

Boone County was advised by VSTOP to select only Republican contests for audit due to the overwhelming margin of Republican to Democratic ballots cast, and the inability to separate primary ballots by party when using direct-record electronic (DRE) voting systems. For example, auditing a Democratic race may require a sample of 25 ballots. Since the ballots cannot be separated, and Republican votes held over 80% of the vote share, it can be expected the random sample would pull many more Republican ballots. It could take exorbitant sample sizes to reach the 25 Democratic ballots that were needed for sample because of the significant disparities in party vote share. While no Democratic contests were selected for audit, the integrity of ballots cast and machine accuracy can be confirmed because the Republican ballots being sampled are from machines used by both parties on Election Day.

Using the Stark Audit Tool, VSTOP proceeded to run ballot sample size estimates on the selected contests based on the initial election night reports found on the county website. While these may not have been the final vote totals (pre-certification), they work appropriately for estimating expected sample sizes and approximating how long it would take to complete the audit.

An initial audit meeting was held to review the post-election audit process, and answer any questions Boone County Election Officials had about the process. From there, the audit date, time, location and selection of audited contests were coordinated by the County Clerk and VSTOP and were finalized.

VSTOP has been authorized by the Indiana Secretary of State to conduct post-election audits. At this time, Indiana does not have mandated post-election audits, and participation is voluntary by the county, and designated by the Secretary of State. Boone County formally requested designation on May 7, 2024 via a County Election Board Resolution. Boone County was granted designation and audit prep began.

**Pre-Audit Process**

On May 30, 2024, the VSTOP team successfully completed a post-election audit in Boone County, Indiana, for the 2024 Primary Election. The following memo will summarize the pre-audit process, explain the execution of the audit, and present the audit results.

**SUBJECT:** Summary of 2024 Boone County Primary Post-Election Audit

**DATE:** 6/28/2024

**TO:** Boone County Clerk's Office and County Election Board  
**CC:** Election Board Chair, Rebecca McClure  
 Election Board Member, Brian Jones  
 Election Board Secretary & County Clerk, Lisa Bruder



The VSTOP Audit Team, led by VSTOP's Election System Audit Specialist, Matt Housley, arrived in Boone County at approximately 8:00 AM and began audit set-up. As the VSTOP Team set-up, Matt had a pre-audit meeting for all County Election Officials participating in the audit. The meeting covered the post-election audit process and responsibilities, reviewed

### Execution of Post-Election Audit

- U.S. House of Representatives District 4 (REP)
    - Diluted Margin – 19.05%
    - Estimated Sample Size – 54
  - Boone County Commissioner District 2 (REP)
    - Diluted Margin – 18.56%
    - Estimated Sample Size – 55
  - Boone County Commissioner District 3 (REP)
    - Diluted Margin – 10.21%
    - Estimated Sample Size – 100
- **Audit Date:** May 30, 2024
  - **Audit Time:** VSTOP Set-up and Pre-Audit Meeting 8:30 AM – Audit Begins 10:00 AM
  - **Location:** Boone County Annex - 116 W. Washington St. Lebanon, IN 46052
  - **Total Ballots Selected for Audit:** Election Day Ballots on VVPAT - 7,685
  - **Estimated Ballot Sample Sizes for Contests Selected for Audit:**

The information above is detailed below:

The ballot manifest/inventory was generated by Boone County's Voting System Vendor, MicroVote, and included all votes cast on Election Day that were recorded via Cast Vote Record (CVR) with Voter-Verified Paper Audit Trails (VVPAT). VSTOP then checked the manifest for functionality in the Stark Audit Tool and confirmed it functioned properly. All pre-audit prep was complete and the audit was ready to be conducted.

In consultation with VSTOP and Boone County Election Officials, it was determined the post-election audit will be inspecting Election Day ballots, so audit estimations and ballot manifests/inventories were generated using only Election Day ballots and reported Election Day totals. It was also determined this audit would be completed with a 1 percent risk limit and 99 percent confidence level. This means there is 99 percent confidence the audit would catch an outcome error if there was one, and only 1 percent risk the audit would not catch any outcome errors. The only way a 100 percent confidence level can be achieved is through a contest's full recount, and an audit is not a recount. The 1 percent risk limit represents the lowest possible risk, and the 99 percent level represents the highest confidence level, that can be achieved in Indiana's post-election audit process.

