



★ VIRGINIA ★
STATE BOARD
of ELECTIONS



November 2023 Risk-Limiting Audit Report

DECEMBER 20, 2023

VIRGINIA DEPARTMENT OF ELECTIONS

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EXECUTIVE SUMMARY

Pursuant to §24.2-671.2 of the Code of Virginia, the Virginia Department of Elections (ELECT) is required to coordinate a post-election, pre-certification risk-limiting audit of electronic voting systems (EVS) in the Commonwealth.¹ The 2023 November General Election Risk-Limiting Audits (RLA) took place in the three weeks following the general election for both houses of the Virginia General Assembly and various local and constitutional offices. During the November 15th meeting of the State Board of Elections (SBE) Virginia Senate District 20 (SD20) was randomly chosen by the Vice Chairman of the SBE to be audited, which includes Norfolk and Virginia Beach as well as Northampton and Accomack counties.² Additionally, three local electoral boards, Arlington County, Loudoun County, and Orange County, applied for RLAs of races wholly contained within their jurisdictions.³ These races were as follows:

- Virginia Senate District 40 (SD40) in Arlington County⁴
- Virginia House of Delegates District 27 (HOD27) in Loudoun County⁵
- Sheriff in Orange County

ELECT announced the successful completion of all RLAs on December 4, 2023.⁶ The results confirmed that the machines accurately reported the outcome of the audited races.

In addition to facilitating the audit each year, §24.2-671.2 also requires ELECT to submit a report to SBE that details the results of the audit and provides an analysis of any detected discrepancies.⁷ The following report gives a comprehensive overview of the history, practice, and process of risk-limiting audits in the Commonwealth to both provide these essential details as well as promote transparency, knowledge, and confidence in Virginia elections and the RLA process.

WHAT IS A RISK-LIMITING AUDIT?

A risk-limiting audit (RLA) means an audit protocol conducted after an election and before the certification of the election results with a pre-specified minimum probability of requiring a full hand count of votes cast, if the outcome reported by the voting system differs from the outcome that would be found by a full hand count of the votes in a contested race.⁸ While RLAs do not guarantee that every vote was counted correctly, they provide strong statistical evidence that the declared winner of a contest actually received more votes.

RLAs provide a more cost-effective and efficient alternative to other forms of post-election audits by reducing the total number of paper ballots needed to confirm election results. To conduct an RLA, a voting system must be in place that produces paper ballots. RLAs analyze a random sample of hand-counted ballots to confirm the election outcomes reported by the electronic voting system. If the margin of an election is wide, fewer votes are audited; if the

¹ Code of Virginia, [§24.2-671.2](#).

² State Board of Elections, November 15, 2023 [Meeting Agenda](#); Supreme Court of Virginia, [Virginia Senate Redistricting Maps](#).

³ State Board of Elections, November 15, 2023 [Meeting Agenda](#)

⁴ Supreme Court of Virginia, [Virginia Senate Redistricting Maps](#).

⁵ Supreme Court of Virginia, [House of Delegates Redistricting Maps](#).

⁶ State Board of Elections, December 4, 2023 [Meeting Agenda](#).

⁷ Code of Virginia, [§24.2-671.2](#).

⁸ *Id.*

margin is narrow, more votes will be audited until enough evidence can confirm the results of the contest.⁹ A two person team, known as an audit review board, must review, count, and tally the sampled ballots. Once tallied, the locality uploads the results of these tallies into Arlo to determine if the risk limit was met. A risk limit means the largest probability that the risk-limiting audit will fail to correct an election outcome that differs from the outcome that would be found by a full manual tabulation of the votes on all ballots cast in the contested race.¹⁰ For example, a 10% risk limit means that there is a 90% chance that the audit will correct an incorrect outcome.

WHAT RLA METHODS DOES VIRGINIA USE?

ELECT currently utilizes the ballot polling method to conduct the mandatory annual RLA in the Commonwealth. A ballot polling method RLA is similar to an exit poll. In this case, ballots (people) are randomly selected and hand-counted (polled).¹¹ If ballots sampled are similar to the reported outcome the risk limit should be met in the first round, and the RLA completed. If the ballots sampled are not similar to the outcome reported, then a second round of the RLA will be triggered and more ballots will be sampled. This was the method used in the SD20 RLA.

In March 2023, the SBE approved local electoral boards to apply for batch comparison method RLAs.¹² Batch comparison method RLAs hand count each ballot within a randomly selected batch of ballots and compare the reported outcome. Deviations discovered during the batch comparison method RLA process are accounted for and reported to Arlo. If there are enough deviations in the sampled batches of ballots a second round of the RLA may be required. This was the method used in the HOD27, SD40, and Sheriff RLAs.

