STATE OF NEW MEXICO COUNTY OF LEA FIFTH JUDICIAL DISTRICT

REPUBLICAN PARTY OF NEW MEXICO, et al.,

Plaintiffs,

vs.

Case No. D-506-CV-2022-00041

MAGGIE TOLOUSE OLIVER, in her official capacity as New Mexico Secretary of State, *et al.*,

Defendants.

THE LEGISLATIVE DEFENDANTS' OPPOSED MOTION TO EXCLUDE THE UNRELIABLE SIMULATION-BASED EXPERT TESTIMONY OF SEAN P. TRENDE

The Court should exclude the "sophisticated social-science analysis" simulation-based testimony of Sean P. Trende as unreliable and as a remedy for his destruction of the 2,040,000 simulated maps he claims underly his opinions. Mr. Trende's expert opinions are putatively based upon him having generated maps, having analyzed those maps, and having compared those maps with New Mexico's current congressional districts. But Mr. Trende didn't save even one of the simulated maps so that they could be tested against his analysis and opinions. No one, including Defendants or the Court, can examine, test, or challenge the bases for his opinions. Regardless of the explanation for his inability to produce his maps, be it his lack of expertise with the simulation software he downloaded, simple negligence in drafting his computer scripts to use that simulation software, or something else, the effect is the same. There is no evidentiary foundation for Mr. Trende's opinions and there is no way to establish that his opinions are reliable. This motion does not seek to challenge Mr. Trende's status as a qualified expert-although his report, source code, and deposition testimony are replete with inconsistencies and misstatements - and instead focuses on the narrow and well-established law of New Mexico that expert testimony is inadmissible absent a showing of reliability. Mr. Trende destroyed the facts and data underlying his opinions. His opinions should be excluded.

1. STATEMENT OF RELEVANT FACTS

1.1. Mr. Trende's opinions are based upon his verified report that claims to be based upon 2,040,000 simulations and his analysis of those simulations.

1. On August 11, 2023, Plaintiffs filed the "Expert Report of Sean P. Trende" with the court. [Exh. A] Mr. Trende signed his report under penalty of perjury. [Exh. A, p. 78]

2. Plaintiffs' Annotated Findings of Fact and Conclusions of Law ("FFCLs") repeatedly describe Mr. Trende's opinions and analysis of his claimed 2,040,000 simulations as the sole basis for his alleged "sophisticated social-science analysis" that Plaintiffs claim reflects an "extreme partisan gerrymander." [Exh. B, FFCLs at p. 4 ¶ 5, p. 11 ¶ 20, p. 13 ¶ 23, p. 14 ¶ 24, pp. 15-16 ¶¶ 27-28, pp. 21-22 ¶ 36, p. 27 ¶ 44, pp. 29-30 ¶¶ 48-50, pp. 36-37 ¶¶ 60-62]

3. Sections 6.4.1 and 6.4.2 of Mr. Trende's report are titled "Baseline Simulations" and "Additional Simulations." In Section 6.4.1, [Exh. A, pp. 43-60], Mr. Trende claims two have performed two sets of 1,000,000 simulations. [*Id.* pp. 44, 54]¹ In Section 6.4.2, [*id.* pp. 61-75], Mr. Trende claims to have performed four additional simulation scenarios of 10,000 simulations each. [*Id.* pp. 61, 64, 67, and 72]

4. Mr. Trende's purported analysis of those 2,040,000² simulations is reflected in Section 6.4.1's and 6.4.2's narrative and in the attendant Figures 19 through 42. The histograms, dot plots, and box plots in those figures refer to "Simulated Maps." [*Id.* pp. 43-75]

¹ Mr. Trende makes repeated references to "millions" of maps: "[o]nce the simulation creates our 1,000,000 maps, [Exh. A p. 44]; "[t]o calculate the index, we take each of the 1,000,000 simulated maps," [*id.*]; "all the districts in each of the 1,000,000 simulated maps," [*id.* p. 47]; discussing "3 million dots" representing the three congressional districts. [*Id.* p. 48]

² Mr. Trende's deposition testimony is that both of the alleged 1,000,000 simulation consisted of "half a million" duplicates. [Exh. C, Dep. ST 54:13-54:16]

1.2. Mr. Trende's report misstates the manner in which he performed his alleged simulations, is inconsistent regarding the number of simulations performed, and is contradicted by his computer scripts that could only produce 240,000 simulations.

5. In his verified report, Mr. Trende testified that he performed his simulations "at home on a Dell Alienware desktop with an i9 processor." [Exh. A, p. 20] At his second deposition, Mr. Trende contradicted his earlier sworn testimony stating that he performed his simulations on a 16-core AMD processor, not an Intel i9 processor. [Exh. C, Dep. ST 154:18-154:20] Mr. Trende explained that the inaccurate testimony was "probably a leftover from having done it on a laptop once and forgetting that I didn't get an Intel chip on this, I got an AMD chip." [*Id.* at 153:13-153:24]

6. Although Mr. Trende claims and his report sometimes reflects having performed "millions" of simulations, his report also states that he created "50,000 simulated maps." [Exh. A, p. 47] Mr. Trende responded to that contradiction stating "[t]hat should be a million. That is a typo, I think." [Exh. C, Dep. ST 72:12-73:3]

7. Prior to his deposition, Mr. Trende produced computer scripts that he claims to have copied and authored to perform the 2,040,000 simulations that form the basis of his analysis and his creation of histograms, dot plots, and box plots allegedly visualizing that analysis, including computer scripts titled "05-Part-6-4.R" and "06-Part-6-4b.R". [*Id.* at 28:19-29:16, 51:12-51:22, 35:18-36:14]

8. The computer script "05-Part-6-4.R" that Mr. Trende claims generated two sets of 1,000,000 simulations only performed two sets of 100,000 simulations. [*Id.* at 43:8-44:17, 49:11-49:16] Mr. Trende addressed the discrepancy between his report's claim of two sets of one million maps and his computer script's instructions to create two sets of 100,000 maps:

it appears that I changed it from a million to 100,000 for some purpose and didn't change it back for you. It's obvious, from the histograms in the report, that it was a million maps.

[Exh. C, Dep. ST 44:13-44:17] After his first deposition Plaintiffs produced an altered version of Mr. Trende's computer scripts that set the number of simulations to 1 million rather than 100,000. [*Id.* at 144:15-145:2]

1.3. None of the histograms or figures in Section 6.4 of Mr. Trende's Expert Report were generated by the computer scripts produced by Mr. Trende.

9. Mr. Trende's "05-Part-6-4.R" and "06-Part-6-4b.R" scripts would have generated figures, including histograms, labeled "Simultated Maps" for Sections 6.4.1 and 6.4.2 of his report. [*Id.* at 35:18-35:23]

10. Mr. Trende's explanation for the discrepancy between his report's "Simulated Maps" and the "Simultated Maps" as would have been produced by his source code was that he made pre- and post-report changes to the scripts:

And when I created these images myself, I hash tagged out the title line in the functions that made the map. I must have unhash-tagged them so that, when Dr. Chen or whomever ran the code, they would be able to match the output file with the document in the report.

[*Id.* at 36:10-36:14]

11. Mr. Trende went on to testify that the computer scripts produced by Plaintiffs were an earlier version of his scripts and not the version that he used to perform the alleged 2,040,000 simulations or to generate his report. [*Id.* at 38:1-38:9]

1.4. Mr. Trende's scripts were configured to destroy his alleged simulations and those simulations cannot be reproduced.

12. Mr. Trende did not produce any of the simulated maps that he claims to have created and analyzed. After admitting that he did not save any of those maps, [*id.* at 22:11-22:20], Mr. Trende testified that the 2,040,000 maps had not been destroyed "because the code is created with the seed set in it [and] should be replicable by plaintiffs' experts or defendants' experts." [*Id.*

at 23:1-23:3] Mr. Trende testified that he instructed the simulations to be reproducible because "presumably, your expert will want to see and reproduce the maps that were created...." [*Id.* at 47:24-48:10] Mr. Trende also testified that in past expert engagements he had received maps from the opposite parties. [*Id.* at 165:10-166:22]

13. When asked whether he had tested whether his source code generated accurate and reproducible results, Mr. Trende testified that "the fact there is a seed included should make it reproducible." [*Id.* at 39:19-39:23, 50:4-50:5]

14. After Mr. Trende's first deposition, Plaintiffs produced maps that they claimed were the 2,040,000 maps underlying his report. [*Id.* at 146:5-146:18] At his second deposition addressing those "re-generated" maps, Mr. Trende initially testified that they were the same as were used in his report. [*Id.* at 147:10-147:20]

15. When examined regarding that claim, Mr. Trende testified that he was unfamiliar with the version of the simulation software he allegedly used, did not know how to determine the version of the software and, beyond "how Sequential Monte Carlo algorithms worked," he was unaware of how the simulation software actually worked. [*Id.* at 157:9-157:21, 156:1-156:5]

16. Mr. Trende testified that he had referenced the manual for the free downloaded simulation software he used, had not "sat down and read it cover to cover," and did not know whether the revised manual applied to the unknown version of the free simulation software he had downloaded. [*Id.* at 156:6-156:9, 157:2-157:14] The manual provided that when the simulation software was used on hardware like Mr. Trende's it would not create reproducible simulations unless specifically instructed to do so. [*Id.* at 158:6-159:5]

17. However, based upon the source code for the simulation software having been published on January 31, 2021, before he said he installed the software, and based upon the source code's internal documentation providing that the simulations were not reproducible, Mr. Trende finally admitted that he could not reproduce the alleged 2,040,000 simulations underlying his opinions. [*Id.* at 161:12-163:3, 163:24-164:5]

2. ARGUMENT

2.1. Mr. Trende's simulation-based opinions should be excluded because the destruction of his alleged 2,040,000 simulations renders his opinions irrelevant, untestable, and unreliable.