The audit began with an introductory presentation given by Matt Housley, Dr. Chad Kinsella and Dr. Jay Bagga to all persons in attendance. This presentation provided general information about the post-election audit process and methodology used, specific information relating to Boone County's audit, and allowed for a Q&A to address any questions or concerns. This presentation has been attached as *Appendix A* to this memo. After this presentation concluded, execution of the audit began. A 20-digit seed number was generated to assist the Stark Audit Tool in selecting the random sample of ballots. This number was generated live-time through 20 rolls of a 10 sided-die by audit participants and members of the public. The live-time generation of the seed number assures the sample is truly random and no-one could know what ballots were going to be selected for sample prior to the audit beginning. The seed number also becomes a control for this audit, so should the audit ever need to be replicated, it can be done so in its entirety.

VSTOP conducted a Ballot Comparison Audit using the Stark Audit Tool built for this type of post-election audit. This audit type is meant to inspect ballots for a match between the CVR and VVPAT. Every ballot's CVRs should match its VVPAT counterpart, resulting in a 100% match rate. Boone County Election Officials alongside the VSTOP Team manually inspect the ballot's CVR to the VVPAT for the selected contests and track the match rate through the required number of ballots to sample. After the required number of ballots (or more) have been sampled, the VSTOP Team enters the match information into the Stark Audit Tool and as long as there are zero non-matches the audit will be successfully completed.

The Boone County Voting System Vendor, members of MicroVote, who participated in this audit included:

- Steve Shamo, General Manager
- Jessica Fouts, Employee

The Boone County Election Officials who participated in this audit included:

- Lisa Bruder, Boone County Clerk
- Rebecca McClure, County Election Board Member

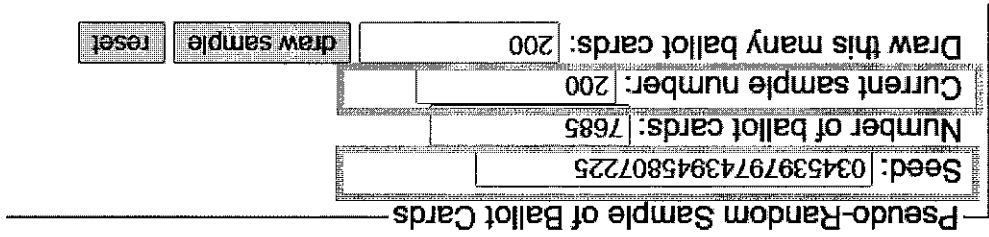
The VSTOP team members who participated in this audit included:

- Dr. Jay Bagga and Dr. Chad Kinsella, VSTOP Co-Directors
- Matt Housley, Election Systems Audit Specialist
- Marc Chatot, Program Manager
- Alisa Gray, Election Training and Assessment Specialist
- Duncan Klemm, IT Specialist
- Gina Caravaglia, Graduate Assistant for Training and Assessment

and confirmed contest selection and election result totals, and completed a final review of the public post-election audit presentation that will be given just prior to the conducting of the audit. By approximately 9:30 AM the pre-audit meeting was concluded and the audit set-up was complete. Boone County's public, post-election audit officially began at 10:00 AM.

The contest requiring the largest sample size for audit was Republican Boone County Commissioner District 3 at 100 ballots. Republican Boone County Commissioner District 2 required 55 ballots and Republican U.S. House of Representative District 4 required 54 ballots. All three contests were inspected on each ballot sampled for audit if needed and applicable. Inspected by at least one County Election Official and one member of the VSTOP Audit Team, each ballot was reviewed for the CVR to VVPAT match for the selected contests. Inspection continued until at least the minimum number of ballots required for inspection were met to achieve the set 1 percent risk limit and 99 percent confidence level. The inspection of the sample of ballots generated the following results.