TIMELINE OF THE RLA PROCESS FOR THE NOVEMBER 2023 GENERAL ELECTION



⁹ National Conference of State Legislatures, [Risk-Limiting Audits, Postelection Audits, A Summary](#).

¹⁰ Code of Virginia, [§24.2-671.2](#).

¹¹ City of Fairfax Post-Election, Risk-Limiting Audit Pilot, 2018, [RLA Pilot Presentation](#).

¹² State Board of Elections, March 7, 2023 [Meeting Agenda](#).

WHAT WERE THE RESULTS OF THE NOVEMBER 2023 RLAs?

Annual Mandatory RLA

Pursuant to §24.2-671.2(C), this year a General Assembly race, either for the House of Delegates or State Senate, was required to be chosen at random for an RLA. During the November 15, 2023, SBE meeting, SD20 was randomly chosen via a live drawing; this district included portions of Norfolk and Virginia Beach cities as well as the entirety of Northampton and Accomack counties.¹³ In this district, Senator-elect William DeSteph won the race against Victoria Luevanos with a 14% margin between the two candidates.¹⁴ The SBE also set the risk limit for this RLA at 10%.

The RLA was successful in the first round of the audit, falling below the 10% risk limit. The RLA confirmed the outcome reported by the EVS. The results were announced at the December 4th, 2023 SBE Meeting.¹⁵

Key Takeaways

Ballot Storage

Strategically storing ballots is key to an easier and smoother RLA process. Having smaller batches of ballots allows for less labor by audit review boards; the less time that an audit review board has to take to find a specific ballot in a batch of ballots the faster an RLA round can be completed. If ballots were in smaller batches this would also create more batches for Arlo to choose from, lessening the chance of a full hand tally in subsequent rounds and of Arlo generally picking all of central absentee precinct (CAP) or early voting batches.

However, this presents a challenge to localities who may not have the time or equipment available to separate ballots into smaller batches. For example, certain EVS can be programmed to batch into a certain amount, such as 100, 1000, etc. Other EVS may not have that capability or may come at a greater cost to the locality. However, localities may consider emptying their EVS on a regular basis during early voting and CAP. For example, during early voting an EVS could be emptied at the end of the day or up to a certain number of processed ballots, creating a batch of ballots. The EVS for CAP may also be emptied at a predetermined amount of ballots, i.e. 1000 ballots, to create a batch of ballots. Breaking down notoriously large batches into smaller batches could also help in terms of a recount as the recount teams would have an easier time processing the ballots. Further discussion with both the election community and the EVS vendors on solutions for this issue should be had in preparation for 2024.

Stakeholders of the RLA

Administering and performing any RLA requires a great deal of coordination amongst both state and local stakeholders. The process includes:

¹³ State Board of Elections, November 15, 2023 [Meeting Agenda](#).

¹⁴ Virginia Department of Elections, Election Night Reporting, [Virginia Senate District 20](#), December 11, 2023.

¹⁵ State Board of Elections, December 4, 2023 [Meeting Agenda](#).

- ELECT staff from Policy, Election and Registration Services, and Information Security divisions;
- GRs and their staff;
- Local Electoral Board (EBs);
- OOE's;
- Clerks of Court and their staff, and;
- Circuit Judges.

Each group relies on the other to perform their duties to the best of their ability for the RLA process to be successful. For ELECT, this means having a robust team available and trained on the RLA process to answer questions and provide supervision. For localities, this means having all the important stakeholders present or on standby to perform their roles. GRs need to be available to coordinate the EB members, audit board members, and their staff; typically, GRs also fill the role of local manager of the RLA, an important role in ensuring that data is properly uploaded into Arlo. EB members from both major parties need to be available to observe the RLA as is required under §24.2-671.2(G).¹⁶ As many in the elections community know, the general election is not only on Election Day but actually starts 45 days before and continues until the first Monday in December when the SBE certifies elections.¹⁷ The RLA is also a part of that timeline as an RLA is essentially required after every general election, to take place after the election but before certification.¹⁸

Clerks of Court need to be available to help maintain the chain of custody of the ballots either by being present for the RLA or are available to transfer custody of the ballots to the GR or EB for the RLA. If an EB member of a major party is unavailable for the RLA, Circuit Court Judges should be available to allow for the temporary appointment of an EB member for the purpose set out in §24.2-671.2(G).¹⁹ For Northampton County, the lone Democratic EB member was unavailable for the beginning of the RLA. On an extremely short timeline, the GR for Northampton County had to find a temporary EB; the GR faced obstacles finding someone to fill the position and arranging for a Circuit Court Judge to approve the temporary appointment. Better training and communication amongst the required and potential stakeholders of the RLA should be encouraged in preparation for 2024.

