-1377-10-30-2020_111804.txt	5cb44e5ea214f40227e04345d4355ff7
EV33-1377-11-02-2020_111214.txt	5d15bb8686a022f53400550cfe010a07

⁵¹ <https://www.azleg.gov/ars/16/00558-01.htm>

⁵² <https://www.azleg.gov/ars/16/00246.htm>

⁵³ <https://www.azleg.gov/ars/16/00542.htm>

5.7.4.3 RECOMMENDATION

Legislation should be considered that requires that the various election related systems to properly integrate to give accurate and consistent counts between the mail-in ballots cast, mail-in ballots received, mail-in ballots accepted, mail-in ballots rejected, and be able to reconcile these details with who voted in the final voted file.

5.7.5 HIGH BLEED-THROUGH RATES ON BALLOTS

**Ballots
Impacted** N/A

A large number of the ballots from in-person voting, primarily on Election Day (ED), experienced bleed-through where the marks from one-side of the ballot were clearly visible on the other side of the ballot. This does not happen when the manufacturer recommended paper is utilized under normal circumstances.

The biggest concern with bleed through is if it occurs in a place that might somehow impact the reading of the ballot on the other side of the paper. Ballots are generally designed to minimize this potential by offsetting the races on each side of the paper so that if bleed-through does happen it is a safe distance away from the ballot ovals on the other side of the paper. Maricopa County Ballots were designed in this manner.

The effect of this offsetting can be hampered, however, if the ballot printer is not in calibration (Please see Section 5.7.10, "Out of Calibration Ballot Printers"). When this occurs the miscalibration causes the front of the ballot to not align where it was intended to on the back of the ballot. If this miscalibration is off enough it could allow the bleed-through to fill out a ballot oval on the other side of the paper and cast a vote, cause an overvote, or simply confuse the tabulator enough to send the ballot to adjudication. Out of the several thousand ballot images that were manually reviewed we could not find any images where bleed-through was close enough to a ballot oval to cause mistabulation, nor did we see any immediate correlation with adjudication. The Dominion tabulators appeared to focus on the actual oval and no bleed-through example was found where a ballot printer was so miscalibrated it actually filled a portion of the oval.

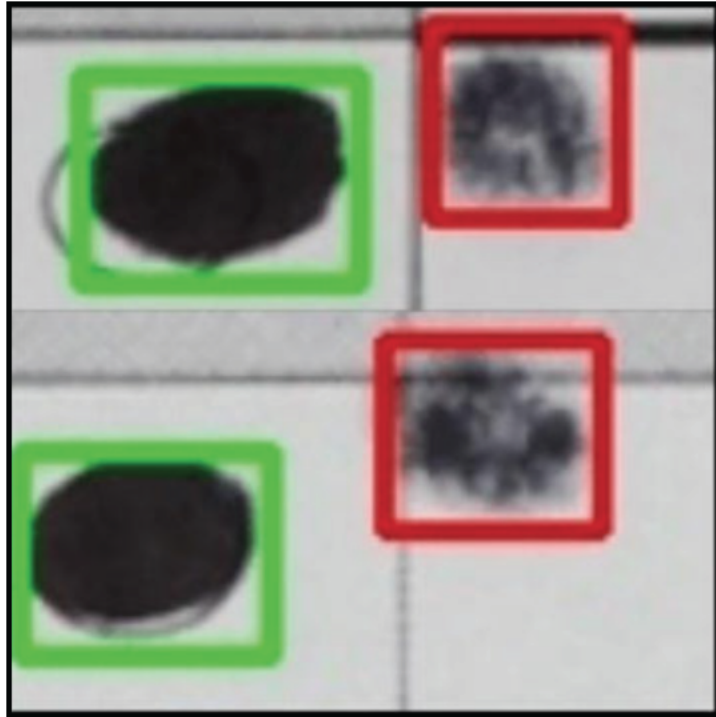


Figure 1 - Green is around the actual vote. The red boxes show the bleed through from the other side.

5.7.5.1 REFERENCES

- Dominion Printing & Finishing Specifications⁵⁴

5.7.5.2 RECOMMENDATION

Legislation should be considered that would require that the election equipment be properly maintained, including, but not limited to ensuring that ballot printers are in the proper calibration.

6.7.5.3 INSTANCES

Kinematic Artifact processing is currently evaluating the ballot images to do a full analysis of bleed-through. A full report documenting all of the bleed-through is expected in the coming weeks. At this time, this particular issue appears to be systemic to any non-Runbeck printed ballots.

⁵⁴ <https://www.sos.state.co.us/pubs/elections/VotingSystems/DVS-DemocracySuite511/documentation/SD-IC-PrintingSpecification-5-11-CO.pdf>

5.7.6 IMPROPER PAPER UTILIZED

A large number of the ballots from in-person voting, utilized paper that is not recommended by the manufacturer of the tabulators for use in the systems. This can result in higher jam rates, more bleed through, and could theoretically impact the readability of the ballots by the scanners, but this last case is extremely unlikely. At this time 10 different papers have been found. Several of these paper stocks include paper with the weight from 20lb to 30lbs; when the generally accepted best practice for voting is to utilize ballot stock of 80lbs or higher. Since this type of paper is generally not tested within the equipment, nor part of the Logic and Accuracy testing, the effects of utilizing it is unclear.

The large number of papers utilized during this election and the lack of official reporting about what paper stocks were utilized made it difficult to identify any potential counterfeit ballots. Standardization on these details would more greatly facilitate future audits.

5.7.6.1 REFERENCES

- Dominion Printing & Finishing Specifications⁵⁵

5.7.6.2 RECOMMENDATION

Legislation should be considered that would require that paper stocks utilized on election day should conform to manufacturer recommendations to ensure that the paper that has been tested in the device is what is actually utilized to cast votes. Legislation should also be considered that mandates the standardization of paper utilized for the election including requiring that the ballot stock amounts utilized be fully accounted for and tracked.

5.7.6.3 INSTANCES

Kinematic Artifact processing is currently evaluating the ballot images to do a full analysis of types of paper utilized. A full report documenting all of the papers utilized is expected in the coming weeks.

⁵⁵ <https://www.sos.state.co.us/pubs/elections/VotingSystems/DVS-DemocracySuite511/documentation/SD-IC-PrintingSpecification-5-11-CO.pdf>

5.7.7 INACCURATE IDENTIFICATION OF UOCAVA BALLOTS

Ballots
Impacted N/A

Maricopa County identified only one box on the manifest as having UOCAVA Original Ballots sent to duplication. The audit team examined all other boxes of ballots and identified 6 other boxes that were inaccurately labeled. All UOCAVA ballots identified by the County were 8 ½" X 11" copies of electronically submitted voted ballots. UOCAVA ballots were found in boxed labeled Braille Ballots and boxes labeled the generic Original Ballots/Damaged/Sent to Duplication. This inaccurate labeling of UOCAVA boxes gave the impression that there were far fewer UOCAVA ballots than were actually counted.

Ballot Custody Transfer Manifest
Arizona Senate Fifty-Fifth Arizona Legislature / First Regular Session Subpoena Duces Tecum
Karen Fann, President of the Arizona Senate / Warren Petersen, Chairman of Senate Judiciary Committee

Transfer Date: 3/3/2021
Total Boxes: [REDACTED]
Observed by: [REDACTED]

Pallet #	Box # (Ballot Type, Machine, Date, First Batch)	Batches
41	[REDACTED]	✓ 1 Original Ballots/Damaged/Sent to Duplication
41	[REDACTED]	✓ 2 Original Ballots/Damaged/Sent to Duplication
41	[REDACTED]	✓ 3 Original Ballots/Damaged/Sent to Duplication
41	[REDACTED]	✓ 4 Original Ballots/Damaged/Sent to Duplication
41	[REDACTED]	✓ 5 Original Ballots/Damaged/Sent to Duplication
41	[REDACTED]	✓ 6 Original Ballots/Damaged/Sent to Duplication
41	[REDACTED]	✓ 7 Original Ballots/Damaged/Sent to Duplication
41	[REDACTED]	✓ 8 Original Ballots/Damaged/Sent to Duplication
41	[REDACTED]	✓ 9 Original Ballots/Damaged/Sent to Duplication
41	[REDACTED]	✓ 10 Original Ballots/Damaged/Sent to Duplication
41	[REDACTED]	✓ 11 Original Ballots/Damaged/Sent to Duplication
41	[REDACTED]	✓ 12 Original Ballots/Damaged/Sent to Duplication
41	[REDACTED]	✓ 13 Original Ballots/Damaged/Sent to Duplication
41	[REDACTED]	✓ 14 Original Ballots/Damaged/Sent to Duplication
41	[REDACTED]	✓ 15 Original Ballots/Damaged/Sent to Duplication
41	[REDACTED]	✓ 16 Original Ballots/Damaged/Sent to Duplication
41	[REDACTED]	✓ 1 Braille Original to Duplication
41	[REDACTED]	✓ 2 Braille Original to Duplication
41	[REDACTED]	✓ 3 Braille Original to Duplication
41	[REDACTED]	✓ 1 Large Print Original to Duplication
41	[REDACTED]	✓ 2 Large Print Original to Duplication
41	[REDACTED]	✓ 3 Large Print Original to Duplication
41	[REDACTED]	✓ 1 Election Day Damaged Original to Duplication
41	[REDACTED]	✓ 1 Provisional Damaged Original to Duplication
41	[REDACTED]	✓ 1 UOCAVA Original to Duplication
41	[REDACTED]	✓ Data Cards - ICP2s - Election Day/USB Drives for Results
41	[REDACTED]	✓ 1 Upload
41	[REDACTED]	✓ 2 Totals Tapes - ICP2s - Election Day
41	[REDACTED]	✓ 3 Totals Tapes - ICP2s - Election Day
41	[REDACTED]	✓ Original Damaged Ballots for Duplication - Random
41	[REDACTED]	✓ 4 Sample Review #1 (Box 1 of 2)
41	[REDACTED]	✓ Original Damaged Ballots for Duplication - Random
41	[REDACTED]	✓ 5 Sample Review #1 (Box 2 of 2)
41	[REDACTED]	✓ Original Damaged Ballots for Duplication - Random
41	[REDACTED]	✓ 6 Sample Review #2 (Box 1 of 2)

✓ Orig Dam Ballots for Dupl - Rand
Sample Rev #2 Box 2 of 2 CN

4/22/2021

5.7.7.1 RECOMMENDATION

Legislation should be considered that requires UOCAVA systems to be designed in a manner to prevent potential multiple copies of UOCAVA ballots from being printed.

5.7.8 MISSING SUBPOENA ITEMS

Ballots
Impacted N/A

The original subpoena dated January 13, 2021, required Maricopa County to provide “Access to all original, paper ballots (including but not limited to early ballots, Election Day Ballots and Provisional Ballots).” The auditors did not receive the following original ballots:

- Rejected Provisional Ballots
- Uncured Mail Ballots
- Ballots returned to the County as undeliverable

Failing to receive these components prevented portions of the audit from being completed, such as validating that the right number of provisional ballots existed, and that ballots returned to the County as undeliverable were properly accounted for and were not reused in some other context. Since these items were not provided, this work was not able to be completed.

5.7.9 NO RECORD OF VOTERS IN COMMERCIAL DATABASE

Ballots
Impacted N/A

All voters within the Final Voted File, or VM55, was cross-checked against a commercially available data source provided by Melissa⁵⁶ called Personator and 86,391 individuals were found with no record in the database for either their name, or anyone with the same last name at the address in the VM55 file. It is expected that most if not all of these individuals are in fact real people with a limited public record and commercial presence. It is highly recommended that this list be further validated with canvassing to determine what percentage of these voters represent current and valid voters.

Personator is a best-in-class identity and address validation tool. It confirms that an individual is associated with an address, indicates prior and current addresses, tracks when and where the individual moves, tracks date-of-birth and date-of-death. To accomplish this, it utilized both private and government data sources such as the US Postal Service’s National Change of Address (NCOA) service, and the Social Security Administration’s Master Death List.

NOTE: The following chart illustrates the percentage of voters by registered party that the Ballot Impacted number represents. This should give a rough idea on the impact to the electorate if the votes were cast by the voters and not another individual that was somehow able to cast a vote.