The court should exclude Mr. Trende's simulation-based opinions—described by Plaintiffs as "sophisticated social-science analysis"—because they are definitionally unreliable. There are three prerequisites for the admission of expert testimony in New Mexico's courts: (1) the expert must be qualified; (2) the expert's testimony must assist the trier of fact; and (3) their testimony must be limited to the area of scientific, technical, or other specialized knowledge in which they are qualified. Rule 11-702 NMRA; *State v. Torres*, 1999-NMSC-010, ¶ 23, 127 N.M. 20; *State v. Alberico*, 1993-NMSC-047, ¶¶ 43-45, 116 N.M. 156. Although there is ample evidence that Mr. Trende is not qualified to render opinions regarding simulation analysis, such as his conflicting testimony regarding the computer on which he performed his simulations and the number of simulations he performed, 50,000, 240,000, or 2,040,000, and his admissions that he doesn't understand and misused the simulation software he downloaded, doesn't know what version of the software he used and doesn't know how to learn that information, and didn't bother to read the user manual as it relates to the simulations he claims he performed, this Motion addresses Plaintiffs' inability to establish the reliability of Mr. Trende's expert opinions because of his decision to destroy the facts and data underlying his opinions.

Both the second and third prerequisites for the admission of expert testimony require a showing of relevance and reliability. *State v. Downey*, 2008-NMSC-061, ¶ 30, 145 N.M. 232; *State v. Anderson*, 1994-NMSC-089, ¶ 14, 118 N.M. 284; *Alberico*, 1993-NMSC-047, ¶¶ 44-45; *United States v. Jakobetz*, 955 F.2d 786 (2d Cir. 1992); *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579 (1993). The trial court's first task is to determine whether the testimony is sufficiently reliable and relevant to help the fact finder in reaching accurate results. *Anderson*, 1994-NMSC-089, ¶ 16 (citations omitted). Critically, "[e]xpert testimony may be received if, and only if, the expert possesses such facts as would enable him to express a reasonably accurate conclusion as

distinguished from mere conjecture." *Downey*, 2008-NMSC-061, ¶ 32 (emphasis added). a proponent of expert testimony must show that the "theory or technique 'can be (and has been) tested'" *id.* ¶ 15, *citing Daubert*, 509 U.S. at 593, or that the "basic data may be verified by court and jury." *Jakobetz*, 955 F.2d at 797-98. Expert testimony is unreliable and inadmissible where its premises are unsupported by the evidence. *Id.* ¶ 34, *citing Hathaway v. Bazany*, 507 F.3d 312, 318-19 (5th Cir. 2007); see also Rule 11-705 NMRA (the expert may be required to disclose the facts or data underlying an opinion on cross-examination).

No one, including the Legislative Defendants or the Court, can test Mr. Trende's opinions against his underlying simulations because they do not exist and cannot be duplicated. [Fact Nos. 12, 17] The consequence of Mr. Trende's choices not to save those simulations and to use the simulation software in a way that prevents the simulations from being reproduced are plain. Plaintiffs cannot establish that Mr. Trende's theories and techniques were applied appropriately because no one can examine them in light of the simulations. Plaintiffs cannot establish that Mr. Trende's theories substitute data for that which Mr. Trende destroyed, there is no way to compare the substitute maps with the original maps that Mr. Trende's opinions relevant or reliable and they must be excluded.

2.2. Mr. Trende's simulation-based opinions should be excluded as a remedy for destroying the facts and data underlying his opinions.

Mr. Trende's "sophisticated social-science analysis" should also be excluded as a remedy for his destruction of his alleged simulations. In State v. Gutierrez, 2021-NMSC-008, 482 P.3d 700, the Court addressed the destruction of facts and data underlying an expert's opinion. During a murder investigation, the State performed a polygraph examination of an early suspect with a motive to commit the crime. Id. ¶ 65. Although he denied shooting and killing the victim, the polygrapher reported that the suspect's responses were deceptive or false. Id. Without a viable criminal suspect, the State lost the underlying charts and recordings of the examination. Id. ¶ 66. Years later the defendant was charged and, upon learning of the polygraph, sought to use it to exculpate himself. Id. ¶¶ 65-66. Because the State had lost the facts and data underlying the polygraph report, the State stipulated to the admission of the report but identified an expert witness to testify about the unreliability of the polygraph results. Id. ¶ 67. After the defendant was convicted and appealed the trial court having permitted the state to present expert testimony, the Supreme Court identified two alternative remedies for the destruction of the facts and data underlying an expert report. Id. ¶ 70. First, the trial court could exclude all evidence which the lost evidence might have impeached; second, it could allow admission of all of the evidence that the lost evidence would impeach with full disclosure of the loss and its relevance and import. Id., citing State v. Chouinard, 1981-NMSC-096, ¶ 23, 96 N.M. 658. The trial court's "choice between these two alternatives depends on the court's 'assessment of materiality and prejudice. The fundamental interest at stake is assurance that justice is done, both to the defendant and to the public." Id. Because the circumstances of the State's destruction of the evidence was not deliberate or in bad faith, and because the criminal defendant wanted to introduce the State's polygraph results, the trial court had appropriately chosen the second option. *Id.* ¶¶ 69, 71.

Applying *State v. Gutierrez* to this case, Mr. Trende's simulation-based opinions should be excluded. The 2,040,000 alleged simulations underlying Mr. Trende's expert opinions are material—in fact, fundamental—to his opinions and his destruction of those simulations is

profoundly prejudicial to the Legislative Defendants. Mr. Trende's report is unambiguous that his opinions are based upon having performed "millions" of simulations and having analyzed those same simulations. [Fact No. 3.] But Mr. Trende did not save the 2,040,000 facts and data underlying his opinions so that they could be disclosed, reviewed, and tested. [Fact No. 12] Although he could have, Mr. Trende did not configure his simulation software so that the simulations could have been reproduced. [Fact Nos. 16-17] Mr. Trende admitted that the Legislative Defendants would be prejudiced by his inability to disclose the facts and data underlying his opinions and the corresponding impossibility of reproduction and testing. [Fact No. 12] Mr. Trende's simulation-based opinions should be excluded.

WHEREFORE the Legislative Defendants respectfully request that Mr. Trende's simulation opinions, Section 6.4 of his report, and all references to same in Plaintiffs' Annotated Findings of Fact and Conclusions of Law be excluded pursuant to Rule 11-702 NMRA because they are unreliable and because they lack an evidentiary foundation, and as a remedy for Mr. Trende's inability to produce the 2,040,000 simulations claims underly his expert opinions, and for such other and further relief as the Court deems just and proper.

Respectfully Submitted,

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CERTIFICATE OF SERVICE

Pursuant to Rule 1-005(E) NMRA, The Legislative Defendants' Opposed Motion to Exclude the Unreliable Simulation-Based Expert Testimony of Sean P. Trende was served on the following on September 20, 2023, by the method reflected:

Person Served All counsel of record <u>Method</u> Via Efile/Eserve and Email

Respectfully Submitted,

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STATE OF NEW MEXICO COUNTY OF LEA FIFTH JUDICIAL DISTRICT

REPUBLICAN PARTY OF NEW MEXICO, DAVID GALLEGOS, TIMOTHY JENNINGS, DINAH VARGAS, MANUEL GONZALES, JR., BOBBY AND DEE ANN KIMBRO, and PEARL GARCIA,

Plaintiffs,

v.

Cause No. D-506-CV-2022-00041

MAGGIE TOLOUSE OLIVER, in her official capacity as New Mexico Secretary of State, MICHELLE LUJAN GRISHAM, in her official capacity as Governor of New Mexico, HOWIE MORALES, in his official capacity as New Mexico Lieutenant Governor and President of the New Mexico Senate, MIMI STEWART, in her official capacity as President Pro Tempore of the New Mexico Senate, and JAVIER MARTINEZ, in his official capacity as Speaker of the New Mexico House of Representatives,

Defendants.