Scheduling and Location of the RLA

While the RLA is on an annual basis during the same time of year, scheduling and finding a location for the RLA can be a challenge for localities, especially for those who are randomly chosen for the RLA. Three out of four localities for SD20 used their Clerk of Court's office as the Clerk of Court is the ultimate custodian of the ballots being audited. Accomack County held their RLA meeting at the GR's office as their office had more space compared to the Clerk of Court's office. When choosing a location for the RLA certain factors should be considered including but not limited to:

¹⁶ Code of Virginia, [§24.2-671.2\(G\)](#).

¹⁷ Code of Virginia, [§24.2-679\(A\)](#), [§24.2-701.1\(A\)](#).

¹⁸ Code of Virginia, [§24.2-671.2](#).

¹⁹ Code of Virginia, [§24.2-671.2\(G\)](#).

- Local office availability and closings due to holidays
- Internet access by the locality manager and the audit review boards to upload data to Arlo
- The public's access to the location of the RLA to observe as the RLA is a public meeting of the EB
- Space for the audit review boards to perform the RLA

These factors will be included in ELECT's RLA guidance to localities. The random nature of the selection of most RLAs can make scheduling the location of the RLA difficult. All localities need to have a plan in place in case they are chosen for an audit. ELECT is developing a communication plan that will remind localities and provide additional training on the RLA to aide future audits.

Early Voting, CAP, and the RLA

For the RLA to be a proper audit of the outcome of the election localities must include in their ballot manifests all batches where ballots for the contested race can be found; this includes CAP and early voting batches. These batches usually are quite large and often contain ballots that do not have the contested race being audited. For ballot polling, this means that Arlo may sample a significant number of ballots that do not contain the audited race and can cause the RLA to miss the risk limit due to a lack of sampled ballots with the audited race. As noted above, more intentional ballot storage of early voting and CAP ballot batches may solve or mitigate this issue.

Training

ELECT produces an RLA Manual that details the steps necessary to perform an RLA and presents that Manual for approval to the SBE during a public meeting.²⁰ ELECT has also produced other materials to assist in the performance of an RLA.²¹ That being said, as this was the first year with the batch comparison method and the key takeaways noted above and below the RLA Manual as well as ELECT's other materials will be revised and updated to provide greater clarity to the elections community. Going into 2024 where all localities will be participating in the RLA this will be important as many localities have not participated in an RLA since 2021, the last statewide RLA.²² ELECT will also be looking for training opportunities to engage with elections community in preparation for the RLA in 2024.

Outreach

As RLAs will continue to be used in the Commonwealth, ELECT should provide more education as to an RLA's purpose and how it fits into our overall goal to have safe, secure, fair, and free elections in the Commonwealth. This will be especially valuable going into 2024 when all localities will be participating in the annual mandatory RLA. Understanding how the RLA fits into the election security process will boost the public's confidence in not only the value of RLAs but also the election process. To achieve this goal, the RLA Manual will be updated and revised to provide greater clarity in the process as well as incorporate lessons learned and feedback from the elections community.

²⁰ State Board of Elections, March 7, 2023 [Meeting Agenda](#); Virginia Department of Elections, [RLA Manual](#).

²¹ Virginia Department of Elections, Formswarehouse, [Risk Limiting Audit](#).

²² Virginia Department of Elections, [November 2020 General Election RLA Report](#).

Requested RLAs

As noted above, the SBE approved the use of the batch comparison method in March 2023 for RLAs that were requested pursuant to §24.2-671.2(D).²³ All three requested RLAs in 2023 used the batch comparison method. The risk limit for all three requested RLAs was set to 10%.

Loudoun County

Loudoun County Electoral Board requested an RLA for the Virginia House of Delegates District 27 race. In this district, Delegate-elect Atoosa Reaser won the race against Chris Harnisch with a 16.33% margin at the time of the November 15 SBE meeting.²⁴ The application did qualify under the Administrative Code of Virginia 1VAC20-60-80 as well as the Code of Virginia §24.2-671.2(D).²⁵ Loudoun County's ballot manifest contained 62,303 ballots with 23,042 of those ballots containing HOD27. This difference is due to the way early voting and CAP are processed and stored, mixing ballots not only with the audited race but also ballots that do not have the audited race. The SBE approved the application on November 15, 2023, during their public meeting.²⁶