*Above: Stark Audit Tool Screen Shot of Seed Number and Initial Ballot Sample*



## Random sampling

- Ballots are not separated by party. Since Republican contests are selected for audit, if the sample draws a Democratic ballot, it will not be inspected for audit and will be skipped. Even though Democratic ballots were not inspected for audit, a CVR to VVPAT match inspection can still be completed. For every skipped ballot, a new ballot must be sampled that can be inspected for audit.
  - For Ballot Comparison Audits, undervotes may or may not be used for inspection. Either way, the integrity and result of the audit will not be affected. VSTOP allows county officials to make the decision on whether they would like to inspect undervoted ballots. Boone County Election Officials determined they would not use undervotes in the ballot inspection process. This means if the contest had been undervoted by the voter, then the ballot sampled will be skipped, and only ballots with votes for the contest would be inspected.
- The seed number was entered into the Stark Audit Tool and a random sample of ballots was generated. VSTOP drew an initial sample size of 200 ballots. All three contests were reviewed using ballots from this initial sample. While it is highly unlikely all 200 ballots would be inspected, 200 ballots were drawn to account for the expected need to sample more than the required amount due to the following factors:

The seed number for the Boone County Post-Election Audit is as follows:  
03453979743945807225

Above: Stark Audit Tool Screenshot of U.S. Rep District 4 Sample Size

Initial sample size

Starting size:  Round up 1-vote differences.  Round up 2-vote differences. **Calculate size** 54.

Audit parameters: Risk limit: 1%  
 Expected rates of differences (as decimal numbers):  
 Understatements: 1-vote: 0.001, 2-vote: 0.001  
 Overstatements: 1-vote: 0.001, 2-vote: 0.001

Contest 1, Contest name: U.S. Rep District 4  
 Contest type: @ plurality  super-majority

Reported votes:  
 Candidate 1 Name: Jim Bond, Votes: 2441  
 Candidate 2 Name: Charles Bookwiler, Votes: 1977  
 Candidate 3 Name: John P. Piper, Votes: 511

Ballot cards cast in all contests: 7685  
 Smallest margin (votes): 1,464. Diluted margin: 19.05%

Above: Stark Audit Tool Screenshot of County Commissioner 2 Sample Size

Initial sample size

Starting size:  Round up 1-vote differences.  Round up 2-vote differences. **Calculate size** 55.

Audit parameters: Risk limit: 1%  
 Expected rates of differences (as decimal numbers):  
 Understatements: 1-vote: 0.001, 2-vote: 0.001  
 Overstatements: 1-vote: 0.001, 2-vote: 0.001

Contest 1, Contest name: Boone County Commissioner District 2  
 Contest type: @ plurality  super-majority

Reported votes:  
 Candidate 1 Name: Cory Katz, Votes: 2113  
 Candidate 2 Name: Donald (Donna) Lawson, Votes: 2536

Ballot cards cast in all contests: 7685  
 Smallest margin (votes): 1,428. Diluted margin: 18.66%

Above: Stark Audit Tool Screenshot of County Commissioner 3 Sample Size

Initial sample size

Starting size:  Round up 1-vote differences.  Round up 2-vote differences. **Calculate size** 100.

Audit parameters: Risk limit: 1%  
 Expected rates of differences (as decimal numbers):  
 Understatements: 1-vote: 0.001, 2-vote: 0.001  
 Overstatements: 1-vote: 0.001, 2-vote: 0.001

Contest 1, Contest name: Boone County Commissioner District 3  
 Contest type: @ plurality  super-majority

Reported votes:  
 Candidate 1 Name: Larry Drake, Votes: 583  
 Candidate 2 Name: Scott Fell, Votes: 2793  
 Candidate 3 Name: Jeff Wolfe, Votes: 2008

Ballot cards cast in all contests: 7685  
 Smallest margin (votes): 765. Diluted margin: 10.21%



## Audit Results

- Republican Boone County Commissioner District 3

○ A total of 177 ballots were sampled for this contest. Of the 177 ballots, 120 were able to be inspected for audit and 57 ballots were skipped due to being Democratic or under voted ballots. All 120 inspected ballots had a CVR and VVPAT match, resulting in **100 percent match rate**. The estimated sample to achieve the set risk limit and confidence level was 100 inspected ballots, but was achieved after 94 inspected ballots. The audit concludes with **99 percent confidence** that the election systems functioned properly resulting in a correctly tabulated and reported election outcome.