Party	%
Democrat Party	43.97%
Prefer Not to Declare	29.83%
Republican Party	22.21%
Independent	2.55%
Libertarian Party	1.3%
Green Party	0.12%

5.7.9.1 DATA FILES UTILIZED

File Name	MD5 Hash
Maricopa County-VM55 Final Voted Nov2020 PBRQ	43070bc7afdf40a37cd45092e9733654

⁵⁶ <https://www.melissa.com>

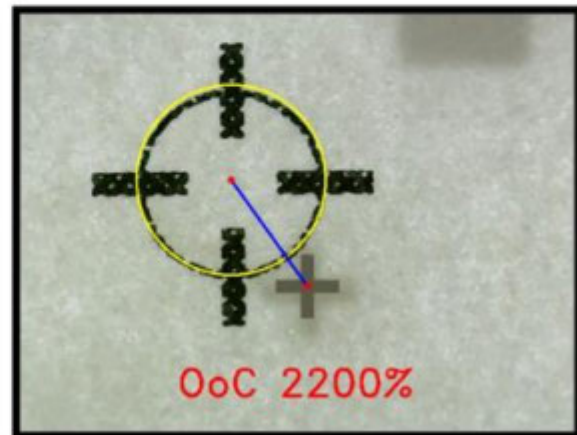
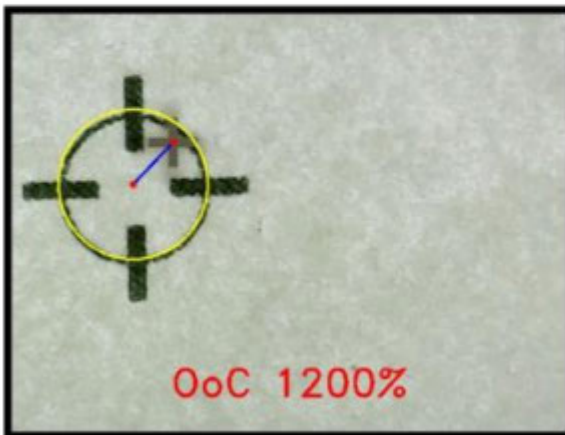
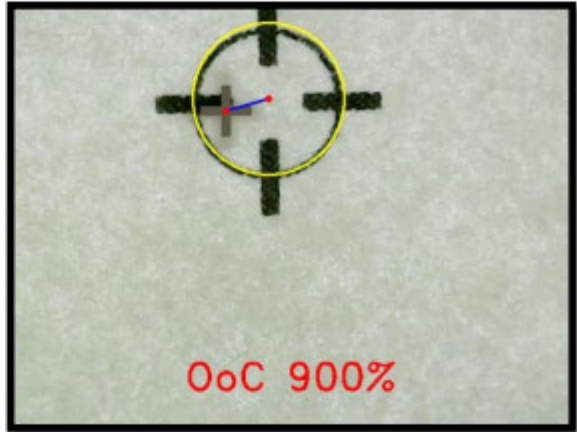
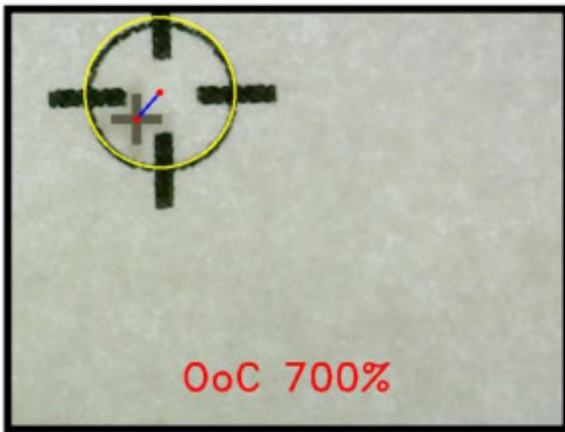
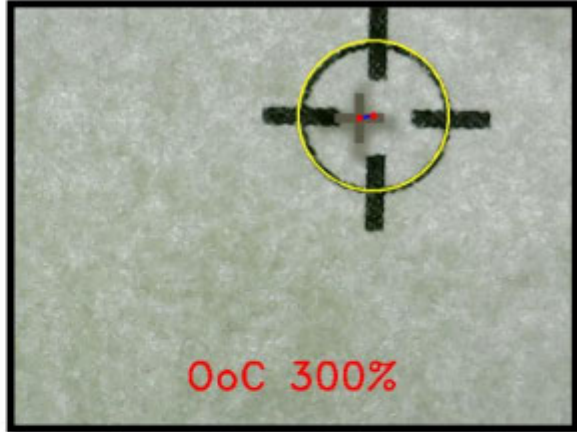
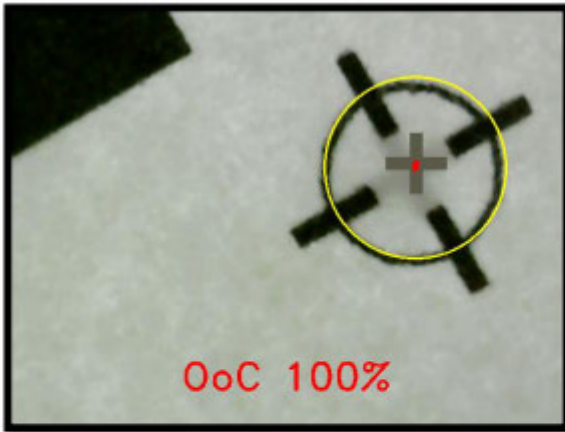
5.7.9.2 RECOMMENDATION

Legislation should be considered that requires a periodic review and maintaining of the voter rolls to be sure it represents current Arizona residents.

5.7.10 OUT OF CALIBRATION BALLOT PRINTERS

**Ballots
Impacted** N/A

A large number of ballots appear to have been printed on printers not properly calibrated. This means that the front-page of the ballot is not consistently aligned with the back page of the ballot. The way this alignment presented appeared to be unique for each vote center printer. This is contrary to manufacturer guidelines and recommendations and could theoretically result in inconstant reading of votes across all the different tabulators, although we identified no instances of this issue causing a ballot to be tabulated incorrectly in the several thousand images reviewed.



5.7.10.1 REFERENCES

- Dominion Printing & Finishing Specifications⁵⁷

5.7.10.2 RECOMMENDATION

Legislation should be considered that would require that the election equipment be properly maintained, including, but not limited to ensuring that ballot printers are properly calibrated.

5.7.10.3 INSTANCES

The Kinematic Artifact processing is currently processing ballot images to fully map all printer miscalibrations. A full report is expected in the coming weeks.

5.7.11 REAL-TIME PROVISIONAL BALLOTS

**Ballots
Impacted** N/A

The Arizona Secretary of State Elections Procedures Manual identifies circumstances that require the issuance of a Provisional Ballot. If a voter appears in the e-pollbook or signature roster as having received an early ballot by mail, but the voter wants to vote in person on Election Day, that voter must be issued a Provisional Ballot. However, Maricopa County reported 58,550 voters who had received mail ballots but were issued standard ballots on Election Day. The County identifies these as “real-time Provisional Ballots.” There is no mention of real-time provisional in the AZ Elections Procedures Manual. In fact, the EPM specifically addresses this circumstance and is clear that such voters must be issued a Provisional ballot.

There appears to be no statutory authority for Maricopa County to deviate from the EPM and issue standard ballots to voters who had already received a mail ballot. We identified no instances of these voters casting more than one ballot, however.

This was reported as a note at the bottom of page 12,329 of the November General Election Canvass Final -below:

Note: There were 58550 Early Ballot recipients that had not RETURNED their Early Ballot and consequently were issued a standard ballot on Election Day. These were processed as real-time Provisional Ballots.

A.R.S. § 16-579(F). Issuing a Provisional Ballot

1. *Circumstances Requiring Issuance of a Provisional Ballot:*

Voter Received an Early Ballot

A voter must be allowed to vote a provisional ballot if the voter appears on the signature roster or e-pollbook as having received an early ballot-by-mail, but either:

(1) affirms that they have not voted and will not vote the ballot-by-mail; or

(2) surrenders the ballot-by-mail to the inspector on Election Day. A.R.S. § 16-579(B)

Voters who appear at a voting location with a ballot-by-mail that has not been voted, along with the affidavit envelope, may use a privacy booth at the voting location to mark the ballot-by-mail. In this circumstance, the voter

⁵⁷ <https://www.sos.state.co.us/pubs/elections/VotingSystems/DVS-DemocracySuite511/documentation/SD-IC-PrintingSpecification-5-11-CO.pdf>

does not sign in and the voter must place the voted ballot-by-mail in its affidavit envelope, sign the affidavit envelope, and place the envelope in the early ballot drop-off container at the voting location.

5.7.11.1 REFERENCES

- State of Arizona – 2019 Elections Procedures Manual⁵⁸
- A.R.S § 16-579 – Procedure for obtaining ballot by elector⁵⁹

5.7.11.2 DATA FILES UTILIZED

File Name	MD5 Hash
11-03-2020-0 Canvass COMPLETE NOV2020	ce62cc061b6bb56b4fd40aa4866adb16

5.7.11.3 RECOMMENDATION

Maricopa County should explain this deviation from the Elections Procedures Manual.

5.7.12 VOTER REGISTRATION SYSTEM AUDIT ACCESS

Ballots
Impacted N/A

One of the most important components of the audit was the analysis of the voter registration system and records of authorized or unauthorized access to that system. Our audit team has been denied the access required to complete this portion of the audit. In the Senate’s subpoena dated January 12, 2021, Maricopa County was ordered to provide the auditors access to, or control of all equipment used in connection with the administration of the 2020 election. In a second subpoena, dated July 26, 2021, the County was ordered to provide all reports, finding and other documents concerning the voter registration breach. The response from the County claims that they are not aware of a breach.

1. "All reports, findings and other documents concerning any breach of the voter registration server, the Maricopa County Recorder’s Office systems, or any other aspect of the Maricopa County elections systems at any time within six months of the November 3, 2020 general election"

The Board of Supervisors is not aware of any “breach”, as stated above, occurring during this time period, or any other time period relevant to the November 3, 2020 election. The Board of Supervisors is aware of an incident in November 2020 wherein an individual programmatically accessed the County Recorder’s website and gathered publicly available information for a short period of time. The Recorder’s website is in no way connected to the air-gapped tabulation system in the secure room where ballots are counted. To the extent you are requesting records related to this incident, you recently made a public records request to both the Maricopa County Recorder and the Board of Supervisors requesting similar information. As always, the Board of Supervisors will comply with your public records request promptly consistent with Arizona law. We hereby request that you accept our response to your public records request in lieu of production pursuant to this subpoena.

Claiming that this breach was nothing more than unauthorized access to public data has not been supported with evidence. According to a news article published December 4th, 2020, Maricopa County confirmed voter data had been stolen and that a federal investigation was under way. CISA considers voter registration systems to be critical infrastructure and thus requires states and counties to implement the highest levels of security. The only way to ensure that there is one vote for every legally registered voter is careful control of the voter registration database.

⁵⁸ https://azsos.gov/sites/default/files/2019_ELECTIONS_PROCEDURES_MANUAL_APPROVED.pdf

⁵⁹ <https://www.azleg.gov/ars/16/00579.htm>

5.7.12.1 REFERENCES

- [Maricopa County Letter to Arizona Senate](#)⁶⁰
- [Cybersecurity and Infrastructure Agency \(CISA\)](#)⁶¹

5.7.12.2 RECOMMENDATION

Legislation should be considered that would require applications developed and utilized for voter rolls or voting to be developed to rigorous standards that ensure the confidentiality and integrity of the systems. Specifically, its recommended that the Open Web Application Security Project (OWASP) Application Security Verification Standard (ASVS) Level 3 be applied to all applications associated with voter rolls or voting and that it be required that this be fully validated no less than once every two years.

Ballots Impacted	N/A
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5.7.13 QUESTIONABLE BALLOTS

Analysis of the paper ballots has discovered ballots which exhibit characteristics that are anomalous and do not match known legitimate ballots. This includes color ballots that are missing Machine Identification Codes (MIC), as well as ballots that are demonstrating consistent printing irregularities that suggest they were not printed with the standard ballot PDF generated from the Dominion Election Management System (EMS). These irregularities may have logical explanations, but these explanations are not immediately evident.

NOTE: The questionable ballots have been reviewed to determine if they favor one presidential candidate over another presidential candidate. No discernable pattern could be determined. This highly suggests that these are not counterfeit but do require some sort of explanation.

5.7.13.1 REFERENCES

- [Maricopa County Election Facts and Myths](#)⁶²
- [Runbeck Printing Website](#)⁶³
- [HP PageWide WebPress T HD Specification](#)⁶⁴

5.7.13.2 RECOMMENDATION

Legislators should consider passing laws standardizing the papers and printing process utilized for printing ballots and requiring documentation to be kept of all papers utilized. This will facilitate determining if a ballot is in fact genuine and remove any areas for confusion.

⁶⁰ <https://www.maricopa.gov/DocumentCenter/View/70435/Final-Signed-Letter-to-Senators>

⁶¹ <https://www.cisa.gov/election-security>

⁶² <https://recorder.maricopa.gov/justthefacts/>

⁶³ <https://runbeck.net/election-solutions/election-printing-mailing/>

⁶⁴ <https://www.hp.com/us-en/commercial-industrial-printing/pagewide/t250-hd-web-presses.html>

6 VOTING MACHINE FINDINGS

The following section outlines all findings related to the voting machines including the analysis and discoveries during the Voting Machine phases of the work.

6.1 Voting Machine Scoring

Cyber Ninjas utilizes a risk ranking system based on the guidelines outlined by NIST publication 800-30, "Guide for Conducting Risk Assessments – Information Security." A severity is assigned to a finding based on a combination of the likelihood the finding could impact the election, or the ability to audit the election and the impact it could have on the election results.

<u>Likelihood</u>	<u>Impact</u>			
	Low	Medium	High	Critical
Critical	Medium	High	High	Critical
High	Medium	Medium	High	High
Medium	Low	Medium	Medium	High
Low	Low	Low	Medium	Medium

Table 1: Election Risk Matrix.

Both the likelihood and the impact of the finding are rated independently on a scale from "Low" to "Critical." These ratings are then combined utilizing the risk matrix represented in Table 1 to determine the associated severity for the issue.

6.2 Digital Analysis Summary

Because the Maricopa County Board of Supervisors and the Arizona State Senate have recently settled their dispute concerning outstanding subpoena items, this portion of the audit is not yet complete. Analysis of those items that were produced, however, clearly demonstrated that the Maricopa County voting systems did not follow CISA or industry standard cyber security best practices.

First Maricopa County personnel did not control the administrative iButton credentials necessary to configure, validate and certify the ICP2 tabulators. Second, Maricopa County did not properly assign and manage the user names and passwords necessary to restrict access the voting systems. The user accounts were not attributable to an individual, rather they were shared throughout the staff. Furthermore, the same password was utilized by multiple accounts and was never changed since the installation of the Dominion software. That same password was used by both administrative and user accounts. If a user had access to user level account, that user had all the knowledge necessary to perform administrative functions with elevated access. Third, the windows security and activity logs were not preserved for the required 22 months following the election, thus significantly hampering the analysis of authorized activity. It did appear that the Dominion software specific logs were preserved, but those logs do did not provide the same level of detail or data that the Windows operating system logs did for security events, remote login events or other user activity. Fourth, there was a clear lapse in the hardware configuration monitoring and baseline in the Maricopa County voting systems as evidenced by the presence of an unauthorized second bootable hard drive in the Adjudication 2 workstation.