EXPERT REPORT OF SEAN P. TRENDE

Expert Report of Sean P. Trende

in Republican Party of New Mexico et al., v. Oliver, et al.

August 11, 2023

Figure 2: Cluster of precincts with edge removed from spanning tree, creating two districts.



This, then, is a microcosm of the approach that the SMC algorithm takes. To simplify greatly, by sampling spanning trees of New Mexico's precincts and then removing two connections, the software produces three randomly drawn districts. While the math is quite complicated, this approach produces a random sample of maps that mirrors the overall distribution of possible maps, similar to the way a high-quality poll will produce a random sample of respondents that reflects the overall population. While the process is complicated, it can be run on a laptop computer. Indeed, these simulations were run at home on a Dell Alienware desktop computer with an i9 processor and128M of RAM, using a free, widely employed, computer programming language (R version 4.1.2).

Importantly, these maps are drawn without providing the software with any political information. In other words, these maps help inform an analyst what maps would tend to look like in New Mexico if they were drawn without respect to politics.

Of course, other features, such as respect for county lines, compactness, or respect for geographic features could play a role in the drawing of district lines as well; these tra-

Democratic Statewide Wins in District, 2020 and 2022 Lines		
District	# D Wins, 20 lines	# D Wins, 22 lines
1	10	10
2	1	10
3	10	10

The Second District changes from one where Democrats won only 1 of the ten statewide races into one where it won ten of ten. At the same time, Democratic performances in the other 10 races are not appreciably weakened; Democrats won all 10 statewide races under both the previous and current lines.

The upshot of this was that the only Republican in the state's congressional delegation, Congresswoman Yvette Herrell, was defeated. She was one of only two Republican incumbents who lost in what was, generally speaking, a favorable environment for the Republicans. This gave Democrats complete control of the state's delegation for only the third time since it began electing members of Congress through congressional districts, and was just the first time this happened in a year that was not an exceptionally good environment for Democrats (the other two elections where this occurred were 2008 and 2018). And it occurred even as Republicans were winning 44.9% of the statewide vote for Congress. *See* "New Mexico Election Results," *New York Times, available at* https://www.nytimes.com/interactive/2022/11/08/us/elections/results-new-m exico.html?action=click&pgtype=Article&state=default&module=election-res ults&context=election_recirc®ion=StateNavMenu

6.4 Simulations

6.4.1 **Baseline Simulations**

To conduct the simulations, I gathered and joined publicly available data with political and demographic data at the census block and precinct levels. After unifying the data at the precinct level, I instructed the simulation to create 1,000,000 sets of three reasonably compact districts, which respect county subdivisions. I was then able to compare the partisanship of the enacted districts to the ensemble of maps.

We can think of this approach as answering the questions, "What would happen if we selected 1,000,000 individuals, gave them basic instructions to keep districts modestly compact and to keep populations equal, withheld political information from them, and then sent them out to draw maps? What sorts of maps would they produce?"

Once the simulation creates our 1,000,000 maps, it calculates the partial lean of the districts. We can then compare the simulated districts to the enacted map to ensure that they perform comparably well on traditional redistricting criteria. That is to say, we ensure that the Legislature would not have to sacrifice traditional redistricting criteria in order to achieve more balanced maps.

To best illustrate the degree to which the 2022 Map reflects outliers when compared to maps drawn without partisan information, I employed the "gerrymandering index," proposed by Bangia *et al.* (2017) and endorsed by McCartan and Imai in their paper setting forth the algorithm used to generate the districts in this report. *See* Cory McCartan & Kosuke Imai, *Sequential Monte Carlo for Sampling Balanced and Compact Redistricting Plans, Annals of Applied Stat* (forthcoming) (manuscript at 24-25), *available at* https://arxiv.org/pdf/2008.06131.pdf.

It is conceptually similar to the idea of root mean squared error (used throughout statistics). To calculate the index, we take each of the 1,000,000 simulated maps and rank the districts from most heavily Democratic to least heavily Democratic. We then average Democratic vote shares across ranks. This tells us, generally speaking, what percentage Democratic vote share we would expect the most heavily Democratic district to have in a map drawn without respect to politics, what we would expect the second-most heavily District to have, and so forth.

Of course, some areas might be conducive to a wide range of partian outcomes depending how the map is drawn. To help account for this, we then calculate the deviations in each plan in the ensemble from the mean for each "bin." To make this less abstract: say that the most heavily Democratic district in the ensemble, on average, gives the Democrats 93.9% of the vote. A district in the ensemble whose most heavily Democratic district was 92% Democratic would have a deviation of 1.9% for that rank, while one whose most heavily Democratic district was 97% Democratic would have a deviation of 3.1%. Next, say that the second most heavily Democratic district in maps in the ensemble is, on average, 92.2% Democratic. A map whose second most heavily Democratic district has a Democratic vote share of 87% would have a deviation of 5.2%, and so forth. To emphasize large deviations (and to make them all positively signed) these values are then squared and added together to give us a sense of how far maps drawn without respect to political data will tend to naturally vary from expectations.

In simplified terms, this gives us the total deviation from the ensemble for all the districts in the plan, while giving more weight to particularly large misses; dividing by three gives us the average deviation. The square root is then taken, which effectively puts everything back on a percentage scale. We then engage in the same exercise for the 2022 Map and compare those scores to those in the ensemble.

The utility of this exercise is that it looks at maps as a whole, rather than in isolation. The results are displayed below:

Figure 19: Values of Gerrymandering Index, Simulated Maps (Red Line = 2022 Map), Using 2020 POTUS as the Metric for Partianship



The ensemble maps have, on average, a Gerrymandering Index of around 1.3%. The 2022 Map, on the other hand, is far on the tail of the distribution. It has a Gerrymandering Index of 6.4%, over four standard deviations from the mean. Of the maps in the ensemble, only 1,103 maps, or 0.11%, had larger gerrymandering indices. The probability that the 2022 Map would be drawn by map drawers who were avoiding political information is vanishingly small. In fact, there is a roughly a one-in-1,000 chance that this map would be produced by someone drawing under the same parameters as the computer. To put this in context, the typical standard in the political science discipline for rejecting the possibility that an outcome was merely a result of chance is 1-in-20, or 5%.

Put simply, it is implausible, if not impossible, that this map was drawn without a heavy reliance upon political data and was likely drawn to favor or disfavor a political party.

Interrogating the maps from a different angle makes clear that the party that the Legislature intended to favor was the Democratic Party, and the one that it intended to disfavor was the Republican Party. To see this, consider the following dotplot. In this plot, all the districts in each of the 1,000,000 simulated maps were sorted from most Democratic to least Democratic. Each of these districts then received a dot in the plot. At the far right, above the number 3, you will notice a large cluster of blue dots spread between 56% and 69%. That means in every plan, the most heavily Democratic district fell somewhere between 56% and 69% Democratic.

The next cluster to the left, hovering above the number 25, consists of blue dots ranging between 49% and 61%. (This means that in all of the 50,000 simulated maps, the second-most Democratic district typically fell between 49% and 61% Democratic.

I have also added a dashed horizontal line at 52.27% Democratic. This represents Biden's two-party vote share from 2020. In other words, this marks the point where a PVI flips from favoring Republicans to favoring Democrats. Figure 20: Democratic Vote Shares, Ranked by Partisanship, in Simulated Maps, Using 2020 POTUS as the Metric for Partisanship. Black Dot = 2022 Map



Here, we can see that the most Republican district is at the extreme of the dotplot. Only a handful of the randomly generated maps returned three districts at least as Democratic as the 2022 Map. We can also see how this was brought about: The most heavily Democratic district is made much more Republican than we would expect, but not so Republican that the incumbent would be seriously endangered.

One shortcoming of these dotplots with a large number of districts is that much of the detail is lost. In short, you cannot plot 3 million dots on a 8.5" x 11" page without a significant amount of overplotting. To address this, in the past I have utilized boxplots (as have other scholars, including McCartan and Imai). While these are less intuitive than the dotplots, they don't suffer from the "overplotting" issue. The way to read a boxplot is as follows: The black horizontal lines represent the median of the distributions. The boxes enclose the middle half of the map values (this statistic is known as the "interquartile range" or "IQR"). The vertical lines coming off of the boxes, known as "whiskers" represent values that are within 1.5 times the values of the "box" in either direction. So, for example, here the boxes for the most Republican district range from 44.6% Democratic to 45.9% Democratic, a range of 1.37 percentage points. The top whisker then ranges from 45.9% to 48%, while the bottom whisker ranges from 44.6% Democratic to 42.5% Democratic. Beyond that, the black dots reflect outliers.