Stopping sample size and escalation

Ballots audited so far: 177

1-vote overstatements:	0	Rate: 0
2-vote overstatements:	0	Rate: 0
1-vote understatements:	0	Rate: 0
2-vote understatements:	0	Rate: 0

Estimated stopping size

Calculate

If no more differences are observed: 94.  
 If differences continue at the same rates: 94.  
 Estimated additional ballots if difference rates stay the same: 0.

*Above: Stark Audit Tool showing Risk Limit and Confidence Level were met after 94 ballots inspected ballots*

- Republican Boone County Commissioner District 2

○ A total of 101 ballots were sampled for this contest. Of the 101 ballots, 82 were able to be inspected for audit and 19 ballots were skipped due to being Democratic or under voted ballots. All 82 inspected ballots had a CVR and VVPAT match, resulting in **100 percent match rate**. The estimated sample to achieve the set risk limit and confidence level was 55 inspected ballots, but was achieved after 52 inspected ballots. The audit concludes with **99 percent confidence** that the election systems functioned properly resulting in a correctly tabulated and reported election outcome.

Stopping sample size and escalation

Ballots audited so far: 101

1-vote overstatements:	0	Rate: 0
2-vote overstatements:	0	Rate: 0
1-vote understatements:	0	Rate: 0
2-vote understatements:	0	Rate: 0

Estimated stopping size

Calculate

If no more differences are observed: 52.  
 If differences continue at the same rates: 52.  
 Estimated additional ballots if difference rates stay the same: 0.

*Above: Stark Audit Tool showing Risk Limit and Confidence Level were met after 52 ballots inspected ballots*

*Above: Stark Audit Tool showing Risk Limit and Confidence Level were met after 51 inspected ballots*

Estimated additional ballots if difference rates stay the same: 0. If no more differences are observed: 51. If differences continue at the same rates: 51. <input type="button" value="Calculate"/>	
Estimated stopping size	
1-vote overstatements: 0	Rate: 0
2-vote overstatements: 0	Rate: 0
1-vote understatements: 0	Rate: 0
2-vote understatements: 0	Rate: 0
Ballots audited so far: 101	
Stopping sample size and escalation	

○ A total of 101 ballots were sampled for this contest. Of the 101 ballots, 85 were Democratic or under voted ballots. All 85 inspected ballots had a CVR and VVPAT match, resulting in **100 percent match rate**. The estimated sample to achieve the set risk limit and confidence level was 54 inspected ballots, but was achieved after 51 inspected ballots. The audit concludes with **99 percent confidence** that the election systems functioned properly resulting in a correctly tabulated and reported election outcome.

- Republican U.S. House of Representatives District 4

In Closing

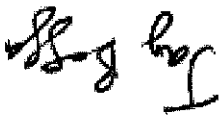
VSTOP would like to thank the Boone County Clerk, Lisa Bruder for her coordination, the Boone County Election Board for their voluntary request for audit designation, and The Indiana Secretary of State's Office for approving Boone County's audit designation and their support of VSTOP to conduct these initiatives.

Upon completion of all 2024 Primary Post-Election Audits, a full summary report of all post-election audit activities and their respective results will be prepared and submitted to the Indiana Secretary of State and all counties involved in a 2024 Primary Post-Election Audit.


For any questions or concerns regarding Indiana's Post-Election Audit Procedures, or information contained in this memo, contact Matt Housley, Election Systems Audit Specialist, at [vstop@bsu.edu](mailto:vstop@bsu.edu).