6.3 Summary Table

#	Finding Name	Likelihood	Impact	Severity
6.4.1	Election Management System Database Purged	High	High	High
6.4.2	Election Files Deleted	High	High	High
6.4.3	Corrupt Ballot Images	High	High	High

6.5.1	Missing Ballot Images	Medium	High	Medium
6.5.2	Failure to Follow Basic Cyber Security Practices	Medium	High	Medium
6.5.3	Subpoenaed Equipment Not Provided	Medium	High	Medium
6.5.4	Anonymous Logins	Medium	Medium	Medium
6.5.5	Dual Boot System Discovered	Medium	Medium	Medium
6.5.6	EMS Operating System Logs Not Preserved	Low	High	Medium
0	Election Data Found from Other States	Low	Medium	Low

6.4 High Findings

6.4.1 ELECTION MANAGEMENT SYSTEM DATABASE PURGED

Likelihood: High **Impact:** High

The Election Management System (EMS) database which holds all details associated with the 2020 General Election was purged and all the election results were cleared by a Results Tally and Reporting Admin on February 2 at 5:14 pm; the evening before the Pro V & V audit was scheduled to officially start. This means that these results were not available for Pro V & V or SLI to perform any type of audit, nor were they available for Cyber Ninjas to review. The next day Pro V & V then proceeded to add new tabulators for their audit, and they imported results into these tabulators further clearing remnants of the database. It is worth noting that the Dominion software fully supports creating a full copy of an existing election project; and if a cleared database was required for Pro V & V to perform their audit, they could have first duplicated the existing Election Project. Neither of the “auditors” retained by Maricopa County identified this finding in their reports.

NOTE: While the log file clearly indicates that the results and images were also purged as part of the process, the majority of the images did appear to be reloaded back to the system at some point. There were images missing and a number of corrupt images as can be seen in the other findings.

NOTE: On August 26th the Maricopa County Board of Supervisors was requested to explain the reasoning for this activity but has chosen not to respond.



Figure 2 - UserLog shows that RTRAdmin Successfully Purged the 20201103 Election Database and Files.

Tabulator Nu...	Name	Location	Type	Counting Group	Log File	Closed	Images Loaded	Load
157189	Audit 7	Maricopa	ICE/ICP 2	EARLY VOTE	☐	☒	☒	1
3002	HiPro 2 Early ...	MCTEC	Imagecast Ce...	EARLY VOTE	☐	☐	☐	1
157192	Audit 10	Maricopa	ICE/ICP 2	EARLY VOTE	☐	☒	☒	1
157191	Audit 9	Maricopa	ICE/ICP 2	EARLY VOTE	☐	☒	☒	1
157193	Audit 11	Maricopa	ICE/ICP 2	EARLY VOTE	☒	☒	☒	1
157185	Audit 3	Maricopa	ICE/ICP 2	EARLY VOTE	☐	☒	☒	1
157186	Audit 4	Maricopa	ICE/ICP 2	EARLY VOTE	☐	☒	☒	1
157195	Audit 13	Maricopa	ICE/ICP 2	EARLY VOTE	☐	☒	☒	1
6004	Canon 4 Early...	MCTEC	Imagecast Ce...	EARLY VOTE	☐	☐	☐	1
157190	Audit 8	Maricopa	ICE/ICP 2	EARLY VOTE	☐	☒	☒	1
157184	Audit 2	Maricopa	ICE/ICP 2	EARLY VOTE	☐	☒	☒	1
157187	Audit 5	Maricopa	ICE/ICP 2	EARLY VOTE	☐	☒	☒	1
157188	Audit 6	Maricopa	ICE/ICP 2	EARLY VOTE	☐	☒	☒	1
157194	Audit 12	Maricopa	ICE/ICP 2	EARLY VOTE	☐	☒	☒	1
157183	Audit 1	Maricopa	ICE/ICP 2	EARLY VOTE	☐	☒	☒	1
3001	HiPro 1 Early ...	MCTEC	Imagecast Ce...	EARLY VOTE	☐	☐	☐	3

Figure 3 - Tabulator List is full of "audit" tabulators which are the only ones with results.

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Election Summary Report

General Election

Maricopa County

November 3, 2020

Elector Group	Counting Group	Ballots	Voters	Registered Voters	Turnout
Total	EARLY VOTE	8,164	8,164	2,595,272	0.31%
	ELECTION DAY	0	0		0.00%
	PROVISIONAL	0	0		0.00%
	Total	8,164	8,164		0.31%

Registered Voters: 8,164 of 2,595,272 (0.31%)

Ballots Cast: 8,164

Figure 4 - Results for the 2020 General Election only show 8,164 votes from the Pro V & V audit.

6.4.1.1 DATA FILES UTILIZED

File Name	MD5 Hash
AZAud-E-089-1 _EMS PRIMARY\AZAud-E-089-1 _EMS PRIMARY	95a6f531c4969dda8f5703858e33d414

6.4.1.2 RECOMMENDATION

Legislation should be considered that could more greatly facilitate audits to be performed and require the counties to cooperate with the audits when they occur. Specifically, the county should be required to provide all the details needed to have a fully functional Election Management System where results can be reviewed.

6.4.2 ELECTION FILES DELETED

Likelihood: High **Impact:** High

According to the Master File Table (MFT) of the drives, a large number of files on the Election Management System (EMS) Server and HiPro Scanner machines were deleted including ballot images, election related databases, result files, and log files. These files would have aided in our review and analysis of the election systems as part of the audit. The deletion of these files significantly slowed down much of the analysis of these machines. Neither of the “auditors” retained by Maricopa County identified this finding in their reports.

6.4.2.1.1 Deletion Activity on the EMS C:\ Drive

The EMS server that was produced contained six hard drives. Two of those hard drives were configured in a mirrored configuration and contained the operating system and install programs. This mirrored drive was assigned the drive letter "C" and was the boot drive for the EMS. Between 10/28/20 08:52:36AM and 11/05/20 05:58:58PM 865 directories and 85,673 election related files (scanned ballots, .dvd files, slog.txt files, etc.) were deleted from the EMS C:\ drive. A full listing is provided in the file named Files and Directories Deleted from the EMS C Drive.txt.



Figure 5-Example of Election Related File Deletion from EMS C:\ Drive

6.4.2.1.2 Deletion Activity on the EMS D:\ Drive

The other four (4) hard drives were configured in a 0+1 hardware raid configuration that contained a single 2.1 Terabyte partition. For the purposes of this examination this raid was manually reconstructed and mounted as a single 2.1 TB drive. This mounted image was then imaged using the FTK Imager software package. The resulting forensic image was then utilized for analysis. This drive contained the dominion election data, election definitions, the election databases, the NAS directory and the scanned ballot images. Between 11/01/20 10:37:41AM and 03/16/21 10:17:06AM 9,571 directories and 1,064,746 election related files were deleted from the D drive. These deleted files include scanned ballot images, ICX results, context.spx files, choice.spx files, .dvd files from the tabulators, and other election related files. A full listing of the deletions is provided in the file Files and Directories Deleted from the EMS D Drive.txt.



Figure 6-Trump Ballot Image Created and Deleted on 1 Nov 2020 from D:\ Drive



Figure 7-Deleted Election Results Files on 5 November 2020 from D:\ Drive

6.4.2.1.3 Deleted Directories and Files from HiPro 1
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HiPro 1 Deleted Files and Folders – 304 Directories and 59,387 files containing election data were deleted from the HiPro scanner number 3 (CyFIR evidence number AZAUD-C-096) by an individual using the account hipradmin01. These files were deleted on 3 March 2021 between 03/03/21 12:53:34PM and 03/03/21 01:37:49PM.



Figure 8-Deleted Election Related Files from HiPro 1

6.4.2.1.4 Deleted Directories and Files from HiPro 3

HiPro 3 Deleted Files and Folders – 1,016 Directories and 196,463 files containing election data were deleted from the HiPro scanner number 3 (CyFIR evidence number AZAUD-C-099) by an individual using the account hipradmin03. These files were deleted on 3 March 2021 between 03/03/21 01:26:32PM and 03/03/21 01:37:49PM.

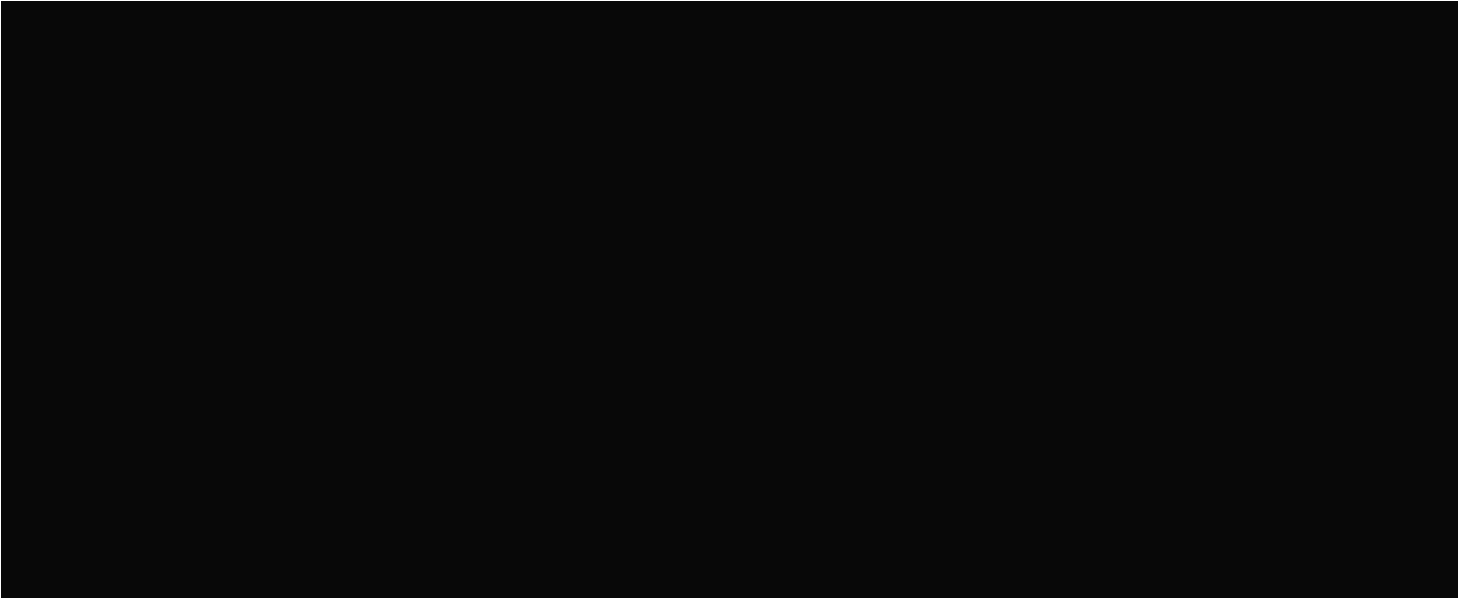


Figure 9-Deleted Election Related Files from HiPro3

6.4.2.1.5 Deleted Directories and Files from HiPro 4

HiPro 4 Deleted Files and Folders – 981 Directories and 191,295 files containing election data were deleted from the HiPro scanner number 4 (CyFIR evidence number AZAUD-C-098) by and individual using the hiproadmin04 account. These files were deleted on 3 March 2021 between 03/03/21 02:32:47PM and 03/03/21 02:44:32PM.

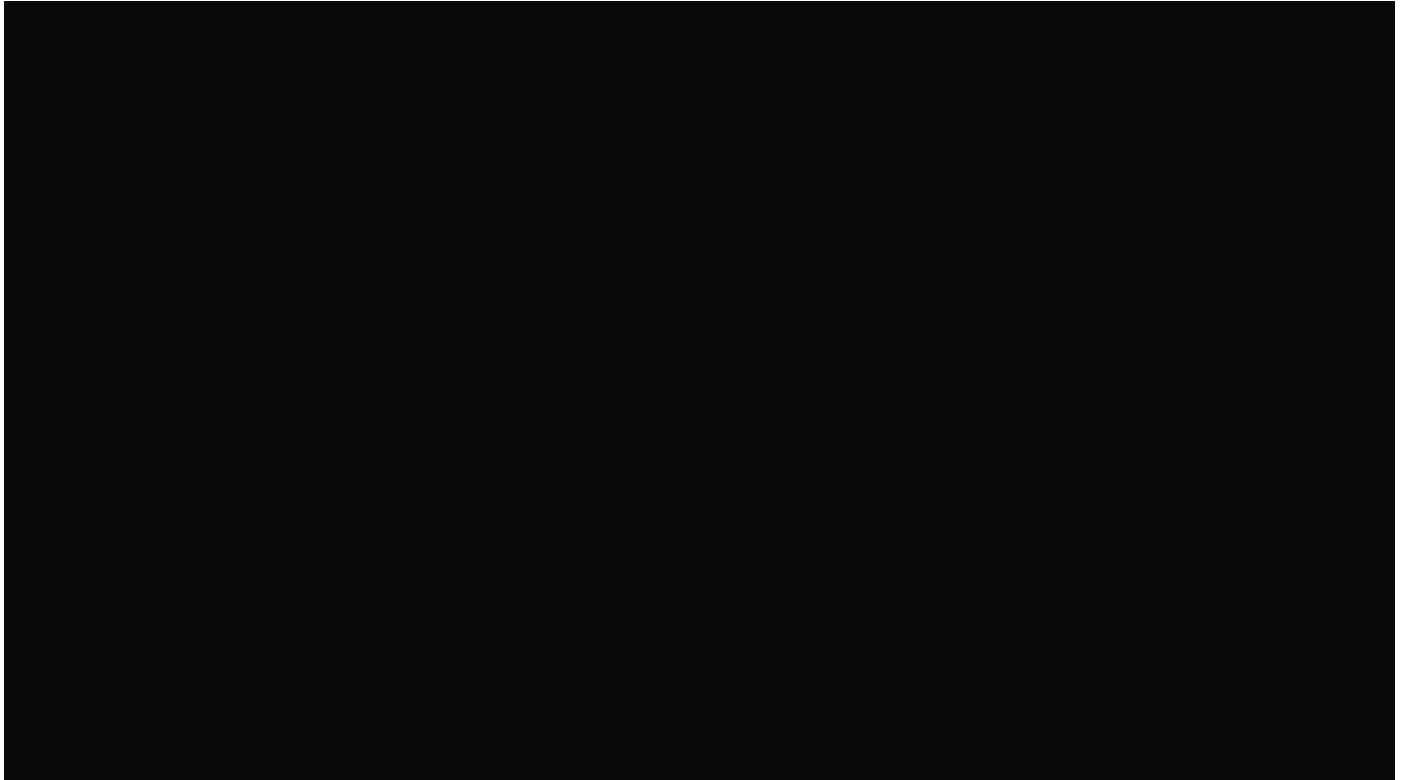


Figure 10-Deleted Election Related Files on HiPro4

6.4.3CORRUPT BALLOT IMAGES

Likelihood: High **Impact:** High

The audit has discovered 263,139 ballot images on the election system that are corrupt and unreadable TIFF format images. It is unclear what events could have resulted in this number of images being corrupted. The corruption of the ballot images in the election system only occurs for ballots that were scanned on or after November 1, 2020. No corruption of ballot images occurred in the 1,347,240 ballots processed on the same nine high-speed scanners prior to November 1, 2020. The image corruption is incongruous with the performance of those same nine high-speed scanner systems during the entire election prior to November 1, 2020. For each of the eight high-speed scanners used for ballots scanned starting on November 1, approximately half of the TIFF images are corrupted. The corruption prevents the audit team from confirming the efficacy of the vote totals and the correlation to the paper ballots stored in the various batches.

