

EXHIBIT "A"

# EXPERT REPORT ON PA MAIL-IN BALLOTS

Dr Steven J Miller

## EXECUTIVE SUMMARY

The analysis was performed on a data set provided by Matt Braynard and his firm, External Affairs, Inc, *and the analysis is predicated on the assumption that the responders are a representative sample of the population of registered Republicans in Pennsylvania for whom a mail-in ballot was requested but not counted, and responded accurately to the questions during the phone calls.* As of November 16<sup>th</sup>, 2020, there were 165,412 mail-in ballots requested by registered PA Republicans that had not arrived to be counted. Around 18,000 people on this list were called and around 3000 answered up to four questions. These responses are used to estimate how many of these 165,412 ballots were requested by someone other than the named person, and to estimate how many of these ballots were mailed back but not received.

- *Estimate of how many of the 165,412 uncounted mail-in ballots were requested in the name of a registered Republican by someone other than that person: 40,875.*
- *Estimate of how many of the 165,412 uncounted Republican ballots that the requester returned but were not counted: 44,892.*

Doing a more detailed analysis with confidence intervals, **I estimate that with a reasonable degree of mathematical certainty (based on the data I received being accurate and a representative sample of the population) the number of the 165,412 mail-in ballots requested by someone other than the registered Republican is at least 37,000, and the number of the 165,412 mail-in ballots requested by registered Republicans and returned but not counted is at least 38,910.**

- *Extrapolating from the survey responses, we estimate about 40% who had requested a mail-in ballot believe they returned it but it had not been counted by the 16<sup>th</sup>, nearly two weeks after the election.*
- *The analysis is based on responses from a data set drawn from 165,412 registered Republican voters who had a mail-in ballot requested in their name but not counted in the election. We estimate on the order of 41,000 of these ballots were requested by someone other than the proper voter. Who made such requests, and why? One possible explanation is that ballots were requested by others. Another possible explanation is that a large number of people requested ballots and forgot they did so later. Again, the conclusions above are based on the data provided being both accurate and a representative sample.*

## DETAILED ANALYSIS

I received a data set of responses to a phone survey given to people who are registered Republicans in PA. These people were contacted because there was a mail-in ballot requested in their name for the November 2020 election, but the ballot had not arrived to be counted as of November 16<sup>th</sup>, 2020; **there are 165,412 such ballots.** In the analysis below I will always make conservative choices (i.e., choices leading to smaller values) when there are multiple ways to interpret the data.

*I assume that the people who responded are a representative sample of this population, and responded accurately in the call.* Around 20,000 of the people called did not respond; most of the calls went to answering machines (around 14,000), had people refuse to talk (around 3000), or there was a bad number / language barrier (about 3500). There were 2684 people who answered the call on November 9<sup>th</sup> or 10<sup>th</sup>, saying either they were the person asked for or wanting to know what the call was about. These respondents were then asked several questions.

The first question was whether or not they had requested a mail-in ballot; 1114 said they did, and 36 were a household member confirming the ballot request. **Thus 1150 of the 2684 confirmed requesting a ballot.** A sizeable number said they did not request a ballot: 531 said they did not while another 25 were a household member stating no mail-in ballot was requested. **This sums to 556 people stated that no ballot was requested.** Of the remaining 978 people, 343 either hung up, refused to talk, or said the person asked for is not available to talk; these 343 people were not asked subsequent questions, though there were also 91 people who said they were unsure if they had requested a ballot were asked the next question. **The remaining 544 people answered that they voted in person** and were not asked any additional questions; this response complicates the analysis as you cannot vote in person if you mail-in a ballot unless you bring the ballot to be cancelled. From the response 'voted in person at the polls' it is unclear if they requested a mail-in ballot; we will thus do the analysis assuming both they all requested and assuming none of them requested.

**We have 1241 people moving on to Question 3** (those who answered yes, had a family member answer yes, or were unsure). Of these, **463 mailed back their ballot** (though there is no record of their ballot being received; 452 said they mailed back their ballot and 11 were family members saying it was mailed) and **643 said they had not mailed back their ballot** (632 said they had not, 11 had family members say it was not mailed). The remaining people were unsure, refused to speak, hung up, or were not the right person.

Our goal is to try to estimate the number of mail-in ballots in PA from these responses with these two issues. We start with the 165,412 people who were recorded as having requested a mail-in ballot but no ballot had arrived. From Question 2 there were 1150 who confirmed requesting a ballot and 556 who did not (this is ignoring the 91 who were unsure and the 544 who said they voted in the polls). Thus we have 556 out of 1706 who said they did not request a ballot but one was requested in their name, which is about 32.59% or 53,909 ballots. To be conservative, we include the 544 people who answered Question 2 by saying they voted in person at the polls. If we assume all of these people brought their ballots with them to be voided, this raises the denominator from 1706 to 2250 for a percentage of around 24.18% (down from the 32.59% before). If we extrapolate *this* number to the 165,412 ballots **we now have 40,875 ballots across PA that were requested by someone other than the person in whose name they were recorded.**

We now turn to estimating the number of mail-in ballots requested by registered Republicans who thought they returned them but which have not arrived and been counted (as of November 16<sup>th</sup>, 2020). From the responses,

463 people out of 1150 (or around 40.26%) said they had requested a ballot and sent it back; however, these ballots have not been counted. We need to figure out what number to apply this percentage to. We adopt a conservative approach and from the 165,412 ballots we now remove the estimated 53,909 (the largest of all our numbers) ballots that were not requested by registered Republicans in their name to get there were 111,503 ballots requested by registered Republicans in PA. Multiplying this by 40.26% yields **44,892 Republican ballots that the requesters returned but were not counted**. If instead we remove the lower estimate of 40,875 ballots (for the number of ballots requested in someone's name but not by them) and subtract that from 165,412 we get 120,520 ballots requested by registered Republicans in PA. Multiplying this by 40.26% yields **48,522 Republican ballots that the requester returned but were not counted**.