Figure 21: Democratic Vote Shares, Ranked by Partisanship, in Simulated Maps, Using 2020 POTUS as the Metric for Partisanship. Black Dot = 2022 Map



As we can see, all of the districts in the Enacted Map would be classified as outliers. Moreover, they are outliers in a very particular manner. The districts that we would expect to be heavily Democratic are still Democratic, but much less so than we'd expect. On the other hand, the district we would expect to be a Republican district is made much more Republican than we would expect. Indeed, its base partisanship is flipped. This pattern reflects the cracking of Democrats in heavily Democratic districts, and their packing into areas where we would expect to see Republican districts, thereby diluting the Republican vote. We see this pattern repeatedly in states where courts have struck down maps; it is the very DNA of a gerrymander. *See also* Gregory Herschlag, *et al.*, *Quantifying Gerrymandering in North Carolina*, 7 *Stat. & Pub. Pol.* 30, 33, 34 (2020) (referring to this pattern as the "signature of gerrymandering").

If we conduct our analysis using the political index described above to measure district partianship, the results are substantively the same.

Figure 22: Values of Gerryman dering Index, Simulated Maps (Red Line = 2022 Map), Using Political Index as the Metric for Partisan ship



Figure 23: Democratic Vote Shares, Ranked by Partisanship, in Simulated Maps, Using Political Index as the Metric for Partisanship. Black Dot = 2022 Map



Figure 24: Democratic Vote Shares, Ranked by Partisanship, in Simulated Maps, Using Political Index as the Metric for Partisanship. Black Dot = 2022 Map



But these simulations assume that the entire map is redrawn. We know from the above, however, that the mapmakers didn't completely redraw the map. Instead, they drew from just two areas of the map. See also NMSA 1978, § 1-3A-7(A)(10) (empowering the citizen's redistricting committee to "to the extent feasible . . . preserve the core of existing districts.").

In situations like this, political scientists will often "freeze" precincts together. This is described in more detail in McCartan and Imai's 'vignette' explaining more complex redistricting environments. See https://alarm-redist.org/redist/articles/mappreproc.html. The most frequent reason for doing this is where the Voting Rights Act is involved. So, for example, in Maryland, I froze the two districts where African-Americans comprised more than 50% of the voting age population (this also necessitated the freezing of a third district, due to geographic constraints). To be sure, there are multiple ways to draw VRA-compliant districts in Maryland, but because VRA analyses are so sensitive and fact-specific, I simply conceded, for sake of argument, that the legislature had drawn those districts in a considerate, fair manner. In New York, I engaged in a similar analysis, freezing the districts where Whites did not comprise a majority of the voting age population and running the simulations on the remaining precincts.

To account for the fact that New Mexico has a history of relatively small changes to its districts and anticipating that the state may offer a desire to at least somewhat continue that trend today, I performed a second set of analyses, which only allowed the precincts the mapmakers swapped between districts to move. That is to say, the precincts from District 1 under the previous lines that were still in District 1 under the new lines were locked together. Likewise, the precincts from District 2 under the previous lines that were still in District 2 under the new lines were locked together, as were the precincts that stayed in District 3.

In effect, this process concedes to the mapmaker that it was proper to keep the precincts in the same district that the mapmaker opted to keep in place; in effect 90% of the map is conceded to the mapmaker. We can therefore ask ourselves: Given the precincts that the mapmakers thought could be swapped between districts, how likely is it that they would have ended up with maps containing the partian breakdown that the 2022 Maps produced?

Even under such extensive concessions the answer is: It would be astonishingly unlikely. *None* of the 1,000,000 additional maps in this ensemble has the gerrymandering index of the 2022 maps. The average index score is 0.62% for the ensembles. For the Enacted Plan? It is 2.95%, or over seven standard deviations from the mean. It is not on the tails, it is beyond them. It is virtually impossible to arrange the precincts that the mapmakers swapped between districts and come up with anything resembling what the legislature came up with, at least without heavy reliance on partisan data.

Figure 25: Values of Gerrymandering Index, Simulated Maps (Red Line = 2022 Map), Using 2020 Presidential Election as the Metric for Partisanship, Only Precincts that were Moved in 2021 Redistricting.



Figure 26: Democratic Vote Shares, Ranked by Partisanship, in Simulated Maps, Using 2020 Presidential Election as the Metric for Partisanship, Only Precincts that were Moved in 2021 Redistricting. Black Dot = 2022 Map



Figure 27: Democratic Vote Shares, Ranked by Partisanship, in Simulated Maps, Using 2020 Presidential Election as the Metric for Partisanship, Only Precincts that were Moved in 2021 Redistricting. Black Dot = 2022 Map



None of the simulated maps rearrange the precincts that the mapmakers rearranged and came up with a map where three districts leaned Democratic. Yet that is exactly what the mapmakers produced here. Again, it is virtually impossible to rearrange these precincts without heavily reliance on partian data and produce the partian configuration that the mapmakers produced.

Looking at the index produces the same results:

Figure 28: Values of Gerrymandering Index, Simulated Maps (Red Line = 2022 Map), Using Political Index as the Metric for Partisanship, Only Precincts that were Moved in 2021 Redistricting.



Figure 29: Democratic Vote Shares, Ranked by Partisanship, in Simulated Maps, Using Political Index as the Metric for Partisanship, Only Precincts that were Moved in 2021 Redistricting. Black Dot = 2022 Map



Figure 30: Democratic Vote Shares, Ranked by Partisanship, in Simulated Maps, Using Political Index as the Metric for Partisanship, Only Precincts that were Moved in 2021 Redistricting. Black Dot = 2022 Map



None of this should be surprising, given what the qualitative analysis revealed. In simple terms, the core of District 1 that was retained gave Joe Biden 61.1% of the vote; the core of District 2 that was retained gave Joe Biden 49.6% of the vote, and the core of District 3 that was retained gave the winner of the 2020 election 61.3% of the vote. The precincts that were moved gave Biden 46.6% of the two-party vote on average. To allocate those precincts in such as to raise Biden's vote share in a district takes work. That is precisely what the mapmakers plainly did here.

6.4.2 Additional Simulations

While the above should be sufficient to demonstrate conclusively that the Enacted Plan is an extreme partial gerrymander, we may look at other scenarios. Since this is intended as a secondary analysis, I have limited the simulations run to 10,000 in each scenario, which is more than enough in an SMC simulation to pull a representative sample of maps.

The first set of simulations mimics the first inquiry above, except instead of using vote outcomes, it uses registration. This is a secondary analysis because (1) as explained above, registration does not necessarily correspond to voting in New Mexico (a registered Democrat in southwest New Mexico can be very different than a registered Democrat in Santa Fe; the same is true for Republicans); (2) the political science literature with which I am familiar has almost entirely utilized vote outcomes; the simulations provided in *Rucho* focused on election outcomes, not registration. Third, the available data don't match neatly with the shapefiles. The November 2020 data do match up mostly with the VEST precinct shapefile, but it does require merging a precinct in Taos County. This analysis is included only for the sake of completeness.

Regardless, using the Democratic share of two-party registration statistics brings about marginally better results for the state. But the map is still an extreme gerrymander. Just 1.92% of the ensemble's maps have larger gerrymandering indices, and the map is over 3 standard deviations from the mean (3.4 sd's).

Figure 31: Values of Gerryman dering Index, Simulated Maps (Red Line = 2022 Map), Using Registration as the Metric for Partianship.







Figure 33: Democratic Registration %, Ranked by Registration Advantage, in Simulated Maps. Black Dot = 2022 Map



Likewise, running the simulations on the precincts that were swapped reveals similar outcomes, with only 1.2% of maps in the ensemble reporting more extreme registration advantages for Democrats, and an outcome over two standard deviations from the mean:
Figure 34: Values of Gerrymandering Index, Simulated Maps (Red Line = 2022 Map), Using Registration as the Metric for Partianship, Swapped Precincts Only.



Figure 35: Democratic Registration %, Ranked by Registration Advantage, in Simulated Maps, Swapped Precincts Only. Black Dot = 2022 Map



Figure 36: Democratic Registration %, Ranked by Registration Advantage, in Simulated Maps, Swapped Precincts Only. Black Dot = 2022 Map



Second, we can compare the plan the legislature enacted to the Citizen Commission's Plan H, which is in many ways similar to the Enacted Plan. First, we should note that our expectation should likely be that this would present unfavorably for Defendants. An examination of the partisanship of the precincts that were retained from Plan H, and the precincts that were swapped from Plan H shows that the mapmakers took a map that was already favorably aligned toward Democrats, and made it even more so:

Partisanship of Precin	cts Moved Fro	m Plan H to	Enacted Plan	s, By District
Citizens Commission H	Enacted Map	Biden votes	Trump votes	Biden Share
i	1	176,902	122,343	59.1%
1	2	15,415	12,550	55.1%
2	1	756	1,092	40.9%
2	2	121,335	109,951	52.5%
2	3	14,917	28,815	34.1%
3	1	10,796	11,418	48.6%
3	2	6,446	6,259	50.7%
3	3	155,047	109,466	58.6%

In particular, the commission retained precincts from Plan H that created three districts that voted for President Biden with at least 52.5% of the vote, roughly his national vote share. It then transferred a collection of precincts from Plan H's District 1 to District 2 that voted 55.1% for Biden. This was offset in part by moving a collection of precincts from District 2 to District 1 that gave President Trump almost 60% of the vote.