TIFF image batches were corrupted in some way and not entirely readable for the purposes of the audit. This means that it was impossible to confirm that the electronically recorded votes corresponded to the corrupted TIFF ballot images. In this scenario it is possible that manipulation of the electronic vote totals occurred in the instances where the TIFF images are corrupted. These corrupt TIFF images are not in the folder structure where finally adjudicated ballots are held. Instead, the corrupted adjudicated ballots for “Early Vote Spare 2” are located amongst what appear to be test batch ballot images.

NOTE: Because these images are critical, a new copy of these images was requested from Maricopa County, but a response was not given.



Figure 11 - Early Vote Spare 2 Misallocated and Corrupted Ballots.

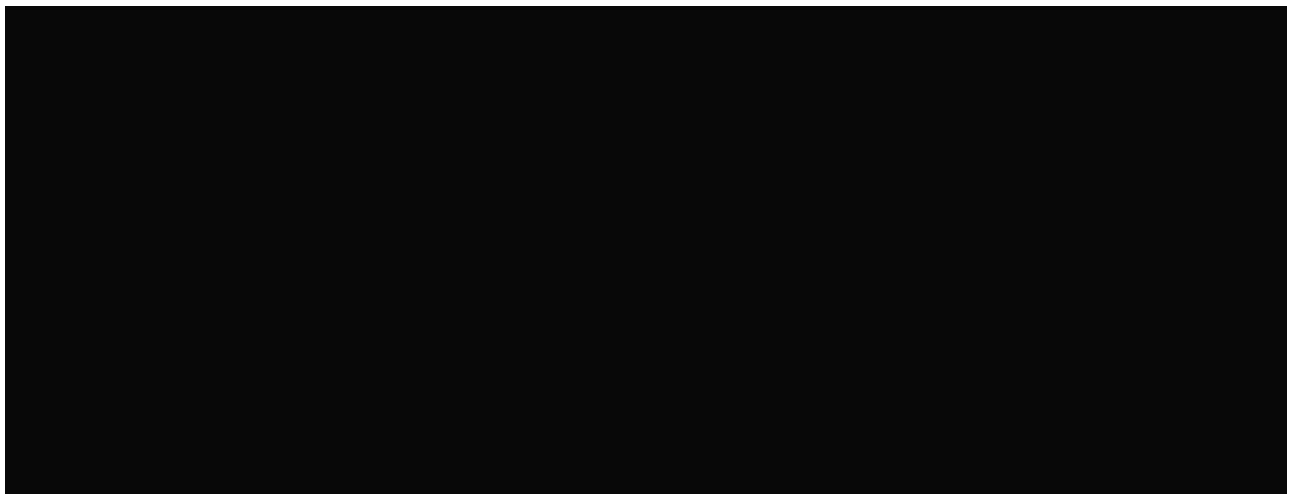


Figure 12 - HiPro 1 Early Vote Spare 2 Showing 97,098 Ballot Tiff Images, Showing the High Volume on these Devices.



Figure 13 - Example folder showing corrupt TIFF images. The corrupt images either will not display a pre-view at all, or the ballot will be partially blacked out.

In addition, the very same nine (9) high speed tabulators processed more than 1.3 million votes from October 20, 2020, to October 31, 2020 without corrupting any TIFF ballot images. It is anomalous that these high-speed scanners had no errors for the eleven-day period prior to November 1, 2020, but had issues starting on November 1.

NOTE: The top level of the EMS folder structure containing all of the scanner's zip files with the unadjudicated ballots (except the aforementioned missing ballots) are present. The corrupted ballots by file name do appear in these zip files, but none of the ballots in this folder structure are adjudicated.

6.4.3.1 DATA FILES UTILIZED

File Name	MD5 Hash
AZAud-E-089-1 _EMS PRIMARY\AZAud-E-089-1 _EMS PRIMARY	95a6f531c4969dda8f5703858e33d414

6.4.3.2 REPRODUCTION STEPS

In order to locate and find the corrupt ballots, the Unix "find" command can be employed in conjunction with the "file," "grep," and "wc" (word count) command to determine if the ballot image is indeed a valid TIFF image format file.

For example, here is the command line:



6.4.3.3 RECOMMENDATION

Legislation should be considered that will make ballot images an artifact from an election that is publicly published for increased transparency and accountability in the election process.

6.5 Medium Finding

6.5.1 MISSING BALLOT IMAGES

Likelihood: Medium **Impact:** High

The total number of ballot images that exist within the body of computer forensics material provided for the audit is substantially less than the official vote totals and the total number of paper ballots audited. 21,273 ballot images are entirely missing from the forensics images of the election equipment. This means that there are electronic votes recorded, but no actual ballot images that correspond to the votes. This makes it impossible to fully validate the results or confirm that the Election Management System (EMS) was not tampered with.

The results from the high-speed scanners from 11/1 to 11/13 are not found in the folder named, "20201103 General ballots and election files and adjudicated tabulators." We find the bulk of them in "20201103 General\Results" folder. The first 15-20 (depending on the specific high-speed scanner) of these batches do not have ballot images. The total number of missing ballot images is 21,273.

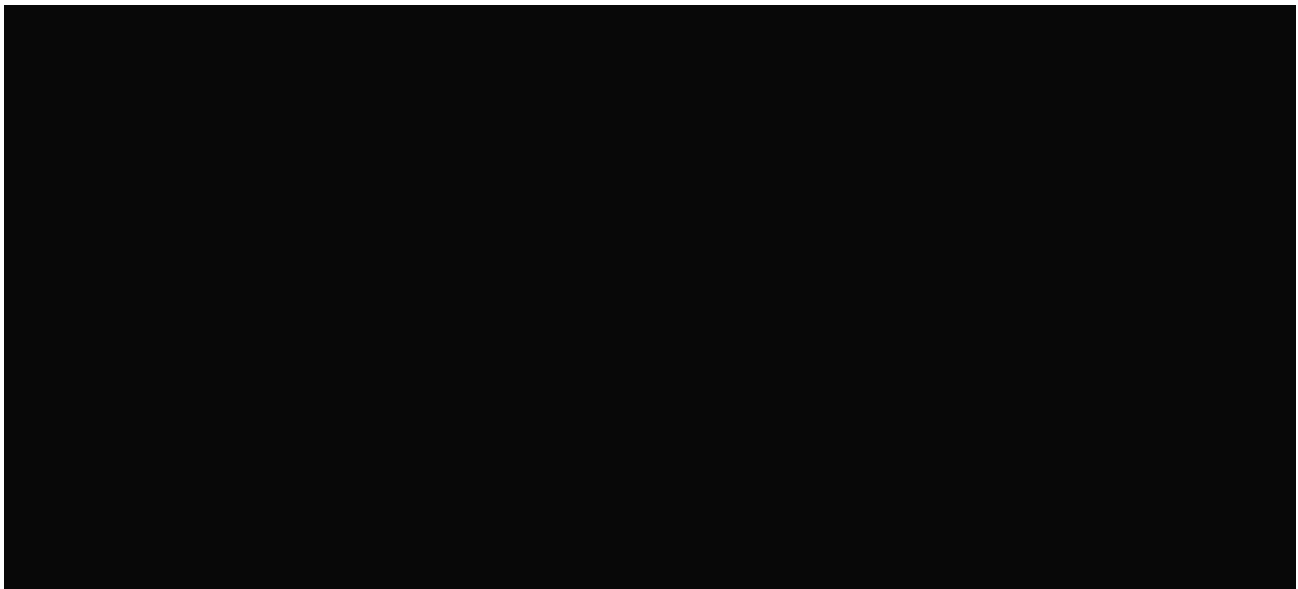


Figure 14 - The tabulator results are found in two different folders, "20201103 General Ballots and election files and adjudicated tabulators" and "20201103 General."



*Figure 15 - The tabulator folder that should have images within it does not have any images.
In total 21,273 images were missing.*

6.5.1.1 DATA FILES UTILIZED

File Name	MD5 Hash
AZAud-E-089-1 _EMS PRIMARY\AZAud-E-089-1 _EMS PRIMARY	95a6f531c4969dda8f5703858e33d414

6.5.1.2 REPRODUCTION STEPS

In order to find the number of ballot images, first it is necessary to query the EMS database for the election project name Project 20201103 General and select the vote total for the entire election using the following MS SQL command. This query is executed using the Microsoft SQL Server Management Studio v17.1 that was found to be installed on the EMS.

Windows Domain and Logon: [REDACTED]

Database Name: [REDACTED]

[REDACTED]

[REDACTED]

In order to count the total number of ballot images, the Unix “find” command can be employed in conjunction with the “grep” and the “wc” (word count) command to determine if the ballot image is indeed a valid TIFF image format file.

For example, here is the command line:

Add these totals together and this is the total number of TIFF images on the EMS for the election.

Then take the total number of ballots from the EMS from and subtract the total from the above commands.

6.5.1.3 RECOMMENDATION

Legislation should be considered that will make ballot images an artifact from an election that is publicly published for increased transparency and accountability in the election process.

6.5.2FAILURE TO FOLLOW BASIC CYBER SECURITY PRACTICES

Likelihood: MediumImpact: High

The Department of Homeland Security’s Cybersecurity & Infrastructure Security Agency (CISA) has published a series of cybersecurity best practices and guidelines. In addition to general guidelines, CISA has also published specific best practices for securing election systems that is available for all counties to access at no cost. In the most recent version of the document CISA broke this guidance into specific categories for ease of utilization. As part of these findings, this report will address the following CISA recommendations and address the lack of Maricopa County compliance with the recommendations; Software and Patch Management, Log Management, Credential Management, and Establish a Baseline for Host and Network Activity.

6.5.2.1 INSTANCES

6.5.2.1.1	Software and Patch Management
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CISA outlines the necessity for software and patch management within election systems. Specifically, CISA states “Failure to deploy patches in a timely manner can make an organization a target of opportunity, even for less sophisticated actors, increasing the risk of compromise.” It is clear that there was no established program to patch the operating system or even update the antivirus definitions. Neither the operating system nor the antivirus had been patched or updated since August 2019 (the date of the installation of the Democracy Suite). The county released a statement that they were prohibited from updating the operating system, that had they done so it would have invalidated the certification issued by the Voter Assistance Commission (VAC) for the Dominion software. This statement is contradicted by the County’s own actions following the installation of the Dominion software. Contrary to the claims that updating items on the election systems would invalidate the certification of the election system by the EAC, forensic analysis revealed that after the installation of the Dominion software in August 2019, 4 EXE packages were created, 45 EXE packages were updated and/or modified, 377 Dynamic Link Libraries (DLL) were created, and 1053 Dynamic Link Libraries were modified on the EMS server. If updating the operating system with patches and updating the antivirus definition file would have invalidated the voting certification, then the county had already invalidated the certification prior to the general election of 2020. Neither security audit contracted by Maricopa County noted these findings in their report.

6.5.2.1.2 Log Management

The Cybersecurity and Infrastructure Agency (CISA) recommends that organizations should set up centralized log management systems that 1) forward logs from local hosts to a centralized log management server, correlate logs from both network and host security devices, and review both centralized and local log management policies to maximize efficiency and retain historical data. Analysis of the systems revealed that none of these recommendations were being followed on the Maricopa County election systems. In fact, in a later paragraph this report details how the windows security logs for the EMS server were in fact intentionally deleted such that the logs no longer covered the time period for the 2020 General Election. Neither security audit contracted by Maricopa County noted this finding in their report.

6.5.2.1.3 Credential Management

The Cybersecurity and Infrastructure Agency (CISA) states that Managing passwords and using strong passwords are important steps in preventing unauthorized access to databases, applications, and other election infrastructure assets. CISA further recommends that usernames be assigned to a specific person, not be shared and be changed every 90 days. CISA actually recommends that multifactor authentication be enabled for election systems. Key to the username and password concept is to be able to uniquely identify a user, assure authorized access by a given users, and to be able to hold that individual accountable for the actions performed by that assigned account. In the case of the Maricopa County election systems, none of these guidelines were followed. Neither security audit contracted by Maricopa County noted this finding in their report.