The first round of the HOD27 RLA was Monday, November 20.²⁷ Loudoun County failed to meet the risk limit in the first round of the RLA. This was due to 20 ballots that had been marked by the EVS as undervotes but were determined as proper votes for certain candidates via the SBE-approved Hand-Counting Guidelines.²⁸ As such, a second round of the RLA was required; the second round was held on Wednesday, November 29.²⁹ Arlo determined that a full hand tally was required to confirm the outcome of the election. During the second round of the RLA, 27 ballots were found to be proper votes after assessment using the Hand-Counting Guidelines. The risk limit was met in the second round. The 47 ballots found made up .0754377799% of the total 62,303 ballots processed during the RLA. The RLA confirmed the outcome reported by the EVS. The adjudicated votes were added to the abstract of votes, presented to the SBE, and approved by the SBE during their December 4, 2023 meeting.³⁰

Arlington County

Arlington County Electoral Board requested an RLA for the Virginia Senate District 40 race. In this district, Senator-elect Barbara Favola won the race against David Henshaw with a 62.15% margin at the time of the November 15 SBE meeting.³¹ Arlington County's ballot manifest had 61,490 ballots with 59,386 ballots containing the SD40; this difference is for the same reason noted above. The application did qualify under the Administrative Code of Virginia 1VAC20-

²³ State Board of Elections, March 7, 2023 [Meeting Agenda](#); Code of Virginia, [§24.2-671.2](#).

²⁴ State Board of Elections, November 15, 2023 [Meeting Agenda](#); Virginia Department of Elections, Election Night Reporting, [Virginia House of Delegates 27](#), December 12, 2023.

²⁵ Code of Virginia, [§24.2-671.2](#); Administrative Code of Virginia, [1VAC20-60-80](#).

²⁶ State Board of Elections, November 15, 2023 [Meeting Agenda](#).

²⁷ Virginia Department of Elections, [Risk-limiting Audits](#).

²⁸ Virginia Department of Elections, [Virginia's Guide to Hand-Counting Ballots](#).

²⁹ Loudoun County, [November 2023 Government Calendar](#).

³⁰ State Board of Elections, December 4, 2023 [Meeting Agenda](#).

³¹ State Board of Elections, November 15, 2023 [Meeting Agenda](#); Virginia Department of Elections, Election Night Reporting, [Virginia Senate District 40](#), December 12, 2023.

60-80 as well as the Code of Virginia §24.2-671.2(D).³² The SBE approved the application on November 15, 2023, during their public meeting.³³

The first round of the SD40 RLA was on Tuesday, November 28.³⁴ Arlo randomly chose five batches, containing 3,450 ballots total. The risk limit was met in the first round of the RLA with only five ballots being found to be proper votes that had been marked as undervotes by the EVS via the SBE-approved Hand-Counting Guidelines.³⁵ The five ballots found made up .1449275362% of the total 3,450 ballots processed during the RLA. The RLA confirmed the outcome reported by the EVS. The adjudicated votes were added to the abstract of votes, presented to the SBE, and approved by the SBE during their December 4, 2023 meeting.³⁶

Orange County

Orange County Electoral Board requested an RLA for their Sheriff race. In this race, Sheriff-elect Jason Smith won the race against Stephen LaLuna with a 35.01% margin at the time of the November 15 SBE meeting.³⁷ Orange County's ballot manifest had 13,227 ballots with 12,814 ballots cast for this race. Unlike the two RLAs noted above, the sheriff's race is locality-wide, meaning every ballot would have the race; the difference here can be attributed to undervotes or overvotes. The application did qualify under the Administrative Code of Virginia 1VAC20-60-80 as well as the Code of Virginia §24.2-671.2(D).³⁸ The SBE approved the application on November 15, 2023, during their public meeting.³⁹

The first round of the Orange County Sheriff RLA was on Wednesday, November 29.⁴⁰ Arlo randomly chose seven batches, containing 7,273 ballots. The risk limit was met in the first round of the RLA with only 16 ballots being found to be proper votes that had been marked as undervotes by the EVS via the SBE-approved Hand-Counting Guidelines.⁴¹ The 16 ballots found made up .21999178503% of the 7,273 ballots processed during the RLA. The RLA confirmed the outcome reported by the EVS. The adjudicated votes were added to the abstract of votes and approved by the local Electoral Board.⁴²

Key Takeaways

Smaller Races and the Batch Comparison Method

Using batch comparison method RLAs for smaller races can be difficult due to the small number of batches available to audit. Deviations found during the batch comparison method RLA process, such as the small number of variations found in Loudoun County, can have more of an

³² Code of Virginia, [§24.2-671.2](#); Administrative Code of Virginia, [1VAC20-60-80](#).