Likewise, the mapmaker shifted a net of over 14,000 Trump votes from District 2 in Plan H to District 3 in the Enacted Map. This group gave Biden just 34.1% of the vote. In exchange, it shifted a group of voters that gave Biden 50.7% of the vote from District 3 into District 2.

Party registration tells the same story:

Registration o	f Precincts N	Moved From Plan H	I to Enacted Plans, I	By District
Citizens Commission H	Enacted Map	Registered Democrats	Registered Republicans	Democratic Share
1	1	188,030	134,807	58.2%
(1)	2	19,997	12,863	60.9%
2	1	1,008	1,048	49.0%
2	2	161,601	113,726	58.7%
2	3	20,167	31,669	38.9%
3	1	11,563	12,425	48.2%
3	2	6,486	6,799	48.8%
3	3	202,606	112,274	64.3%

Thus, it should be completely unsurprising that the resulting map represents an extreme gerrymander, with an ultimate gerrymandering index 6.67 standard deviations from the mean. Again, it is beyond the tails.

Figure 37: Values of Gerryman dering Index, Simulated Maps (Red Line = 2022 Map), Swapped Precincts from Plan H Only.



Figure 38: Democratic Registration %, Ranked by Registration Advantage, in Simulated Maps, Swapped Precincts from Plan H Only.



Figure 39: Democratic Registration %, Ranked by Registration Advantage, in Simulated Maps, Swapped Precincts from Plan H Only.



A final consideration may be a desire to keep Indian Reservations and other Indigenous homelands intact. To check this, I obtained a shapefile of Reservations from the Redistricting Data Hub. I matched census blocks to the Reservations, and then merged together precincts that overlapped those entities. Thus, every precinct that includes a Reservation is merged together, ensuring that the Reservations are not split.

The answer does not change. Even with these precincts frozen together, the Enacted Plan is an extreme outlier.

Figure 40: Values of Gerryman dering Index, Simulated Maps (Red Line = 2022 Map), Keeping Reservations Intact



Figure 41: Democratic Vote Shares, Ranked by Partisanship, in Simulated Maps, Using Presidential Vote Share in 2020 as the Metric for Partisanship. Black Dot = 2022 Map. Reservations are frozen together.



Figure 42: Democratic Vote Shares, Ranked by Partisanship, in Simulated Maps, Using Presidential Vote Share in 2020 as the Metric for Partisanship. Black Dot = 2022 Map. Reservations are frozen together.



7 Additional Considerations

Finally, there may be other legitimate considerations that motivate a legislature. Many of these are controlled for in the simulations above. However, it is worth comparing the performance of the Enacted Map against previous New Mexico maps. To begin with, we can examine the number of county splits.

Total Splits, New Mexico Congressional Maj				
Year	# Splits			
1972	1			
1982	3			
1992	5			
2002	5			
2012	6			
2022	9			

While previous maps haven't had the minimum number of county splits possible, they have never had more than six splits. The Enacted Map, however, splits nine, the most in New Mexico's history.

We can also look to see how the compactness of the Enacted Map's districts compares to previous maps in New Mexico. To do this, I employ three commonly utilized metrics. The first two metrics are based on comparing the drawn district to a circle, which is the most compact shape. The Reock score looks at the ratio of the area of the district to the area of the smallest circle that would enclose the district (also known as a "minimum bounding circle"). Ernest Reock, A Note: Measuring Compactness as a Requirement of Legislative Apportionment, 1 Midwest J. Pol. Sci. 70, 71 (1961). This ratio will fall as districts become distorted lengthwise; it therefore punishes long, bacon-like districts. A "perfect" Reock score is 1, while a zero is a theoretical perfectly non-compact district.

The second measure is the Polsby-Popper score, which looks at the ratio of the area of a district to the area of a circle that has the same perimeter as the district. Daniel D. Polsby & Robert D. Popper, *The Third Criterion: Compactness as a Procedural Safeguard Against Partisan Gerrymandering*, 9 Yale L. & Pol'y Rev. 301 (1991). To understand the motivation behind Polsby-Popper, sketch out a circle. Then erase some of the edge of the circle, and have a narrow tendril snake into the district toward the center. The Reock score would not change much, since the size of the minimum bounding circle remains the same and the area of the district does not change much, but the Polsby-Popper score would fall significantly, since the perimeter of the district would be greatly increased. A "perfect" Polsby-Popper score is 1, while a theoretical perfectly non-compact district would score a zero.

The final measure that I examine is the Convex Hull score. It is similar to the Reock score except that it uses the minimum bounding polygon instead of the minimum bounding circle. To understand this, consider that a perfect square – something that most people would consider a compact district – has a Reock score of 0.64. By allowing for shapes other than a circle to be the benchmark, the Convex Hull score recognizes that compactness can come in many forms. Like the other scores, a 1 is the most compact district and a zero is a theoretical non-compact district.

The following table provides the average scores for New Mexico's maps:

Average	e Compactr	ness, New Mexico Co	ongressional Maps
Year	Reock	Polsby-Popper	Convex Hull
1972	0.487	0.490	0.838
1982	0.324	0.345	0.746
1992	0.420	0.340	0.765
2002	0.408	0.361	0.784
2012	0.388	0.350	0.785
2022	0.368	0.289	0.730

By any metric, the districts produced in 2021 are some of the least compact districts in New Mexico history. Using Convex Hull and Polsby-Popper, they are the least compact Congressional Districts ever drawn. Using Reock scores, they are the secondleast compact Congressional Districts. Under any of the three metrics, the 2021 lines are less compact than the preceding lines.

8 Conclusion

A careful qualitative analysis reveals that the 2021 redistricting shifted large numbers of Democrats from the 1st and 3rd Districts into the 2nd, while shifting large numbers of Republicans out of that district. The resulting map is one of the least compact maps in New Mexico's history, with a record number of split counties. It cracks the most Republican region of the state, splitting it among three districts, while carefully ensuring that the two Democratic districts – the 1st and the 3rd – don't become dangerously Republican.

A simulation analysis confirms these suspicions. Across millions of maps, under multiple assumptions and scenarios, the Enacted Map presents as an extreme outlier. Note that the ensembles still present a wide array of district configurations for a wouldbe mapmaker to choose from; the legislature's discretion is not entirely cabined in. What it cannot do is select *this* combination of precincts, which would almost certainly only arise in a scenario where political considerations predominate.

In short, no matter how one looks at it, this map is an extreme gerrymander under the test outlined by Justice Kagan and endorsed by the Supreme Court of New Mexico.

I declare under penalty of perjury under the laws of the State of New Mexico that the foregoing is true and correct. See N.M. R. Civ. P. Dist. Ct.1-011(B).

Dated: August 11, 2023 <u>Sean P. Trende</u> SEAN P. TRENDE

FILED 5th JUDICIAL DISTRICT COURT Lea County 9/15/2023 10:12 PM NELDA CUELLAR CLERK OF THE COURT Cory Hagedoorn

STATE OF NEW MEXICO COUNTY OF LEA FIFTH JUDICIAL DISTRICT

REPUBLICAN PARTY OF NEW MEXICO, DAVID GALLEGOS, TIMOTHY JENNINGS, DINAH VARGAS, MANUEL GONZALES, JR., BOBBY and DEE ANN KIMBRO, and PEARL GARCIA,

Plaintiffs,

v.

Cause No. D-506-CV-2022-00041

MAGGIE TOLOUSE OLIVER, in her official capacity as New Mexico Secretary of State, MICHELLE LUJAN GRISHAM, in her official capacity as Governor of New Mexico, HOWIE MORALES, in his official capacity as New Mexico Lieutenant Governor and President of the New Mexico Senate, MIMI STEWART, in her official capacity as President Pro Tempore of the New Mexico Senate, and JAVIER MARTINEZ, in his official capacity as Speaker of the New Mexico House of Representatives,

Defendants.