Maricopa County Failed to Ensure Unique Username Allocation to Individuals

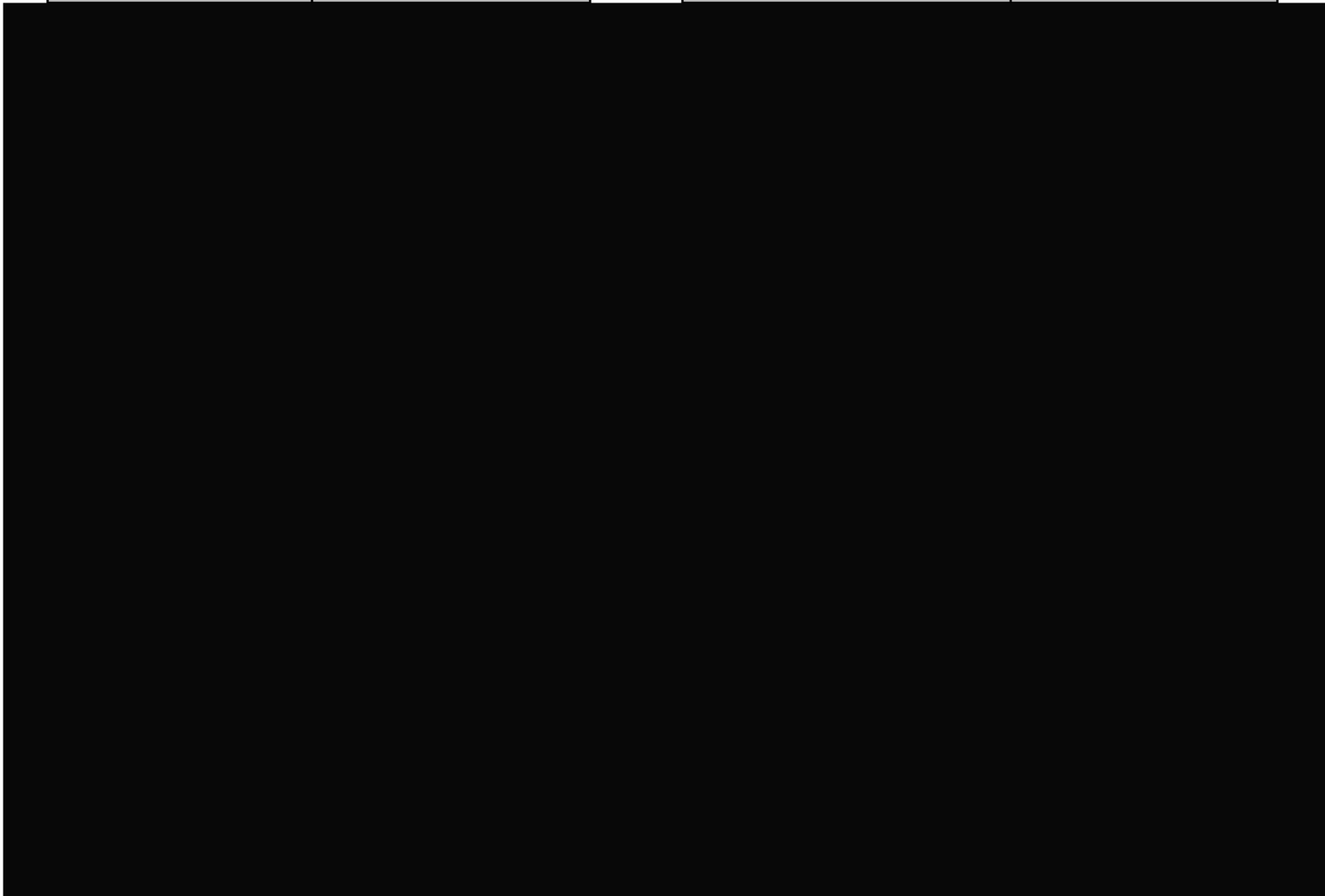
Generic username accounts were created as part of the Dominion Software installation on 8/06/2019. These accounts were not assigned to a specific individual but appear to have been shared accounts based on function, not individual accountability. Neither security audit contracted by Maricopa County noted this finding in their report.

Maricopa County Failed to Create Unique Passwords for Each Account

Unique passwords were not created for each account. Just to be clear, the same password was used for all the accounts (if there was in fact a password for the account). This action violates every principle of password management guideline as published in every cyber security framework that currently exists. Below are the list of accounts and the corresponding password. Note the last 4 characters of the password has been masked for security reasons, but all 4 of those characters are the same for all accounts. Furthermore, these passwords had not been changed since the Dominion software suite had been installed (presumably by Dominion employees) in August of 2019. The recommendation from CISA and most cybersecurity frameworks recommend that passwords, especially for administrative accounts, should be changed every 90 days. Neither security audit contracted by Maricopa County noted this finding in their report.

Account Name	Password	Account Name	Password
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Account Name	Password	Account Name	Password
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Note: These passwords were subsequently used in conjunction with accessing virtual machines that were created from copies of the forensic images and were proven to be legitimate passwords. Neither security audit contracted by Maricopa County noted this finding in their report.

6.5.2.1.4 Lack of Baseline for Host and Network Activity

The analysis of the computing systems that comprised the Maricopa County voting system (to the extent produced) did not find any whitelisting, monitoring, baselining, or network programs that could have been used to establish a baseline for host and network activity. CISA recommends that counties leverage software and monitoring functions to establish and enforce a software and a network baseline of approved programs, communications protocols, and communications devices for voting systems. This baseline should be monitored and integrated into an alerting and response capability to ensure that no unauthorized programs are executed on the endpoints in the network and there are no unauthorized devices communicating on the network. Neither security audit contracted by Maricopa County noted this discrepancy or finding in their report.

6.5.3 SUBPOENAED EQUIPMENT NOT YET PROVIDED

Likelihood: Medium **Impact:** High

SLI Compliance report page 11 states that the Maricopa County produced 6 EMS computers. Further analysis indicated that there were 4 EMS workstations and 2 EMS servers. Maricopa County only produced 1 EMS server and 4 EMS workstations despite the Arizona Senate subpoena requesting ALL EMS servers and systems utilized in the 2020 General Election. This has impacted the ability to complete the audit of the digital network and devices. For example, if malware was resident on the missing EMS or that machine was utilized in any manner to manipulate the results of the election; this would not be able to be determined from our analysis.

6.5.3.1 INSTANCES

6.5.3.1.1 Network Related Data

The Arizona Senate Subpoena to the Maricopa County Board of Supervisors included the production of network routers, router configuration files and managed switches used in the 2020 General Election. In subsequent conversations with county officials and county attorneys between 4/22/21 and 4/30/21 these officials agreed to provide virtual access to the systems and to provide archived Splunk data beginning 60 days prior to the election and ending 90 days following the election. Maricopa County refused to provide any data citing that the production of the router data would compromise ongoing law enforcement operations and the personally identifying information (PII) of Maricopa County residents. Maricopa County and the Arizona State Senate recently settled their dispute regarding outstanding subpoena items, so this portion of the audit is not yet complete.

6.5.3.1.2 Poll Worker Laptops

Despite the presence of at least one poll worker laptop at each voting center, the auditors did not receive laptops or forensic copies of their hard drives. It is unknown, due to the lack of this production, whether there was unauthorized access, malware present or internet access to these systems.

6.5.3.1.3 ImageCast Precinct (ICP) Administrator Credentials and Hardware Tokens

Maricopa County utilized the Dominion ImageCast Precinct 2 (ICP2) tabulator during the General 2020 election. These tabulators are normally configured with cellular wireless connections, Wi-Fi access and multiple wired LAN connections. The ICP2 actually requires two forms of authentication to configure, check and/or access the device, a numerical password and an iButton token. Maricopa County produced iButton credentials for Poll Workers to open and close polls on the ICP2's but did not produce any credentials to access the higher level administrative or configuration settings for the tabulators. This prevented the verification of the ICP2 settings to include the cellular wireless settings, the local area network settings, the wide area network settings and access to the administrative configuration reporting functions. During the course of the examination, we were able to recover the higher-level admin's numerical password from the EMS SQL Database. We also attempted to create administrative level iButton credentials utilizing the EMS system forensic images mounted in a Virtual Machine (VM) environment. The VM of the EMS system was fully functional and was used to produce poll worker iButton credentials, however, the EMS did not have the ability to create the administrative ICP2 credential.

The EMS, as produced to the auditors, only had the Poll Worker role programmed into EMS. The Poll Worker role did not have the necessary privileges and functionality to create an administrative iButton credential. In their response to the Arizona Senate request for the administrative ICP2 iButton credentials, the Maricopa County officials indicated that they did not possess these credentials and only the contracted Dominion employees have access to these credentials. Dominion has refused to comply with the production request. Given the inability to create administrative tokens with the EMS and the statement by Maricopa County concerning the ownership of the administrative iButtons, Maricopa County is unable to validate tabulator configurations and independently validate the voting system prior to an election. Additionally, since Maricopa County does not control the administrative iButtons, Maricopa County is apparently unable to independently configure, validate the voting systems prior to an election, or satisfactorily freeze the configuration of the systems for the required time periods during an election. If only the vendor controls the administrative iButtons, Maricopa County has no way of checking the configuration of the tabulators.

6.5.3.1.4 IPX and Other Devices

Based on the videos of the Maricopa County Tabulation and Election Center (MCTEC) there are a significant quantity of systems that were used in the voting process for the 2020 General Election that were not produced, including the items pictures below.