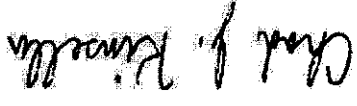
**Matt Housley, MPA**  


*Election Systems Audit Specialist*  
Voting System Technical Oversight Program

**Dr. Jay Bagga**  


*Co-Director*  
Voting System Technical Oversight Program

**Dustin Renner**  
  
*Election Director*  
Indiana Secretary of State

**Dr. Chad Kinsella**  
  
*Co-Director*  
Voting System Technical Oversight Program

**Lisa Bruder**

**From:** VSTOP <vstop@bsu.edu>  
**Sent:** Wednesday, July 10, 2024 3:44 PM  
**To:** Lisa Bruder; brianjones74@gmail.com; becky48@mymetronet.net  
**Cc:** Renner, Dustin; Housley, Matt  
**Subject:** Boone County Post-Election Audit Summary Report  
**Attachments:** Boone County Post-Election Audit Summary (Final and Signed).pdf

CAUTION: This email originated from outside your organization. Exercise caution when opening attachments or clicking links, especially from unknown senders.

Boone County Clerk's Office and County Election Board,

I apologize for the delay on your Post-Election Audit Summary Report. This report serves as the official, Secretary of State approved, summary of your 2024 Primary Post-Election Audit that took place on May 30, 2024. Your county can choose how you would like to use this report. If you choose, it can be posted as a public document, but at minimum should be able to be requested through a PRR if you do not want to post it publicly. VSTOP would again like to thank you and your county for your voluntary participation and congratulate you on a successful, and now verified, Primary Election! Feel free to let me know if you have any questions or concerns about the report and always reach out if there is anything VSTOP can do for Boone County.

All the best,

**Matt Housley, MPA (he/him)**

*Election Systems Audit Specialist*

Voting System Technical Oversight Program

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# **VSTOP**

Voting System Technical Oversight Program

## **Boone County 2024 Primary Post-Election Audit**

Voting System Technical Oversight Program  
Thursday, May 30, 2024

# **vstop** Today's VSTOP Audit Team

- **Dr. Chad Kinsella**  
*VSTOP Co-Director,  
BSU Associate Professor of Political Science*
- **Dr. Jay Bagga**  
*VSTOP Co-Director,  
BSU Professor of Computer Science*
- **Marc Chatot, MS**  
*VSTOP Program Manager*
- **Matt Housley, MPA**  
*Election Systems Audit Specialist*
- **Alisa Gray, MPA**  
*Training and Assessment Specialist*
- **Duncan Klemm, BA**  
*IT Specialist*
- **Gina Caravaglia, BS**  
*VSTOP Graduate Assistant for Training and  
Assessment*

# √stop Indiana Post-Election Audit History

- In 2018 Indiana authorized a pilot Risk-Limiting Audit (RLA) Program (Labeled as Post-Election Audit in Indiana Code). “Piloting” means that Post Election Audits are optional and there are minimal code requirements to the audit procedures while Indiana gains greater experience with the process.
- Supported by the EAC, NASS, NCSL, Brennan Center, Verified Voting and various State Government Institutions, RLA’s are “the gold standard” of auditing procedures.
- VSTOP has conducted 24 PEAs (RLAs) in 23 Indiana Counties. Every audit has confirmed the outcome of races selected for audit, affirming the accurate work of our County Election Officials and Administrators.
- Boone County will be the 24<sup>th</sup> Audit County and 25<sup>th</sup> Post-Election Audit Completed by VSTOP.



Indiana Counties  
Post-Election Audit Status  
No Risk Limiting Audit  
Risk Limiting Audit Conducted



# Post-Election Audit Defined

**"Post-Election Audit (PEA) means an audit protocol that makes use of statistical methods and is designed to limit to acceptable levels the risk of certifying a preliminary election outcome that constitutes an incorrect outcome."**

IC 3-12-13-3





## Secondary Definition

**“A Post-Election Audit (PEA) means sampling ballots until the sample can show confidence to say that the election outcome was correct as reported.”**

-Matt Housley, VSTOP Election Systems Audit Specialist

**“THE SOUP ANALOGY”**

# √STOP

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# Comparison Audit Terminology