## EXTENSION: CONFIDENCE INTERVALS

We can do a more detailed analysis and obtain confidence intervals; we will be conservative and take the lower values. If we have a large number of data points (usually more than 30 suffice; as we are in the hundreds to thousands there are no concerns) and we observe in a sample of size  $n$  of a population of size  $N$  that  $x$  have a property, we can extrapolate that to how many in the entire population have the property.

The simplest estimate is that the proportion in the sample with the property is  $p = x/n$ . so the number in the entire population is just  $pN = xN/n$ . The difficulty with that is small errors in our estimate of the proportion in the sample scale. Thus we frequently construct 95% and 99% confidence intervals.

If each person from the population of size  $N$  is independently chosen to be in the sample of size  $n$ , and each person has the same probability  $p$  of having the desired property, then the number of people in the sample with the property can be approximated by a normal distribution. We have 95% of the mass of the normal is within 1.96 standard deviations of the mean, and 99% is within 2.576 standard deviations. This leads to the following confidence intervals, where below  $p$  is the observed sample proportion having the property ( $p = x/n$ ):

- 95% confidence interval for the probability:  $p - 1.96 \sqrt{\frac{p(1-p)}{n}}$  to  $p + 1.96 \sqrt{\frac{p(1-p)}{n}}$
- 99% confidence interval for the probability:  $p - 2.576 \sqrt{\frac{p(1-p)}{n}}$  to  $p + 2.576 \sqrt{\frac{p(1-p)}{n}}$

Once we have these, we can extrapolate to the entire population by multiplying by  $N$ :

- 95% for the number with property:  $pN - 1.96 N \sqrt{\frac{p(1-p)}{n}}$  to  $pN + 1.96 N \sqrt{\frac{p(1-p)}{n}}$
- 99% for the number with property:  $pN - 2.576 N \sqrt{\frac{p(1-p)}{n}}$  to  $pN + 2.576 N \sqrt{\frac{p(1-p)}{n}}$

We now apply this to our problem. For the first question, we had either 556 out of 1706 who said they did not request a ballot but we know one was requested in their name, or (including the 544 who said they voted in person) we have 556 out of 2250.

- 95% confidence interval for the probability: [30.46%, 34.92%] or [22.93%, 26.49%],
- 99% confidence interval for the probability: [29.76%, 35.62%] or [22.37%, 27.05%].

We can use this to estimate the number of ballots requested by someone other than the registered Republican:

- 95% confidence interval for such ballots: [50,380, 57,755] or [37927, 43823],
- 99% confidence interval for such ballots: [49,222, 58,914] or [37001, 44750].

Thus our conservative estimate is there are at least 37,000 ballots requested by someone other than the voter, assuming the data is accurate and the responders are a representative sample.

We can apply a similar analysis to the number of ballots that responders said were returned but were not received. Here we have 463 of 1150 registered Republicans saying they had requested and returned a ballot, but as of November 16<sup>th</sup>, 2020 no ballot in their name had arrived to be counted. It is easy to construct 95% and 99% confidence intervals for these probabilities (we observed 40.26%).

- 95% confidence interval for the probability: [37.43%, 43.10%],
- 99% confidence interval for the probability: [36.54%, 43.99%].

To estimate a 95% or 99% confidence interval we need to know how many ballots to remove from the 165,412. We can compute this many different ways, but in the interest of obtaining the most conservative estimate we subtract the largest number, 58,914, and use the smallest percentage, 36.54%, which gives

simplest, widest range we can look at the high and low values from the above analysis of what to subtract from 165,412: 37,001 and 58,914. Thus using the lower value of the 99% confidence interval values we obtain that **to a reasonable level of mathematical certainty, assuming the data is accurate and drawn from a representative sample of the population, the number of mail-in ballots requested by registered Republicans and returned but not counted is at least 38,910.**

Respectfully submitted,



Steven J Miller

November 21, 2020

**Declaration of Professor of Mathematics, Steven J Miller, Ph.D.**

1. My name is Steven J. Miller. I am over 18 years of age and am competent to testify in this action. All of the facts stated herein are true and based on my personal knowledge.

2. I received a B.S. in Mathematics and Physics from Yale University in 1996 and a Ph.D of Mathematics from Princeton University in 2002. I have published numerous papers and written several books on statistical topics, and have taught probability and statistics for the past 15 years.

3. I am currently a professor of mathematics at Williams College. I make this declaration in my personal capacity.

4. I have analyzed a summary of phone bank data provided to me regarding responses to questions relating to mail ballot requests, returns and related issues.

5. I evaluated the data provided and performed a statistical evaluation of the data and various related calculations. I provide this declaration with regard to the report presenting my findings.

6. I can show, to a reasonable degree of professional certainty, that the conclusions as stated in this report are correct under the assumptions that the responders are a representative sample of the population and have responded accurately.

I declare under the penalty of perjury that the foregoing is true and correct.



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Dr. Steven J Miller, November 21, 2020