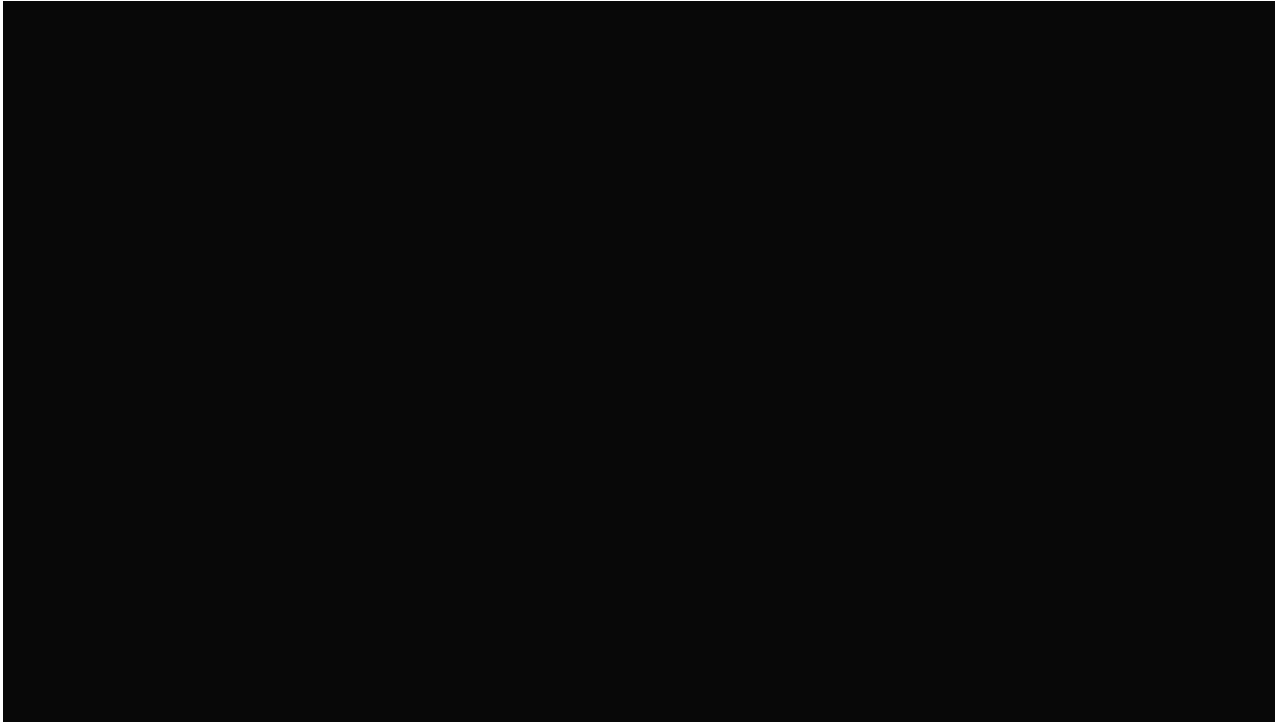


Figure 16-Video Taken on 8 November 2020 of Maricopa County ICX Systems

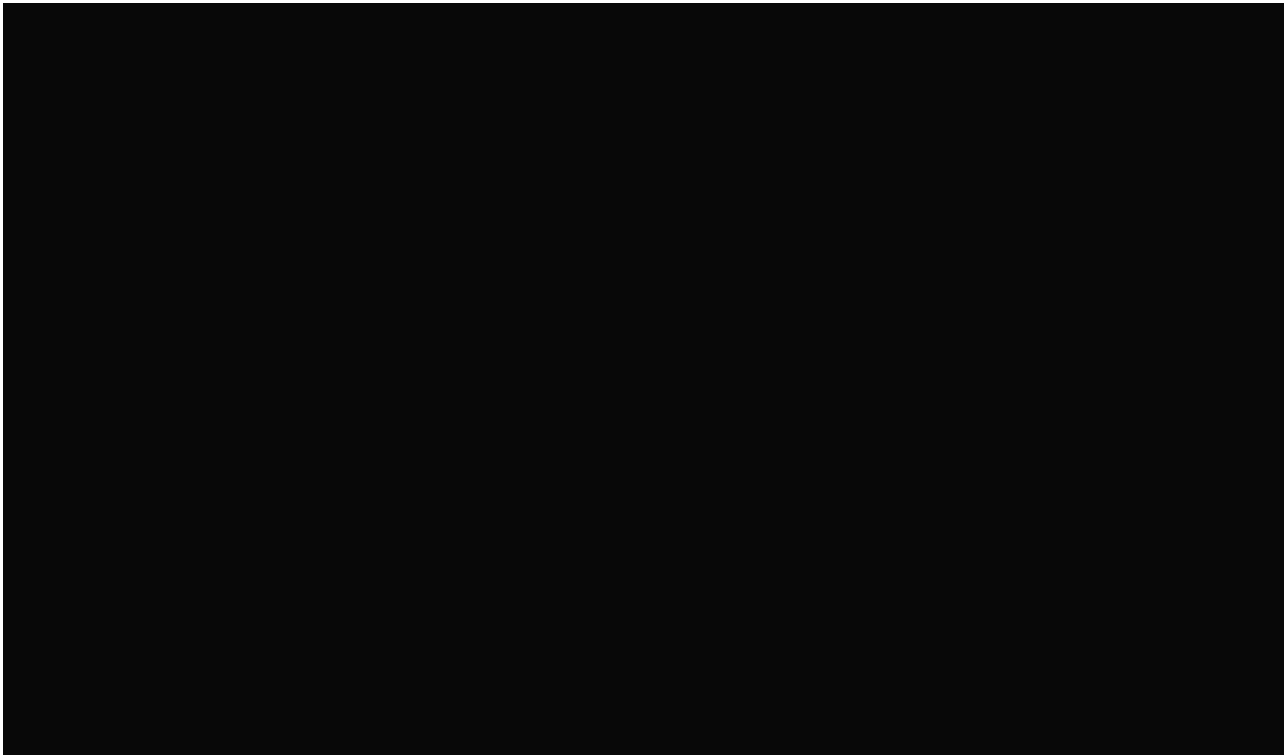


Figure 17-Video Capture Taken from Maricopa County Live Stream

6.5.3.1.5 Other Devices Connected to the Election Network

Examination of the network configurations for the produced systems determined that the programmed gateway for all the systems was [REDACTED]. This normally refers to the network router used to route network traffic external to the [REDACTED]. This device could also have been a managed switch. In either case, the device was not produced. The DNS cache has an entry for [REDACTED] with an IP address of [REDACTED], indicating that this system had been communicated with the EMS server and was probably used for printing. Given the naming convention of the device, [REDACTED], MCTEC is the acronym for the Maricopa County Tabulation and Election Center. This device has not been produced by Maricopa County. Therefore, there are additional network components that the county has not acknowledged and that are in tension with the public statements made by the county that the election system did not have any routers and was completely isolated from the internet.

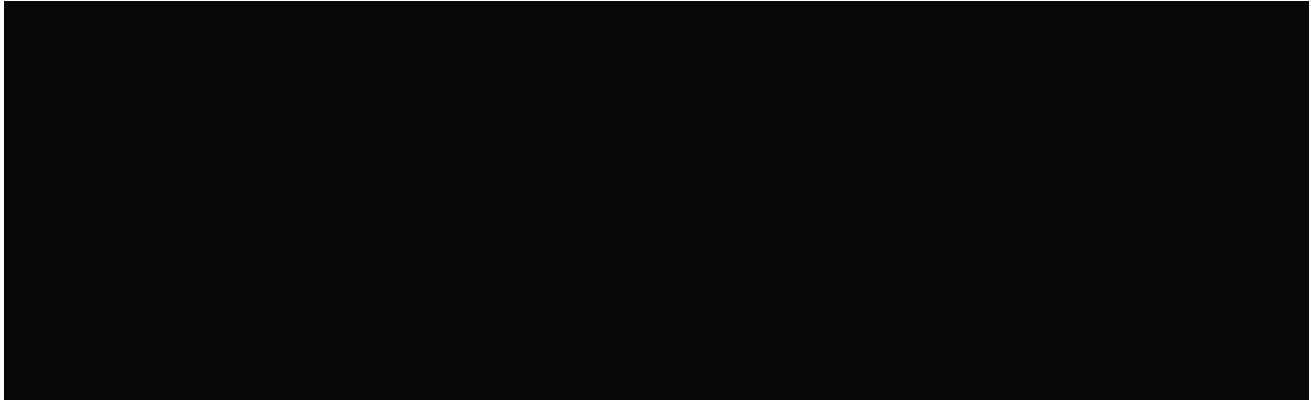


Figure 18-DNS Update Table Recovered from the Maricopa County EMS.



Figure 19-Default Gateway Settings

6.5.4 ANONYMOUS LOGINS

Likelihood: Medium **Impact:** Medium

There are common functions in Microsoft Windows that will record an anonymous login activity into the windows security logs. These logins, however, exhibit known recording sequences within the logs that allow analysts to determine the origination of the requesting function and determine the legitimacy of the logged action. An example of this behavior is the windows response to a request to access a Windows Server Message Block (SMB) share, also known as a network drive. When a user requests a connection to network drive, that initial connection request is logged as an anonymous user. The log entry also records the requestor's host name and the requestor's IP address. That anonymous request is then immediately followed up with another logged entry that authenticates the user's actual username and password in order to grant access. Below is a screen shot of this normal windows activity. Notice that the workstation name, source network IP and source port fields of this log entry contains valid data. This log entry is immediately (within one second) followed by the successful authentication of the username that is authenticating to the network drive for access permissions. That subsequent user authentication is also logged.

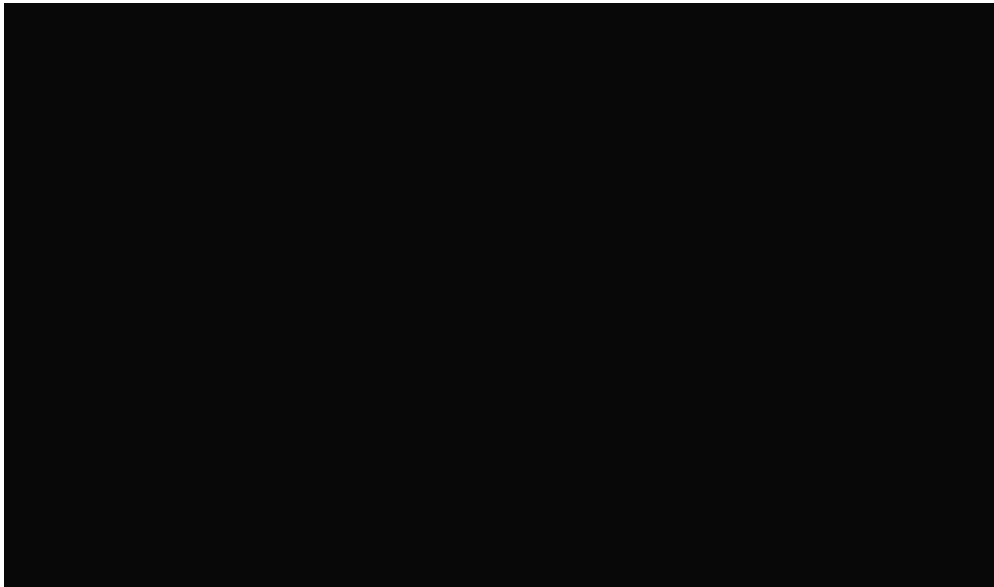


Figure 20-Normal Anonymous Request to SMB Share

While the Windows security logs from the Maricopa County EMS server only are present from 2/5/21 to 4/12/21, there are a significant number of atypical remote, anonymous logins contained in the Windows security logs. Below is an example of the atypical anonymous logons. Note that this is a remote login (login [REDACTED]). Note that the Workstation Name, Source Network Address and Source Port log elements are not populated, and that root/system level access is granted. It is normal for logins from the local system (login type [REDACTED]) to not populate these data fields, but the fact that it is a network remote login (login type 3), and the fields are not populated is irregular and indicates that this is not a typical anonymous login. A search of the event logs from other Windows 2012 R2 servers did not reveal a single logon type [REDACTED] anonymous log entry that did not record these log data elements.

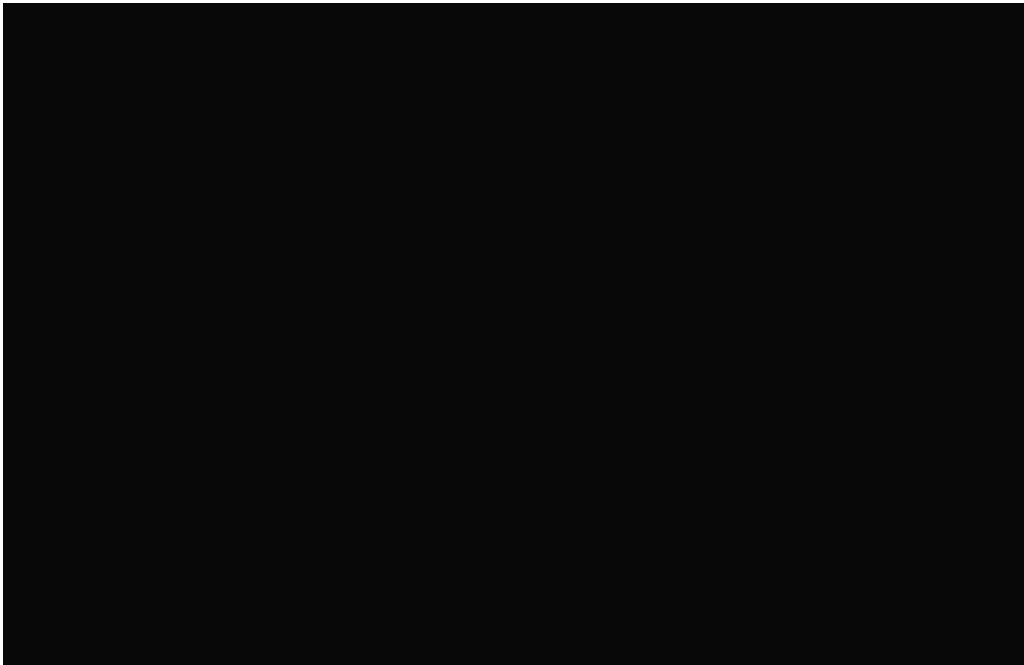


Figure 21-Atypical Remote Anonymous Access to EMS Server

Without access to the network data, it is impossible to determine the origin of these successful atypical remote anonymous logons. The fact that there effectively was no user account and password controls resulting in shared user accounts and passwords, coupled with the lack of network data, makes it impossible to determine if these accesses were legitimate or unauthorized without the network data. This portion of the audit is therefore not yet complete.

6.5.5 DUAL BOOT SYSTEM DISCOVERED

Likelihood: Medium **Impact:** Medium

Analysis of the system labeled Adjudication 2 (CyFIR evidence designation AZAud-E-087) revealed that this system contained two bootable hard drives. These two hard drives were subsequently labeled One of the AZAud-E-087-1 and AZAud-E-087-2. Neither security audit contracted by the Maricopa County noted this finding in their report.

7.5.5.1 ANALYSIS OF AZAUD-E-087-1 DETERMINED THE FOLLOWING:

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Configured to communicate with an SMTP server address of [REDACTED] in the Dominion Voting Systems NLog.config file. Note: the nslog.config files on this system also contained clear text passwords, one of which was the password for the emsdbadmin account.

7.5.5.2 ANALYSIS OF AZAUD-E-087-2 DETERMINED THE FOLLOWING:

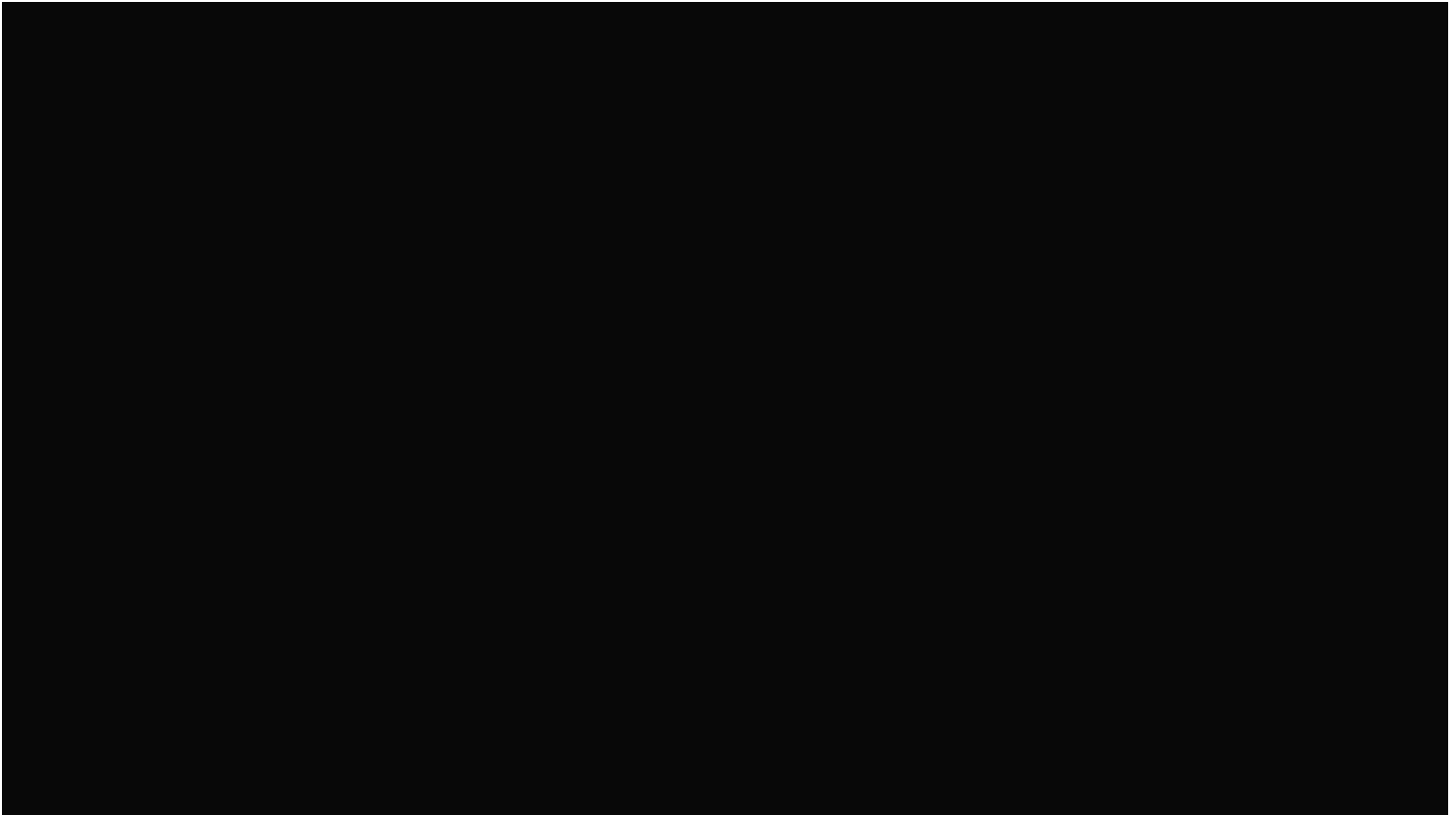
[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

The discovery of a system with a dual boot configuration is a significant finding. First, it demonstrates a failure in the hardware configuration management of the Maricopa County election systems. Second, two bootable hard drives within the same system, under certain circumstances would create a situation where one operating system could act as a “jump box” where one system could access the internet and the other system would be restricted to an isolated network. This is commonly called a dual homed access and could have provided an access route into the voting system network. Without the router data, historical Splunk data and NetFlow data, we cannot complete the full analysis of the impact of this dual boot computer. Neither of the two audits performed by Maricopa County detected or reported this additional, bootable hard drive on the Adjudication 2 system.



