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Comment on RLA procedures In Maryland

Greetings:

We thank you for the opportunity to comment on the proposed updates to the Code of Maryland Regulations (COMAR) to implement the requirements in law for Risk Limiting Audits (RLA). Citizens Oversight has observed many audits and is familiar with RLA implementations in a variety of jurisdictions. We have also developed a Ballot Image Auditing (BIA) solution called AuditEngine¹.

The comments below first address concerns related to the use of BIAs and the limitations of RLAs in detecting certain types of election errors. We then provide several specific procedural recommendations regarding the conduct of RLAs, including procedures for escalation to full hand counts and documentation of sampled ballots.

¹ see <https://AuditEngine.org>

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Ballot Image Audits in Maryland Need Careful Verification

Recently, Maryland has conducted Ballot Image Audits (BIAs) using the services of Clear Ballot. Despite the potential power of BIAs, they can create a false impression of security if the configuration of the voting system is used as the basis for those audits. For example, if the election definition data, barcode encodings, and similar configuration information are adopted directly from the voting system being tested, the results of a BIA may mirror the voting system exactly while verifying nothing independently.

We are concerned about the recent events at the 2025 election in Stephentown NY, where three of the contests had inaccurate results and two contests were overturned². Rensselaer County had just started using the Clear Ballot voting system.

Available information indicates that the problem was a configuration error in which targets were evaluated in the wrong locations. That type of error should not occur in an integrated voting system where the same system is used to design the ballots and provide the mapping data used by the voting machines. Under such circumstances there should be no need for human entry of target locations. This should not be considered ordinary human error but rather a gap in the Clear Ballot process if it depends on manual entry of these locations. Other voting systems generally derive these mappings automatically from the ballot design process.

We are further concerned because documentation indicates that Clear Ballot requests that Maryland provide mapping data from the voting system, including the locations of each oval for each ballot style, as well as the encoding of barcodes from the ES&S system. If such information is relied upon, an error in the configuration of the voting system may be propagated directly into the Clear Ballot auditing system. If both systems rely on the same incorrect configuration, they may both report that everything is correct even though multiple contests may have been evaluated incorrectly, as occurred in Stephentown, New York.

We have experience with the AuditEngine ballot image auditing system and have conducted pilot audits in cooperation with Maryland staff. Through that work we have learned that auditing systems themselves can also make mistakes if not carefully designed and verified. AuditEngine evaluates the human-readable text on ballot summary sheets using OCR rather than relying on barcodes, and it performs independent mapping of ballot elements. The system includes several proofing stages that rely on human review to verify configuration and mapping before results are accepted.

The bottom line is that ballot image audits are valuable tools, but they cannot be relied upon without careful and structured scrutiny to ensure that they are truly independent of the voting system configuration they are intended to check.

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<https://cbs6albany.com/news/local/stephentown-library-budget-vote-passes-with-recount-after-failing-on-election-day>

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RLAs are a limited solution to this problem

Given the need for additional scrutiny, how might these risks best be addressed? Some may suggest that a “Risk Limiting Audit” (RLA) provides the best solution. Because the concept of limiting risk appears in the title, RLAs may initially seem like a convenient answer.

There is certainly no harm in conducting additional auditing. BIAs generally can detect far more issues in the election because they review every single image and every single contest. They are a much more rigorous test of the accuracy of an election. There is zero additional risk due to sampling. RLAs do examine paper ballots directly, and that can detect some errors that a BIA may miss. For that reason, we are not attempting to block the use of RLAs in Maryland. However, the technology has significant limitations. These limitations are discussed more thoroughly in the paper “The Four Fatal Flaws of RLA Audits,” summarized below. In addition to these procedural problems, RLAs rely on paper records that have been in storage where it is impossible to have 100% security. It is easy to change paper records with only a pen, by adding overvotes or filling in blank contests. Entire paper ballot batches can be easily swapped out and there is no way to easily detect this.

In contrast, if ballot images are secured with cryptographic mechanisms that are easily applied, it is impossible to modify, and or delete those images without detection.