PLAINTIFFS' ANNOTATED FINDINGS OF FACT AND CONCLUSIONS OF LAW

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Ct. at 2491, it also involved a companion challenge in *Benisek v. Lamone*, 348 F. Supp. 3d 493, 497-507 (D. Md. 2018), vacated and remanded sub nom. Rucho, 139 S. Ct. 2484, to Maryland's Sixth District in its 2011 congressional redistricting map, Rucho, 139 S. Ct. at 2493. Both in *Benisek* and here, the challengers alleged that the mapdrawers targeted a single district to flip it from Republican control to Democratic control. Id. at 2510–11 (Kagan, J., dissenting). Both in Benisek and here, the challengers presented candid statements from mapdrawers, revealing why they drew the map the way they did (although, notably, Plaintiffs were effectively denied discovery by Defendants and non-party Legislators, whereas the plaintiffs in *Benisek* received robust discovery, including depositions of the gerrymanders). Id. Both in Benisek and here, the challengers showed how the mapdrawers made substantial, partisan cracking and packing of voters not necessary to reach population equality. Id. And both in *Benisek* and here, there was an election under the challenged map where the Republican challenger lost by a narrow margin in a favorable Republican year. See Pls.Ex.30. But the evidence in this case is even more powerful because the Benisek plaintiffs relied only upon this evidence, whereas Plaintiffs here have also presented a sophisticated social-science analysis, comparing SB1 to one million simulated maps—the same of type of simulation evidence, from the same expert, which carried the day in *Harkenrider v. Hochul*, 197 N.E.3d 437, 453 (N.Y. 2022). So, if Maryland's Sixth District is an unconstitutional partisan gerrymander, as Justice Kagan concluded was clear under her own test, the conclusion is even more obvious here as to SB1.

C. The Legislature Creates SB1 By Taking The Committee's Most Favorable Map For Democrats—The Concept H Map—And Modifying It Into A Near-Perfect Partisan Gerrymander

20. After the Citizen Redistricting Committee submitted its three maps to the Democratic-controlled Legislature, the Legislature did not adopt any of them. *Compare* Pls.Ex.1, *with* Comm. Rep. 30–40. Instead, Democrat legislative leadership took the Concept H Map—the map most favorable to Democrats—and adjusted it to be a near-perfect partial gerrymander for their party. See Pls.Ex.2, at 4. That is, "the mapmakers took a map that was already favorably aligned toward Democrats," the Concept H Map, "and made it even more so[.]" Trende Rep.67-68. Further, legislative leadership blocked Republican legislators from their map-drawing process in all material respects, perfunctorily meeting with Republicans about redistricting yet refusing to incorporate any Republican input into the map ultimately proposed. Pls.Ex.8, ¶¶ 7–11; Pls.Ex.32, ¶¶ 7–11. The Legislature ultimately introduced its gerrymandered map as SB1; the Legislature passed the map with only Democrats voting in support, while one Democratic Representative, an independent Senator, and all present and voting Republican legislators voted against the map, id. ¶ 9; and the Governor signed it into law, see Pls.Ex.13; see generally Pls.Ex.14.

21. In a text-message conversation between the Center for Civic Policy and Defendant Senator and President of the Senate Mimi Stewart—who, along with other members of legislative leadership, was responsible for the redistricting process reveals the Legislature's precise strategy. Pls.Ex.2, at 4. In this conversation, held during the drafting of SB1, Senator Stewart brags to a representative for Center for Civic Policy that "[w]e improved [the Concept H Map] and now have CD 2 at 53% dpi Representative Herrell, that, "We are sorry we've sent her to DC. Our Redistricting session is offering a way out of her chaotic and divisive politics." Pls.Ex.17, at 1.

23. Senator Stewart's text messages and these other revealing statements from key legislators are entirely consistent with objective analyses about SB1's lines. The Legislature partisan gerrymandered SB1 for the Democrats by cracking the State's Southeastern region among the State's three congressional districts. Trende Rep.17, 31–43, 67–68. SB1 pushes District 1 and District 3 further into Southeastern New Mexico, while shifting District 2 substantially into the Central region, which region is the most populous and strongly favors Democrats. Id. at 17, 32. That is, with SB1, the Legislature made politically targeted changes to the prior congressional map, concentrated in the Southeastern and Central regions, *id.* 34–35, to "transform[]" District 2 "from one where Republicans would generally be favored into one where Democrats tend to win"-without making District 1 and District 3 "so much less Democratic that they might seriously threaten their incumbent Democrats" in the process, *id.* at 42. Simple partial composition calculations for each of the State's three districts under the 2011 Map and SB1-calculations prepared by one of Legislative Defendants' own experts Kimball Brace, and which are generally consistent with the analysis of Plaintiffs' expert, Mr. Trende-demonstrate the Legislature's near-perfect gerrymander with SB1. As Mr. Brace calculates, under the prior map, District 1 was 57.70% Democratic; District 2 was 44.75% Democratic; and District 3 was 58.25% Democratic. Brace Rep.52 (pdf page number). Then, under SB1, District 1 is 53.57% Democratic (a decrease of 4.13%); District 2 is 52.73%

Democratic (an increase of 7.98%); and District 3 is 55.97% Democratic (a decrease of 2.28%). *Id.* at 73 (pdf page number); *see also* Trende Rep.42 (calculating similar pattern); *accord* Sanderoff Rep.6 (calculating District 2 under SB1 as 53% Democratic, 47% Republican).

24. Specific, discernible changes that SB1 made to the prior map also reveal the Legislature's near-perfect gerrymander. While the 2020 census required only minor population adjustments to reapportion New Mexico's districts, "mapmakers substantially altered the map for the first time in decades," diluting Republican votes through cracking and packing. Trende Rep.26, 32, 50, 78.

25. SB1 shifted "more than twenty times the number of residents that had to be shifted to meet equal population requirements," *id.* at 33, from about 23,000 to 505,952, *id.* at 33, 36. District 1 shifted 166,485 residents to District 2, although District 1 was underpopulated. *Id.* at 33. District 3 gave 21,292 residents to District 2 and 122,222 residents to District 1, although it only had to give up 3,082 residents. *Id.* And while District 2 was only overpopulated by 8,181 residents, it lost over 195,000 residents, giving 55,518 residents to District 1 and 140,435 residents to District 3—although, again, District 3 had to lose population. *Id.*; *see also id.* at 34 (summarizing these changes in chart form). Unsurprisingly, the shifting of these residents was "not politically neutral." *Id.* at 35. The Legislature focused its cracking and packing in the Southeastern and Central regions—given that the former is highly Republican while the latter is highly Democratic—to pack a net "approximately 40,000 Democratic votes" into District 2 and flip District 2's partisan makeup. *Id.* at 35–36 (relying on presidential-vote data); *see also id.* at 36–43 (reaching same conclusion after relying on an "index of [ten] elections," "party registration data," "actual vote results," and the "ten statewide races included in [the] index individually").

26. With respect to the Southeast region, SB1 deeply fractures it among the State's three districts, "for the first time in the state's history." *Id.* at 35. Thus, District 1 contains De Baca, Lincoln, and part of Otero and Chaves Counties; District 2 contains part of Otero, Chaves, Eddy, and Lea Counties; and District 3 contains Curry, Roosevelt, and part of Chaves, Eddy, and Lea counties. *Compare* Trende Rep.17 (listing counties in this region), *with* Pls.Ex.1.

27. SB1 splits a record number of counties and is not compact, given New Mexico's geography. Specifically, SB1 "splits nine" counties, which is "the most in New Mexico's history." Trende Rep.75–76. By "any metric" of compactness, "the districts produced [by SB1] are some of the least compact districts in New Mexico history." *Id.* at 76–77 (considering the Reock, Polsby-Popper, and Convex Hull metrics); *see also* Pls.Ex.18, at 2–3 (explaining how SB1 cracked the agricultural industry and the oil and gas Industry, which industries are longstanding communities of interest); Pls.Ex.7.

28. A sophisticated social-science analysis of SB1 performed by Plaintiffs' expert, Sean P. Trende, tells the same story. Mr. Trende randomly generated one million politically-neutral maps that adhere to New Mexico's redistricting criteria, but do not take partisanship into account. Trende Rep.43–44. Then, Mr. Trende calculated the "gerrymandering index" for these one million maps, which index shows the expected percentage of Democratic vote shares across the maps from the most heavily Democratic district to the least. *Id.* at 44. The one-million map ensemble had an average gerrymandering index of around 1.3%, while SB1 had a gerrymandering index of 6.4%—meaning that it fell over four standard deviations away from the mean gerrymandering index of the million-map ensemble. *Id.* at 46. SB1 was more favorable for Democrats than 99.89% of the one-million ensemble maps (or 998,897 maps). *Id.* Given that extreme disparity between SB1 and the millionmap ensemble, Mr. Trende concluded that "it is implausible, if not impossible, that [SB1] was drawn without a heavy reliance upon political data and was likely drawn to favor or disfavor a political party." *Id.* at 46–47.



Id. at 51 fig.19 (red line = SB1).