6.5.6 EMS OPERATING SYSTEM LOGS NOT PRESERVED

Likelihood: Low **Impact:** High

The Windows event logs that were present on the EMS Server that was produced by Maricopa County contain Windows security event logs (██████████). This file records the Windows operating security events for the EMS server including all user accesses, whether those accesses are from the local system itself or from accessing the system remotely. This log file was restricted by a policy set by Maricopa County to a file size of 20,480KB (20MB). The logging activity was set to automatically overwrite the existing log entries if the security file exceeded this size. The overwrite action would write a new log entry and delete the oldest entry in the log file. In the case of the security.evtx file on the EMS server, the earliest retained log entry was dated 2/5/2021 10:37:49 AM (the last day of the Pro V & V audit) and the latest entry was dated 4/12/2021 4:53:16 PM. The logs were not preserved and did not cover the dates for the general election (3 November 2020). An examination of the EMS and other systems involved in the 2020 General Election did not discover any enabled external log aggregation functionality nor were historical logs beyond those that were contained on the operating systems provided to the digital examination team. The security access logs were not preserved and were overwritten.

The screenshot shows a configuration window for 'Policy Settings EMS Security.evtx'. It includes a checked checkbox for 'Enable logging'. Below it, 'Maximum log size (KB)' is set to 20480. Under the heading 'When maximum event log size is reached:', there are three radio button options: 'Overwrite events as needed (oldest events first)' (which is selected), 'Archive the log when full, do not overwrite events', and 'Do not overwrite events (Clear logs manually)'.

Figure 22-Policy Settings EMS Security.evtx

6.5.6.1.1 User Log Deletions on 2/11/2021

A user leveraging the emsadmin account remotely logged into the EMS server at 2/11/2021 9:08:27 AM via terminal services and began executing a script at 2/11/2021 9:09:04 AM that checked accounts for blank passwords. The event logs record this connection as originating from a system with the IPV6 address of [REDACTED], which is a local network IPV6 address. Between 2/11/2021 8:09:04 AM and 2/12/2021 7:12:55 AM this user ran this check 462 times. Each time the check was performed a new line was added to the security log, which had the effect of deleting the oldest entry in the log file due to the previously mentioned log size limitation setting. 462 older log entries were deleted via this method.

6.5.6.1.2 User Log Deletions on 3/03/2021

A user utilizing the emsadmin account remotely logged into the EMS server at 3/3/2021 11:12:31 AM and began executing a script at 3/3/2021 11:13:44 AM that checked accounts for blank passwords. The event logs record this connection as originating from a system with the IPV6 address of [REDACTED], which is a valid IPV6 local network address. Between 3/3/2021 11:12:31 AM and 3/5/2021 7:58:04 AM this user ran the script 37,686 times. Each time the check was performed a new line was added to the security log, which had the additional effect of deleting the oldest entry in the log file due to the previously mentioned log size limitation setting. 37,468 older log entries were deleted via this method.

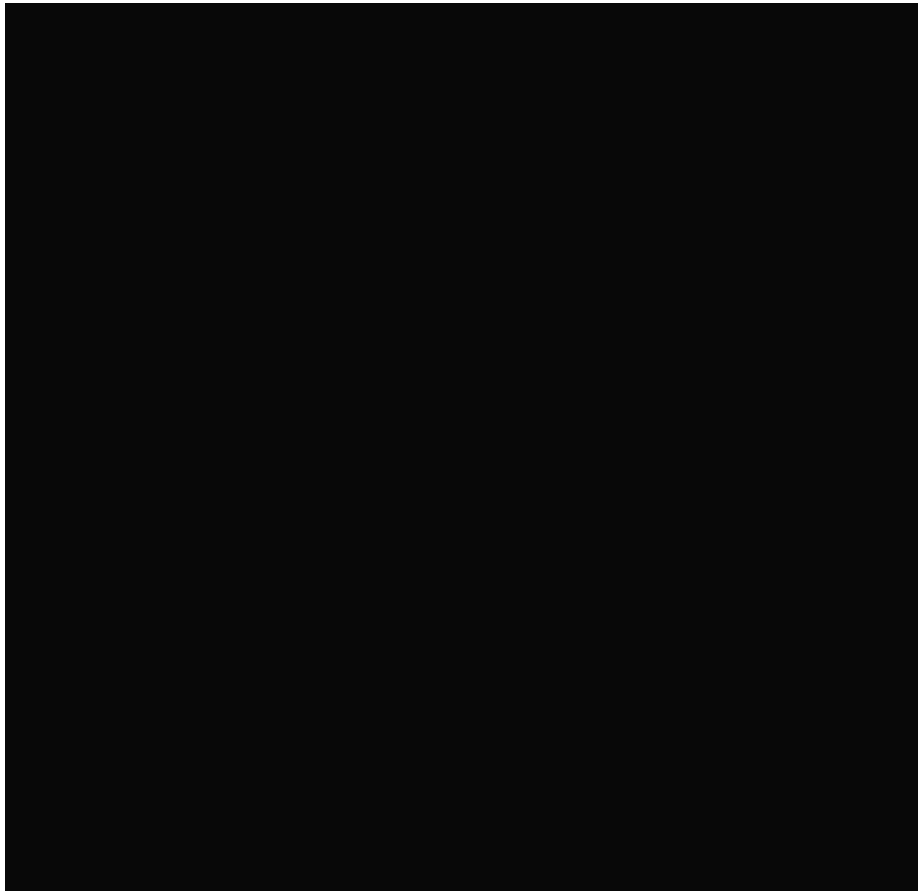
This was 14 days after the Arizona State Senate described the risk of evidentiary loss due to continued use of election equipment, and 6 days after Judge Thomason ruled that the subpoena needed to be complied with.



Figure 23-3 Identified but Unnamed Individuals at the keyboard at 3/3/2021 at 11:06AM

6.5.6.1.3	User Log Deletions on 4/12/2021
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A user utilizing the emsadmin account began executing a script at 4/12/2021 1:39:38 PM to check accounts for blank passwords. Between 4/12/2021 12:39:38 PM and 4/12/2021 12:45:13 PM this user ran this check 330 times. Each time the check was performed a new line was added to the security log, which had the additional effect of deleting the oldest entry in the log file due to the afore mentioned log size limitation setting. 330 older log entries were deleted via this method.



*Figure 24- County Employee at the EMS Keyboard on 4/12/2021 at 12:39PM
the time of the last blank password check was run.*

7.5.5 INTERNET CONNECTIONS

Likelihood: Medium **Impact:** Medium

The Maricopa County Board of Supervisors has repeatedly stated that the network connecting the election /voting systems is an isolated network that has no ability to connect to the internet. An in-depth analysis of both the allocated and unallocated space of the EMS, EMS workstations, Adjudication Workstations and other elements of the election system has definitively proven that this is not the case. There were hundreds of connections to public internet sites recovered from the unallocated areas of the hard drives. For the purpose of this report, only internet connection artifacts that contained valid dates after the installation of the Dominion Software suite on 8/6/2019 were included in this report. Additionally, for the purposes of this report only sites that have been visited multiple times were reported to avoid false reporting of default internet histories. Given that the Dominion Software suite was installed on 8/6/2019, no internet history URL visit dates should exist after that date.

The county did not provide a network diagram, a function diagram or any other documentation to determine if in fact a given system was supposed to be connected to the internet. Public statements by the county made clear that no election related system was connected to the internet. For the purposes of the internet examination, auditors used this statement as the starting point to prove or disprove that there was internet connectivity accessible to the systems provided by the county as a result of the subpoena. In the course of the examination definitive evidence was recovered that the EMS, EMS Client 1, EMS Client 3, EMS Client 4, REWEB 1601, and the REGIS 1202 systems had access to the internet after the installation of the Dominion voting software suite was installed on 8/6/2019. Given the nature of unallocated space analysis this is by no means a complete recovery of all internet history, but is definitive for the recovered internet artifacts on the dates and times indicated.

6.5.6.2 INTERNET CONNECTIONS TO THE EMS

The EMS Server had 3 connections on 2/2/2021 to the URL [REDACTED]

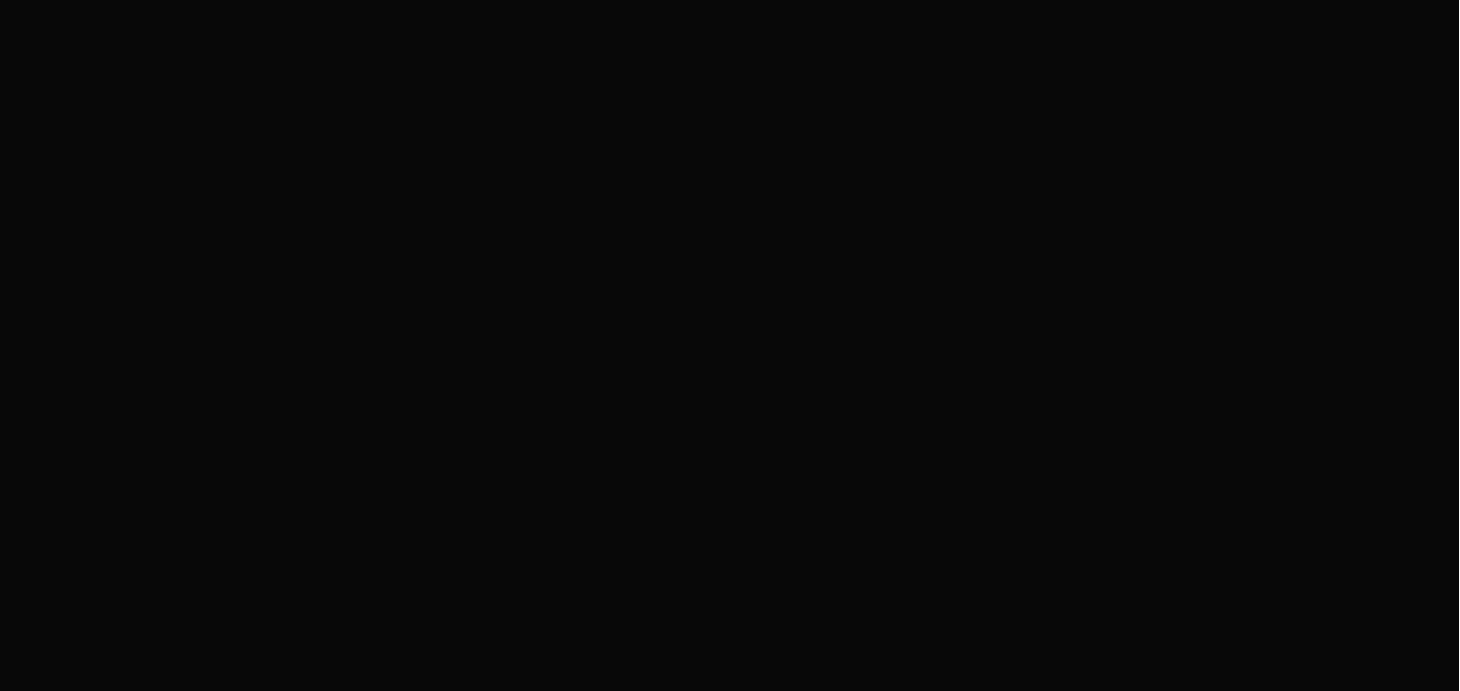
[REDACTED]

6.5.6.3 INTERNET CONNECTIONS TO THE EMS CLIENT 1

The EMS Client 1 had 9 Connections to the internet between 2/7/2020 and 2/22/2021, specifically to the go.microsoft.com and www.bing.com URL's.