- **Risk Limit** – The designated percent chance that the Audit would not detect a potentially incorrect election outcome. VSTOP has set the risk limit at **1%** for this audit. The risk limit cannot be 0% because that would result in every ballot being sampled, which is a recount, not an audit.
- **Confidence Level** – This is the percent the audit is confident that it would detect a potentially incorrect election outcome. VSTOP’s intended Confidence Level is **99%** for this audit. The Confidence Level cannot be 100% because that would result in every ballot being sampled, which is a recount, not an audit.
- **Match Rate** – A Comparison Audit checks the CVR to the VVPAT to ensure that the machine correctly tabulated the votes correctly. All CVR Records should match their respective VVPAT Records. The audit should complete with a 100% match rate.
- **Diluted Margin** – This describes the “closeness” of a contest. The smallest number of votes between candidates, divided by the total number of ballots cast in all contests.
- **Ballot Manifest/Inventory** – Details the location of the ballots and how many ballots are stored in said location. This is critical for selecting of sample ballots and ensuring we know where they are located.
- **Stark Audit Tool** - An Audit Software developed by Dr. Philip Stark from the University of California Berkeley Department of Statistics. It is widely accepted, tested, and successfully implemented by a variety of State and Local Governments completing PEAs.
- **Random Seed Number** – Computers are not inherently random. The seed number assists the Audit Tool in selecting the Random Sample of Ballots. The audit team will have various individuals from the county and the public, participate in the rolling of a 10-sided die to generate a 20-digit number which ensures the sample is truly random.



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# PEA Audit Type

- Boone County uses MicroVote Systems which are Direct Recording Electronic (DRE) Voting Systems
- These systems have a Cast Vote Record (CVR) which is the digital record of the ballot, and a Voter-Verified Paper Audit Trail (VVPAT) which is the paper record of the ballot
- This allows us to complete a **Comparison Post-Election Audit**. In a Comparison Audit we are checking for machine accuracy and election outcome accuracy. The Audit will compare the CVR to the VVPAT ensuring that both records match.



# Contests for Audit

## U.S. House of Representatives District 4 (REP)

CANDIDATES	ELECTION DAY BALLOT VOTE TOTALS
Jim Baird	1977
Charles Bookwalter	
John P. Piper	
*Indicates Winner of Election	

Diluted Margin- 19.05%

Risk Limit – 1%

Confidence Level – 99%

Expected Sample Size – 54 Ballots



# Contests for Audit

## Boone County Commissioner District 2 (REP)

CANDIDATES	ELECTION DAY BALLOT VOTE TOTALS
Corey Fitz	2113
Donald (Donnie) Lawson*	3539
<small>*Incumbent Winner of Election</small>	