It would be a shame if Maryland were to supplant BIAs and use only the weaker RLA audits, and if the intention of trying RLAs in Maryland is to eventually turn to this much weaker approach, then that would be a mistake.

- **Bad for Tight Margins:**

Although RLAs can work reasonably well when margins are wide, they become very difficult to apply when margins are tight. In such cases the number of ballots that must be examined can grow rapidly, approaching a full hand count. When margins are close, the Full Hand Count Alternative Procedure (see below) should be considered from the outset rather than relying on an RLA process that may escalate late in the audit, causing delays and adding costs. We believe that this problem is so severe, that it makes RLAs essentially worthless when compared with a BIA audit.

- **Requires no corrections:**

An RLA relies on a relatively small set of samples to represent the reliability of the entire election. Those sampled ballots must be compared exactly with the voting system results. If auditors follow their usual practice of correcting errors as they encounter them, the statistical meaning of the sample is destroyed. Errors discovered in the sampled ballots must therefore be recorded and reported without correction during the sampling phase.

- **Corrections require a full hand count.**

The sampling stage of an RLA does not correct the election outcome. It only

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evaluates whether the reported outcome appears consistent with the sampled ballots. If the outcome cannot be confirmed with sufficient confidence, the audit must escalate to a full hand count. The correction of results therefore occurs only during that full hand count, which is a different process from the sampling stage itself.

- **Don't cover all contests:**

In practice, RLAs are difficult to apply comprehensively to every contest in an election. Although some academic analyses suggest that auditing all contests is feasible, real-world deployments typically focus on only a small number of contests, usually those considered most significant. It remains important that when a ballot is sampled, all contests on that ballot are compared with the voting system results. However, contests not included in the formal audit are not actually protected by the defined risk limit. The comparison of these additional contests can still provide useful information, even if the formal statistical guarantee does not apply to them.

With these limitations in mind, adding RLAs when BIAs are already being conducted is not inherently wrong. However, it does not directly address the types of failures that can occur in both voting systems and ballot image auditing systems. RLAs are more difficult to apply than necessary for this purpose, and they do not provide comprehensive coverage of the types of errors that have been observed in practice.

Is There a Complementary Approach?

The limitations discussed above suggest that additional methods may be useful alongside both Ballot Image Audits and Risk Limiting Audits. Citizens Oversight has been developing an audit approach called **ACRE** (All Contest Review and Evaluation), which is intended to address some of the configuration and interpretation risks described earlier.

ACRE is based on reviewing a small sample of ballot images by human eye and comparing them with the Cast Vote Record (CVR) for those ballots in the reported results. The goal is to provide a simple, transparent check that can detect configuration errors, barcode interpretation failures, and other issues that may not be revealed by either BIAs or RLAs alone.

Because this comment concerns the proposed RLA procedures in COMAR, a full description of ACRE is outside the scope of this submission. We plan to provide additional information about this method in a separate document.

This brief mention is included only to note that additional complementary audit approaches are under development that may help address the types of failures discussed above.

Specific Comments on the RLA Process

We now turn from general observations to specific comments on the proposed RLA procedures.

Separate procedure for full hand counts

Papers discussing RLAs often combine the concepts of a sampling phase and a full hand count phase. These phases may be grouped under the overall concept of an RLA audit, but they are in fact distinct procedures. If a Card-Level Comparison RLA (CLC-RLA) audit³ is conducted, the process must shift to a different method if a full hand count becomes necessary. In some circumstances it may be preferable to skip the sampling stage entirely and proceed directly to a full hand count, particularly when margins are tight or when the audit reveals multiple issues.

A full hand count should include multiple checkpoints designed to detect and correct human error. Human counting errors can occur at approximately a 0.48% to 2% rate if no safeguards are used⁴⁵. When the margin of victory approaches this level or is smaller, it becomes critical to include procedures that detect and correct counting errors during the process.

One advantage of a full hand count is that corrections may be made as discrepancies are discovered. In contrast, the statistical validity of an RLA sampling phase depends on recording discrepancies without correcting them during the sample review. Election departments already have established recount procedures that operate batch by batch and allow discrepancies to be addressed during the counting process.