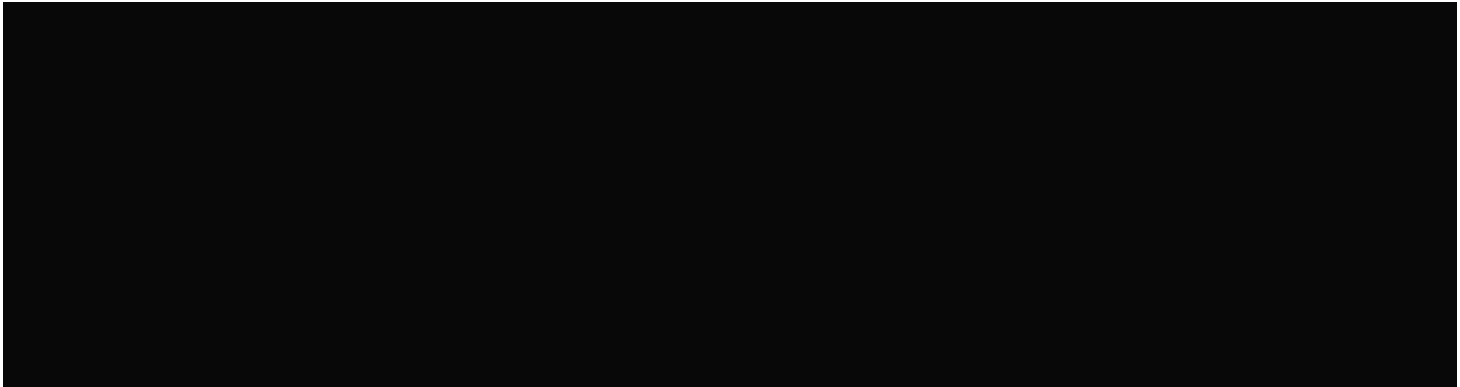
[REDACTED]

In addition to the HTTP(S) connections, there were 51 records recovered that contained 143 connections to an internal device that was not produced by Maricopa County with an IP address of [REDACTED].



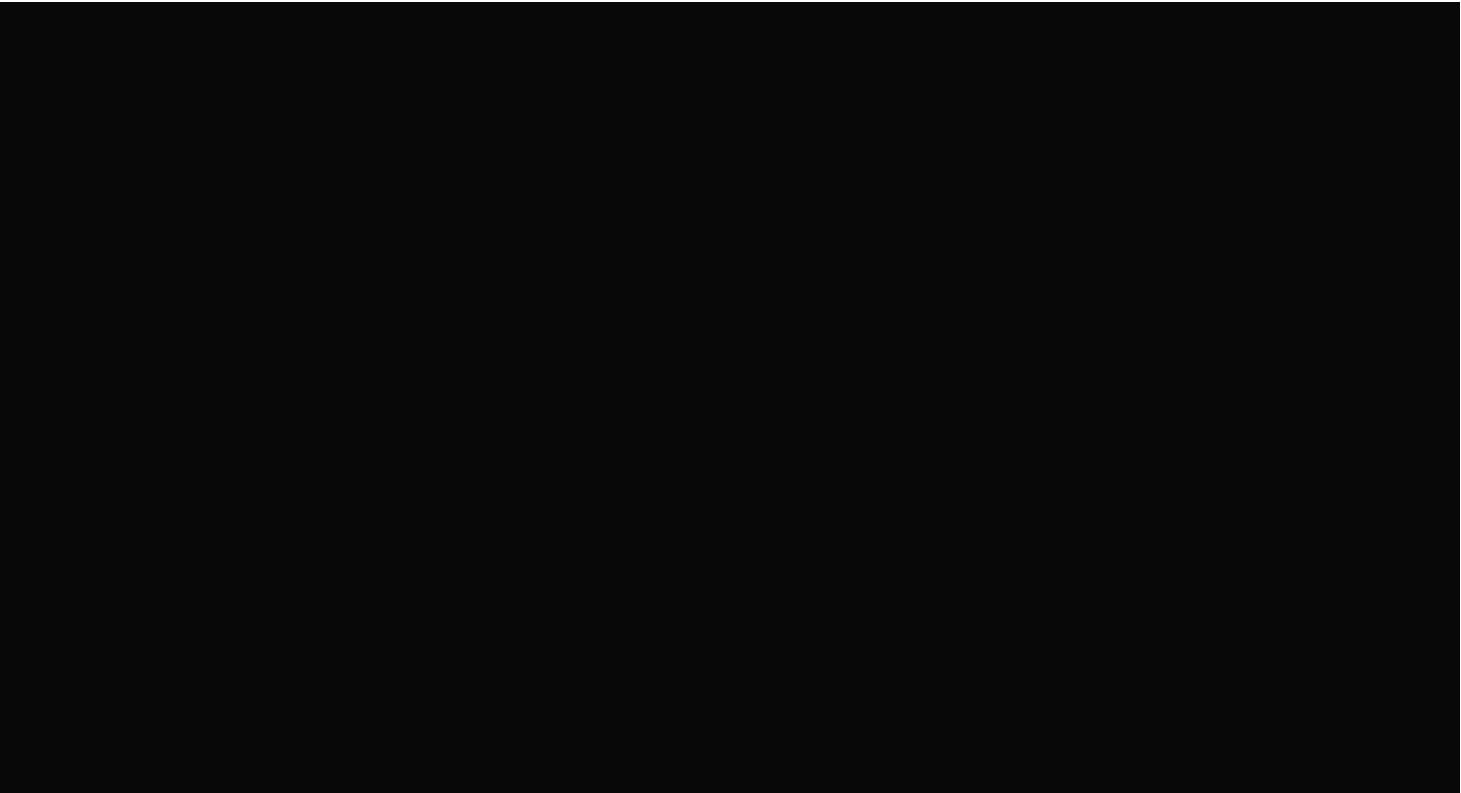
6.5.6.4 INTERNET CONNECTIONS TO THE EMS CLIENT 3

The EMS Client 3 had 6 Connections to the internet to the go.microsoft.com URL.



6.5.6.5 INTERNET CONNECTIONS TO THE REWEB 1601 SYSTEM

The county provided what was represented as a “forensic image” of the system with the hostname [REDACTED]. This in fact was not an actual forensic image, but rather a copy of the hard drive on a 4TB external drive. It is unknown what actions were taken by the County to ensure that the drive was wiped prior to the system copy. A carve for internet history artifacts recovered 890 internet records, each with multiple visit iterations for public URL connections including foxnews.com, maricopa.gov, Microsoft.com, msn.com and adnxs.com.



6.5.6.6 INTERNET CONNECTIONS TO THE REGIS 1202 SYSTEM

The county provided what was represented as a “forensic image” of the system with the hostname REGIS 1202. This in fact was not an actual forensic image, but rather a copy of the hard drive on a 4TB external drive. It is unknown what actions were taken by the County to ensure that the drive was wiped prior to the system copy. A carve for internet history artifacts recovered 205 internet records, each with multiple visit iterations for public URL connections including maricopa.gov, Microsoft.com, and logons to the localhost.



7.6 Low Findings

7.6.1ELECTION DATA FOUND FROM OTHER STATES	Likelihood:	Low	Impact:	Medium
The Maricopa County Adjudication 2 system had two bootable hard drives. The drive identified as [REDACTED] contains a directory [REDACTED]. Inside of that directory are subdirectories that appear to contain data from other jurisdictions and what appears to be demonstration data. Specifically, these directories are named [REDACTED]. One can reasonably assume that WA is an abbreviation for Washington and SC is an abbreviation for South Carolina. There is no known need for this external data to be located on a Maricopa County adjudication system. Neither of the two audits performed by Maricopa County reported this finding.				

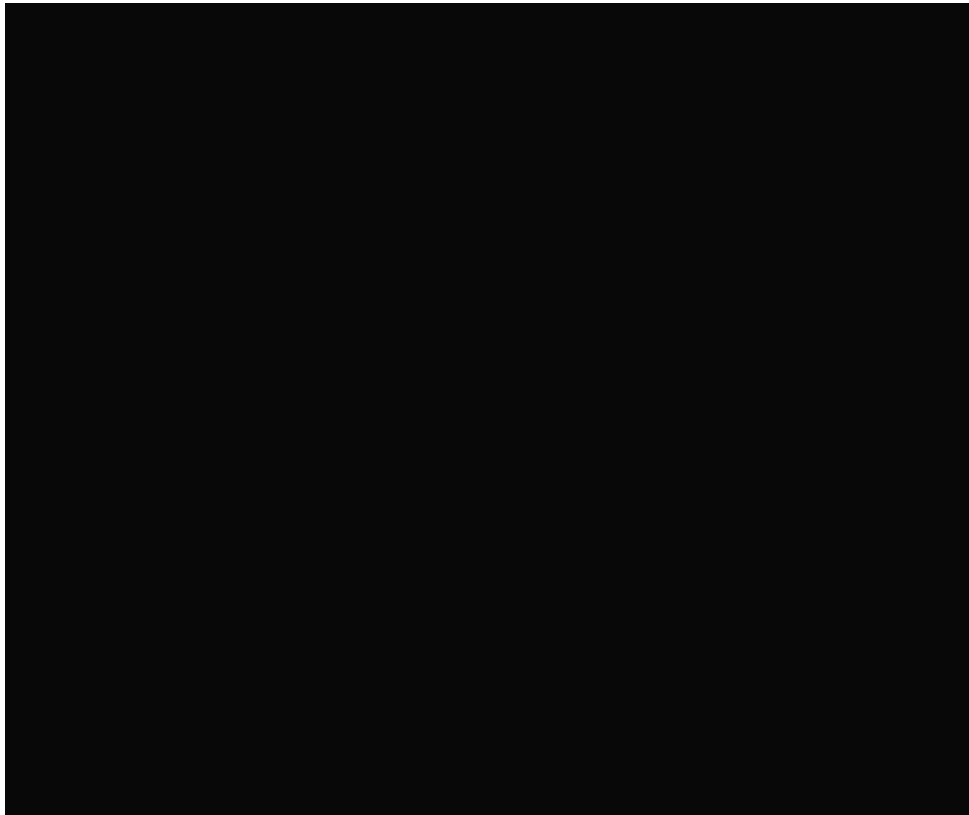




Figure 26-General with Variable SP Directory



Figure 27-SC Cert Cookie General Directory Structure

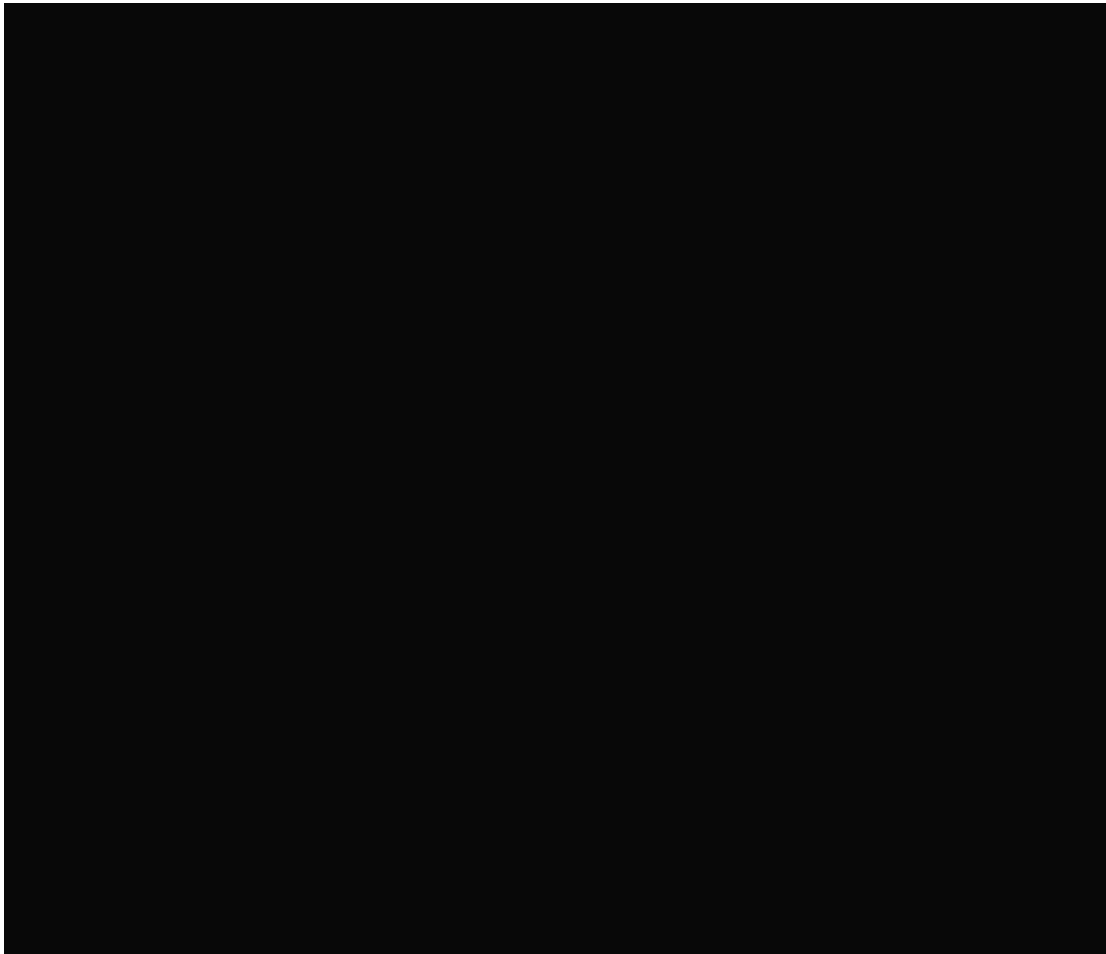


Figure 29-Special Election with Fusion Directory



Figure 28 - WA Cert General 2018 vA Directory

7 ABOUT CYBER NINJAS

Cyber Ninjas is an application security consulting company specializing in ethical hacking, training, and security program development. Our staff represents over 10 years of experience in a variety of areas including application support, development, product management, and application security. This experience across all areas of the software development life cycle gives us a unique perspective on how to build security into your existing processes. With everything we do, our goal is to build the knowledge within your organization. We strongly believe that "Security comes with knowledge," and that it is our job as Cyber Ninjas to train and teach through every engagement to build up capabilities within your organization.