Diluted Margin- 18.56%

Risk Limit – 1%

Confidence Level – 99%

Expected Sample Size – 55 Ballots



# Contests for Audit

## Boone County Commissioner District 3 (REP)

CANDIDATES	ELECTION DAY BALLOT VOTE TOTALS
Scott Pell*	2793
John Wolfe	2106

\*Indicates Winner of Election

Diluted Margin- 10.21%

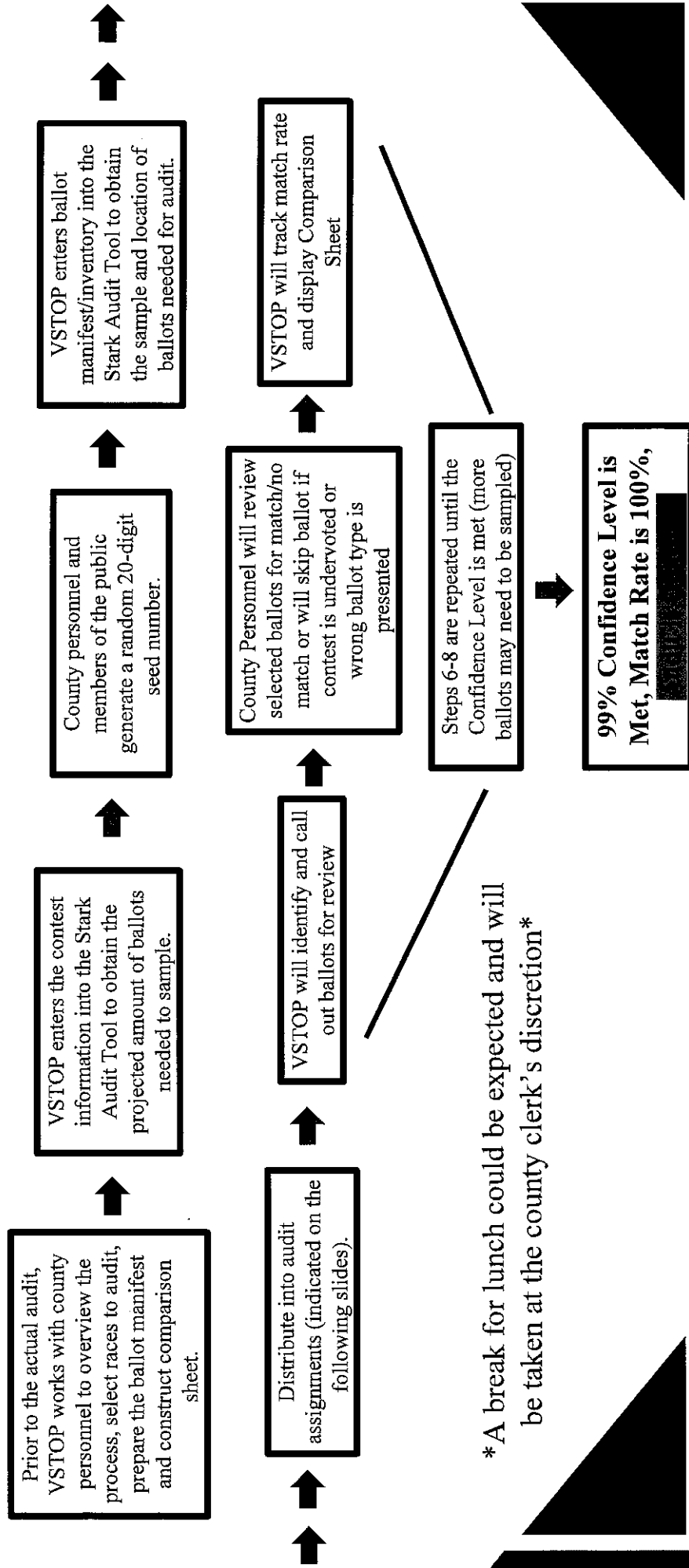
Risk Limit – 1%

Confidence Level – 99%

Expected Sample Size – 100 Ballots

# VSTOP Executing the Post-Election Audit

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\*A break for lunch could be expected and will be taken at the county clerk's discretion\*



# Audit Personnel Assignments

Assignment	Individual/Affiliation	Description
Audit Oversight and Observation	Dr. Jay Barger (VSTOP), Gina Caravaglia (VSTOP), Boone County Election Board & Various Election Officials	Observing the election process and assisting with process as necessary
VVPAT Rewinder Management	Steve Shamo (Micro Vote), Duncan Klemm (VSTOP)	Ensures that VVPAT Rewinder is set up and functioning properly for Ballot Review
Ballot Review Prep and Ballot Calling	Boone County Election Officials, Dr. Chad Kinzilek (VSTOP)	Ensuring that all needed VVPATs are provided and ready for Ballot Review
Ballot Management	Boone County Election Officials	Responsible for handling all VVPATs during the duration of Rewinder and providing storage for VVPATs
Ballot Review	Boone County Election Officials and Marc Gillispie (VSTOP)	Three Audit members are responsible for verifying VVPATs and recording to ensure accuracy. Make any additional adjustments as needed
Comparison Sheet Set-Up and Ballot Review Tracking	Matt Housley (VSTOP), Lisa Gray (VSTOP)	Responsible for tracking audit progress in the data spreadsheet
Stark Audit Tool Operations	Matt Housley (VSTOP)	Enters all required information into the auditing software