29. Mr. Trende's sophisticated social-science analysis is in accord with the independent analyses of SB1 conducted by various public-interest groups and news outlets. The Princeton Gerrymandering Project condemned SB1 as strongly favoring

splitting some counties for the first time in almost two centuries." *Id.* at 2519. As a result, the new Maryland Sixth District ended up "with 66,000 fewer Republican voters and 24,000 more Democratic ones," leaving Republicans "little or no chance to elect their preferred candidate" "[i]n what was once a party stronghold." *Id.* Further, despite this blatant gerrymander, there was one election under the new Sixth District map where the Republican challenger lost by a narrow margin in a favorable Republican year. *See* Pls.Ex.30 (49.7% to 48.2%, in the Democratic candidate's favor).

35. Justice Kagan concluded that Maryland's Sixth District map was an impermissible partisan gerrymander. As for the first element, Justice Kagan concluded that the Maryland mapmakers drew the Sixth District with the intent to entrench Democrats at the expense of Republicans. *Rucho*, 139 S. Ct. at 2517 (Kagan, J., dissenting); *see also id.* at 2510–11 (cataloging key statements from mapmakers). For the second element, Justice Kagan concluded that Sixth District had the intended entrenching effect, since the mapmakers "reconfigured the entire district" by cracking 66,000 Republicans out of the district and packing 24,000 Democrats into the district. *Id.* at 2518–19. Finally, for the third element, Justice Kagan "pass[ed] quickly over [it]" because Maryland did not "offer[] much of an alternative explanation for the evidence that the plaintiffs put forward." *Id.* at 2516 n.2.

36. Plaintiffs satisfy Justice Kagan's three-part test here. First, the Legislature drafted SB1 with the egregious partisan intent to entrench Democrats in District 2 at the expense of Republicans, just like mapdrawers in *Benisek*. *Infra* Part I.A. Second, SB1 has an egregious partisan effect, as it substantially dilutes Republican votes in District 2 through packing and cracking, under both the qualitative- and sophisticated-social-science-analysis approaches described in Justice Kagan's *Rucho* dissent—making the case here stronger than that in *Benisek*, given that *Benisek* relied upon only qualitative data and was not a near-perfect gerrymander because that map still allowed Republicans to keep one congressional seat, although it would have been possible for Democrats to eliminate that seat as well. *Infra* Part I.B. Finally, Defendants cannot possibly carry their burden under the third element to justify their gerrymander, just like the defendants in *Benisek*. *Infra* Part I.C.

A. The Legislature Passed SB1 With Egregious Partisan Intent

37. Courts consider several factors when determining whether a mapdrawer has acted with impermissible intent to entrench their favored party in power, weighing both direct and circumstantial evidence of the mapdrawer's partisan intent for this element. See Rucho, 139 S. Ct. at 2520–21 (Kagan, J., dissenting); see also, e.g., Benisek v. Lamone, 241 F. Supp. 3d 566, 575 (D. Md. 2017) ("[D]irect evidence, as well as circumstantial evidence, may be used to prove the element of intent."); Harkenrider v. Hochul, 197 N.E.3d 437, 452 (N.Y. 2022) ("Such invidious intent could be demonstrated directly or circumstantially[.]"). These factors include whether the "map-drawing process" itself was partisan, see League of Women Voters of Ohio v. Ohio Redistricting Comm'n (LWV of Ohio), 192 N.E.3d 379, 410 (Ohio 2022), which may be demonstrated by, for example, "proof of a partisan process excluding participation by the minority party," Harkenrider, 197 N.E.3d at 452, "correspondence" and "contemporaneous statements" from mapdrawers, the "specific Concept H Map had created. Trende Rep.67–69; *supra* pp.3, 11. The choices to retain or swap these precincts follow a partisan pattern: retaining a sufficient number of Democratic precincts from the Concept H Map districts in each SB1 district; swapping Democratic-leaning precincts from the Concept H Map's District 1 for Republican-leaning precincts in District 2, thus making the latter more Democratic; and swapping Democratic-leaning precincts from the Concept H Map's District 3 for Republican-leaning precincts in District 2, again making the latter more Democratic. Trende Rep.67–69.

44. Second, SB1's objective features further demonstrate that the Legislature acted with egregious partisan intent when enacting SB1. E.g., Rucho, 139 S. Ct. at 2517–18 (Kagan, J., dissenting). The calculations from all three experts who did partisan-composition calculations in this case—experts from Plaintiffs and Legislative Defendants—demonstrate that SB1 is a near-perfect partisan gerrymander, given the partisan composition of each of the three districts that this map creates. See supra pp.13–14; see also infra Part I.B. Further, Mr. Trende conducted a statistical analysis of SB1 as compared to one million maps randomly generated by a computer without taking partisanship into account, and that analysis showed SB1 was more favorable for Democrats than 99.89% of the one-million ensemble maps (or 998,897 maps), meaning that "it is implausible, if not impossible, that [SB1] was drawn without a heavy reliance upon political data and was likely drawn to favor or disfavor a political party." Trende Rep.43–47; supra pp.15–16; infra Part I.B.

B. SB1 Has An Egregious Partisan Effect

47. The second prong of Justice Kagan's test considers the "effects" of the redistricting map alleged to be a partisan gerrymander, asking whether "the lines drawn in fact have the intended [partisan] effect by substantially diluting [the plaintiffs'] votes." *Rucho*, 139 S. Ct. at 2516 (Kagan, J., dissenting) (citation omitted). Two methods of proof may independently establish this effects element. *Id* at 2517–19.

48. First, plaintiffs can show that a map has impermissible partisan effects through just qualitative evidence, which evidence is "far simpler[,]but no less powerful" than the sophisticated social-science analysis. *Id.* at 2518–19; *infra* pp.29– 30 (describing the sophisticated-social-science-analysis approach). Such qualitative evidence includes mapdrawers making "substantial" shifts in a district's "partisan composition" through cracking and packing that are unnecessary to reach population equality. *Rucho*, 139 S. Ct. at 2519, 2522 (Kagan, J., dissenting). And notably, the challengers to Maryland's Sixth District in *Benisek* only presented this kind of qualitative evidence to demonstrate that map's partisan effect, yet Justice Kagan still easily concluded that that map was an impermissible partisan gerrymander. *Id.* at 2518–19.

49. Second, plaintiffs can also establish a map's impermissible partisan effects with a sophisticated social-science analysis. *Id.* at 2517–18. Such evidence includes the "extreme outlier approach," which uses "advanced computing technology to randomly generate a large collection of districting plans that incorporate the State's physical and political geography and meet its declared districting criteria, *except for*

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partisan gain." Id. at 2518 (considering this evidence as to the challenged North Carolina map). These simulated maps, "each with a partisan outcome attached to it," can then be "line[d] up . . . on a continuum—the most favorable to Republicans on one end, the most favorable to Democrats on the other," allowing the analyst to identify "the median outcome—that is, the outcome smack dab in the center—in a world with no partisan manipulation." Id. Next, the map is measured against this continuum, revealing "where the State's actual plan falls on the spectrum"—whether it is "at or near the median or way out on one of the tails." Id. This comparison establishes the partisan effects of a gerrymandered map, as "[t]he further out on the tail" that a map falls, "the more extreme the partisan distortion and the more significant the vote dilution." Id.; see also Harkenrider, 167 N.Y.S.3d at 664–67; Adams v. DeWine, 195 N.E.3d 74, 86–91 (Ohio 2022); LVW of Pa., 178 A.3d at 770–75, 818–21.

50. SB1 has an egregious partisan effect since it substantially dilutes Republican votes in District 2 under both the qualitative- and sophisticated-socialscience-analysis approaches described in Justice Kagan's *Rucho* dissent.

51. <u>a. Qualitative Evidence</u>. The qualitative data about SB1 alone suffices to establish that map's impermissible partisan effect, just as Justice Kagan concluded that this type of data was sufficient with respect to Maryland's Sixth District in *Benisek. Rucho*, 139 S. Ct. at 2518–19 (Kagan, J., dissenting).

52. *First*, the Legislature's balancing of the Democratic-party composition in each of the three districts created shows that it achieved a near-perfect gerrymander.

60. <u>b. Sophisticated Social-Science Analysis</u>. Sophisticated social-science analysis confirms that SB1 is an extreme partisan gerrymander, independently establishing SB1's impermissible partisan effects. *See* Trende Rep.43–75.