³³ State Board of Elections, November 15, 2023 [Meeting Agenda](#).

³⁴ Virginia Department of Elections, [Risk-limiting Audits](#).

³⁵ Virginia Department of Elections, [Virginia's Guide to Hand-Counting Ballots](#).

³⁶ State Board of Elections, December 4, 2023 [Meeting Agenda](#).

³⁷ State Board of Elections, November 15, 2023 [Meeting Agenda](#); Virginia Department of Elections, Election Night Reporting, [Orange County Sheriff](#), December 12, 2023.

³⁸ Code of Virginia, [§24.2-671.2](#); Administrative Code of Virginia, [1VAC20-60-80](#).

³⁹ State Board of Elections, November 15, 2023 [Meeting Agenda](#).

⁴⁰ Virginia Department of Elections, [Risk-limiting Audits](#).

⁴¹ Virginia Department of Elections, [Virginia's Guide to Hand-Counting Ballots](#).

⁴² Virginia Department of Elections, [Orange County Sheriff Results](#).

effect on the RLA and the calculations made by the Arlo software. Typically, the batch comparison method is used at the statewide level such as in Georgia and Pennsylvania.⁴³ Having the batch comparison method at the statewide level allows for a greater universe of batches and for deviations found in the process to have less of an impact on whether the risk limit will be met. ELECT is in discussions with VotingWorks on ways that the software can be improved to better implement the batch comparison method at the local level.

Locality-wide Races

As stated previously, CAP and early voting batches can have a great deal of ballots that do not have the audited contest. This is also a problem in batch comparison method RLAs. If a local Electoral Board requests an RLA for a race that is not a locality-wide race, then the CAP and early voting batches will include ballots that do not have the audited race. While these ballots are not reported during a batch comparison method RLA, these ballots do slow down the processing of ballots by the audit review board as they have to sort out those ballots to then get to the ballots with the audited race. This issue was noted in the June 2023 RLA Report and appeared again during Loudoun County's November 2023 RLA.⁴⁴ In contrast, Orange County's RLA for their Sheriff's race did not have that issue as that race was a locality-wide race; every ballot in the CAP or early voting batches would have the audited race. ELECT should encourage localities who wish to perform a batch comparison method RLA to choose a race that is locality-wide to avoid audit review boards spending more time sorting the ballots than counting the ballots.

CONCLUSION

All RLAs performed for the 2023 General Election determined that the correct outcome of the election was reported by the EVSs. The results reflect the hard work of election administrators and further exemplify the integrity and validity of the 2023 General Election. RLAs are an important tool in reassuring the public that EVSs are accurate and reliable and provide an excellent check on the democratic process. ELECT intends to build upon the lessons learned during this year's audits in the coming year to ensure safe, secure, fair, and free elections in the Commonwealth.

⁴³ Georgia Secretary of State Elections Division, [Georgia's 2022 Statewide Risk Limiting Audit Confirms Results](#); Pennsylvania Department of State, [Post-Election Audits](#).

⁴⁴ Virginia Department of Elections, [June 2023 Risk-Limiting Audit Report](#).

Appendix

General Assembly Races Eligible for Random Selection in November 2023

House of Delegates Districts*	Senate Districts*
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*Uncontested races, races below 1%, or races applied for by local electoral boards pursuant to §24.2-671.2(D) were removed from selection as they were ineligible.

Arlo Results

Virginia Senate District 20 (Virginia Beach, Norfolk, Northampton County, Accomack County)

Sample Size	Rik Limit Met?	P-Value	Audited Votes
724 ballots	Yes	.063216	William R. DeSteph: 249; Victoria A. Luevanos: 198; Write-In: 0

Virginia House of Delegates District 27 (Loudoun County)

Sample Size	Risk Limit Met	P-Value	Audited Votes
Full Hand Tally (62,303 ballots)	First Round: No Second Round: Yes	First Round: .100262 Second Round: 0	Chris K. Harnisch: 9,759; Atoosa R. Reaser: 13,191; Write-in: 109

Virginia Senate District 40 (Arlington County)

Sample Size	Risk Limit Met	P-Value	Audited Votes
5 batches (3,450 ballots)	Yes	.095313	David A. Henshaw: 617; Barbara A. Favola: 2,780; Write - In: 11

Orange County Sheriff

Sample Size	Risk Limit Met	P-Value	Audited Votes
7 batches (7,273 ballots)	Yes	.096885	Stephen M. LaLuna: 2,118; Jason C. Smith: 4,934; Write-in: 25