2017 November Election, November 7, 2017

## Pre-Audit Meeting Closing

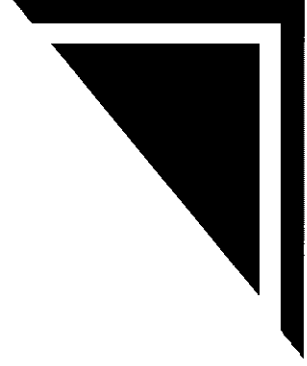
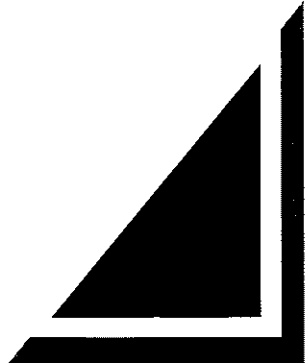
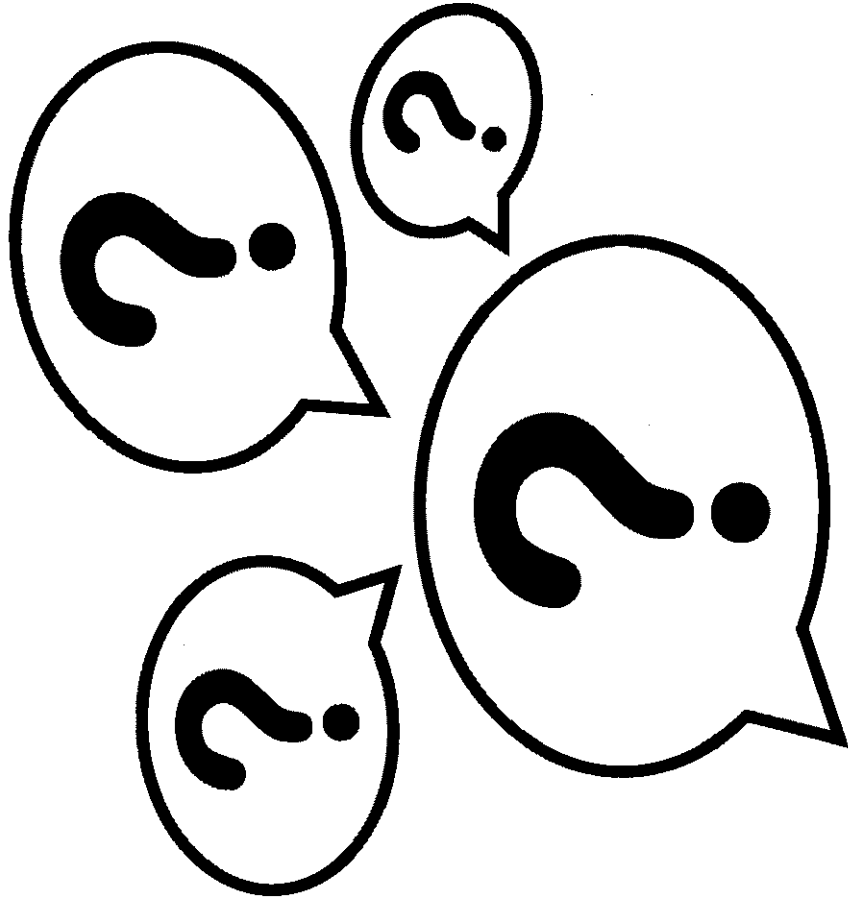
Thank you to Boone County Clerk, Lisa Bruder, County Election Staff, and the County Election Board for volunteering to conduct a Primary PEA and working with VSTOP throughout the process.

Thank you to the Indiana Secretary of State's Office for authorizing this PEA and its support of this process as a another check on our Election Systems to ensure the highest levels of integrity in Indiana Elections.

# Questions?

**STOP**

BY THE NATIONAL SURVIVAL CENTER



# √STOP Generation of SEED Number!

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VSTOP Team, Boone County Elections Team, Members of Media and The Public can assist in this part of the Post-Election Audit.

Again, this helps the Stark Audit Tool in drawing the Random Sample of Ballots.

This means that the sample of ballots is being generated at random live-time. No person can know in advance which ballots could will be selected for Audit.