For these reasons, we suggest that the RLA procedures explicitly recognize the need for alternative procedures when circumstances warrant a full hand count. The following language illustrates the type of provision that could be included.

Full Hand Count Alternative Procedure

When errors are detected that appear to be significant, such as configuration errors that may affect many ballots, the process should transition to Full-Hand Count Alternative Procedures that operate like a conventional full hand count.

³ Such as https://www.usenix.org/legacy/event/ewtwote10/tech/full_papers/Stark.pdf "Super-Simple Simultaneous Single-Ballot Risk-Limiting Audits"

⁴ Goggin, et al,

https://www.researchgate.net/publication/265200703_Post-Election_Auditing_Effects_of_Procedure_and_Ballot_Type_on_Manual_Counting_Accuracy_Efficiency_and_Auditor_Satisfaction_and_Confidence "Post-Election Auditing: Effects of Procedure and Ballot Type on Manual Counting Accuracy, Efficiency, and Auditor Satisfaction and Confidence" -- Goggin does define and compare the efficiency of different methods but does not include comparing with voting system counts or compiling errors.

⁵ Burke, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=6150329 -- "Errors and Costs of Counting Ballots by Hand or by Computer" Note, the error rates found in this study were slightly higher than the Goggin study because they included the process of summation.

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Any full hand count conducted in this manner should keep batches or precincts together and produce subtotals for each batch or precinct that can be compared with the official results. One useful safeguard is to divide batches approximately in half and assign two audit teams to tally each half independently. This approach reduces the tendency for audit teams to attempt to match the previously published totals for the batch.

If a full hand count is conducted statewide, the RLA procedures should no longer be used. When it appears that results may need to be corrected, the Full Hand Count Alternative Procedures should be applied instead.

Documenting RLA Samples

One difficulty we have encountered while providing oversight of RLA audits is that the interpretation of each sampled ballot is typically entered into an application such as ARLO by VotingWorks. These applications function in a manner similar to DRE systems, where observers must rely on the software's internal data entry rather than directly reviewing the recorded information. This introduces an unnecessary layer of opacity into a process that should remain transparent.

Transparency can be improved by

- Maintaining a full record on paper of each ballot entered into the application
- Taking a snapshot photograph of each ballot, which allows any third party to directly see the physical evidence of the ballot.

Unfortunately, when county staff are responsible for entering the ballot interpretations into the application, it is possible for the data entry process to rely on the CVR data rather than the ballot itself. In that circumstance, discrepancies may never be detected, even when they exist, and yet the staff can meet the desire of reporting "no discrepancies."

For these reasons, it is essential that each sampled ballot be fully documented so that the data entry can be independently verified. We suggest that the procedures include steps such as the following.

1. If a Card-Level Comparison Audit is performed, all contests on the ballot should be captured by the process and compared with the voting system results, even if the ultimate risk in these contests does not influence the need to escalate the number of samples captured.
2. If a Card-Level Comparison Audit is performed, each sampled ballot card should be documented by photographing both sides of the sheet and later linking these images to the sampled ballot by ID number. These photographs and their relation to the audit should be made publicly available so that third parties can independently verify the interpretation of the ballot used in the audit.
3. Discrepancies between the CVR and the ballot images should be reported accurately and completely. If discrepancies are determined to be caused by errors introduced

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during the auditing process, those errors should be enumerated and disclosed. Discrepancies should not be corrected by auditing staff without full documentation and explanation.

4. Audit results should be posted publicly. The report should include the photographs of sampled ballots used in a Card-Level Comparison Audit, a record of the interpretations entered into the audit system, a list of any discrepancies detected, and an explanation of whether those discrepancies are attributed to errors in the auditing process, errors in the voting system, or other causes.

We appreciate the opportunity to provide these comments and trust that they will be given careful consideration in the development of procedures for conducting these audits. In addition to the procedural recommendations above, we expect to submit further information separately regarding complementary audit methods such as ACRE that may help strengthen election verification.

Sincerely,

A handwritten signature in black ink, appearing to read 'Ray Lutz', with a long horizontal stroke extending to the right.

Ray Lutz
Executive Director, Citizens Oversight

Submitted on behalf of Citizens Oversight and supporting contributors.