61. In his expert report, Mr. Trende used sophisticated social-science analyses to evaluate SB1. Id. at 17–22. This approach applies a state-of-the-art simulation methodology, which is both more current and more sophisticated than the earlier methodology that Justice Kagan had endorsed in her Rucho dissent. See id.; Rucho, 139 S. Ct. at 2517–18 (Kagan, J., dissenting). Mr. Trende randomly generated one million maps that "incorporate the State's physical and political geography and meet its declared districting criteria, except for partisan gain." Rucho, 139 S. Ct. at 2518 (Kagan, J., dissenting) (emphasis omitted); see Trende Rep.43–44. Mr. Trende then used the simulations to calculate the "gerrymandering index," showing the expected percentage of Democratic vote shares across the maps from the most heavily Democratic district to the least. Trende Rep.44. The ensemble of one million simulated maps has an average Gerrymandering Index of around 1.3%. Id. at 46. When Mr. Trende placed SB1 on this continuum, it fell on the far end of the distribution's tail, with a gerrymandering index of 6.4%—over four standard deviations from the mean. Id. Thus, it "was an out-out-out-outlier." Rucho, 139 S. Ct. at 2518 (Kagan, J., dissenting). SB1 is thus more favorable for Democrats than 99.89% of the one-million ensemble maps (or 998,897 maps). Trende Rep.46,

62. Further, because "New Mexico has a history of relatively small changes to its districts," Mr. Trende then performed "a second set of analyses," generating an additional million simulated maps that only moved the precincts that the SB1 mapmakers also swapped between districts, while keeping the remaining precincts locked in place. *Id.* at 54–60. This, in essence, concedes "90% of the map . . . to the mapmaker." *Id.* at 54. This additional ensemble of simulations has an average Gerrymandering Index of 0.62%, while SB1 "is not on the tails, it is beyond them," with a Gerrymandering Index of at 2.95%—over seven standard deviations from the mean. *Id.* Mr. Trende's additional simulations only confirm that SB1 is "an extreme partisan gerrymander." *Id.* at 61–75.

63. None of Defendants' three experts offer any persuasive evidence to the contrary. *See* Brace Rep.; Sanderoff Rep.; Pls.Ex.6 (hereinafter "Chen Rep.").

64. Mr. Brace's report largely supports the qualitative analysis discussed above. As relevant here, Mr. Brace calculated a "State Composite Score" for each district under the prior map, the three maps proposed by the Citizen Redistricting Committee, and SB1, using data from statewide nonjudicial races. Brace Rep.6–9. Mr. Brace's statewide composite score for District 2 under the *prior* map is 44.75% Democratic versus 55.25% Republican. *Id.* at 51 (pdf page number). Then, his statewide composite score for District 2 under *SB1* is 52.73% Democratic versus 47.27% Republican. *Id.* at 73 (pdf page number). Although Mr. Brace concludes from this data that SB1's shift of composite scores in the Democrats' favor is "not overwhelming[]," such that SB1 is "not . . . an egregious gerrymander," *id.* at 6, he fails to grapple with just how different the shift from 44.75% Democratic (District 2 under the prior map) to 52.73% Democratic (District 2 under SB1) is in a State like

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	COUNTY OF LEA STATE OF NEW MEXICO	2	Peifer, Hanson, Mullins & Baker PA	
3	NO. D-506-CV-2022-00041	2	20 First Plaza, NW Switz 725	
4	REPUBLICAN PARTY OF NEW MEXICO,	5	Albuquerque, New Mexico 87102	
5	JENNINGS, DINAH VARGAS, MANUEL	4	(505) 247-4800 geanchez@neiferlaw.com	
	GONZALES, JR., BOBBY AND DEE ANN	5	apace@peiferlaw.com	
6	KIMBRO, and PEARL GARCIA, Plaintiffa	67	Also Present: JOWET CHEN	
8	vs.	8		
9	MAGGIE TOULOUSE OLIVER, in her	9	INDEX	
10	official capacity as New Mexico Secretary of state, MICHELLE LUJAN	_	EXAMINATION OF SEAN P. TRENDE	
	GRISHAM, in her official capacity as	10	By LUCAS M. WILLIAMS4	
11	Governor of New Mexico, HOWIE	11		
12	New Mexico Lieutenant Governor and	12	SIGNATURE/CORRECTION PAGE	
	President of the New Mexico Senate,	13	EXHIBITS	
13	as President Pro Tempore of the New	14	FORMALLY MARKED/IDENTIFIED PAGE 1. Expert Report of Sean Trende	
14	Mexico Senate, and JAVIER MARTINEZ,	16	2. July 5, 2023 Court Order of the NM Supreme	
1.5	in his official capacity as Speaker of the New Merice House of Perrosentative	то	3. August 25, 2023 Amended Court Order of the	
16	Defendants.	17	NM Supreme Court	
17	DEPOSITION OF SEAN P. TRENDE	18	 List of work Product Produced by Plaintiffs¹ Counsel	
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22	TAKEN BY: LUCAS M. WILLIAMS	22	11. Code 04-Part-6-2.R	
22	ATTORNEY FOR THE DEFENDANTS	22	13. Code 06-Part-6-4b.R	
23	REPORTED BY: KAREN RODRIGUEZ, CCR #55	23	14. Code 07-Additional Figures.R	
24	KMR Court Reporting, LLC	24	16. Expert Report of Brian Sanderoff	
25	Albuguergue, New Mexico 87192	25	17. Expert Report of Jowei Chen	
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1 2 3	2 APPEARANCES For the Plaintiffs: MOLLY DIRAGO	1 2	SEAN P. TRENDE after having been first duly sworn,	4
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	21		23
1	A. I'm not planning on it.	1	But because the code is created with the seed set in it,
2	Q. Okay. All right. Mr. Trende, I want to go over	2	it should be replicable by plaintiffs' experts or
3	with you briefly some of the materials that were	3	defendants' experts. And since it would run in less
4	provided by plaintiffs' counsel to us from you.	4	than a day on my computer, it shouldn't be too
5	I am going to show on the screen what I am	5	burdensome to do so.
6	marking as Exhibit 4 to this deposition. Do you	6	Q. Let's talk about the files that you sent to us.
7	recognize that to be a tree structure containing the	7	We'll work through that. I'm going to show you what I'm
8	work product that was produced to us from plaintiffs'	8	marking as Defendants' Exhibit 6. That is titled
9	counsel?	9	"get_packages.R."
10	MS. DIRAGO: Objection, form.	10	(Exhibit 6 identified.)
11	A. I would like to see the rest of it, but	11	Q. (By Mr. Williams) Do you see that?
12	Q. (By Mr. Williams) All right. What do you mean,	12	A. Yes.
13	the rest of it?	13	Q. And it appears that that code sets up the
14	A. Okay. So the second page was blank?	14	environment that you're going to be working in. Is that
15	0. Yeah. Well, it reflects that there were 10	15	correct?
16	directories with 72 files	16	A. Yes.
17	A Veg The tree structure descript extend to the	17	0. Does it do anything else?
18	second page. So was I do recombine that to be	18	A. No. There's a bunch of packages that I typically
10	documents provided by course!	19	use or frequently use in R. So I just found it was
20	(Prhibit 4 identified)	20	simpler to create one script that I could reference on
21	(Exhibit 4 Identified.)	21	my E drive and always have most of what I wanted
21	Q. (By MI. WIIIIams) All fight. I m going to show	22	0 I have put on the screen what I've marked as
22	you what I m marking as Exhibit 5 to the deposition,	22	y. I have put on the screen what I ve marked us
23	which is an additional two files that were produced to	23	(Frhibit 7 identified)
24	us on August 23rd.	24	(Exhibit / Identified.)
145	(EXHIDIT 5 Identified.)	25	Q. (by MI. WIIIIams) bo you see chat:
0.000			
	22		24
1	22 Q. (By Mr. Williams) Do you recognize those two	1	24 A. Yes.
1 2	22 Q. (By Mr. Williams) Do you recognize those two files?	1 2	24 A. Yes. Q. What is the purpose of this code, Mr. Trende?
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25 27 1 blog post is some type of an identifier for -- it's 1 (Exhibit 9 identified.) 2 probably not a true name, for someone who wrote the Q. (By Mr. Williams) And those are methods that 2 3 code. 3 you're using where? 4 Q. So you copied this from somebody and just kept 4 A. So if I recall correctly, I tried to organize the 5 code by following the Table of Contents in my report. 5 their name on it? A. Well, I took the code from a website and 6 So segment 5 in my report is called "Methods/Guiding 6 7 certainly wouldn't claim it as my own, so yeah. 7 Principles." Q. All right. I'm going to show you what I've 8 And so under that, if you go to page 15 of my 8 9 marked as Exhibit 8, which is named "01 -- get data.R." 9 report, you'll see a table, "Sample Redistricting in a 10 Three-District State," which would be what is created in 10 (Exhibit 8 identified.) 11 Q. (By Mr. Williams) Do you see this one? 11 the first chunk. And if you go to -- oh, it looks like 12 A. Yes. 12 I didn't include that map, but it was for Section 5.4 13 Q. All right. And the first line of that code 13 where I talk about "Regions of New Mexico Utilized." 14 contains the phrase or the command, set working 14 That map was to be included there. 15 director, "setwd." Do you see that? 15 Q. All right. 16 A. Obviously, those regions get utilized throughout A. Yes. 16 17 Q. And then it refers to a directory that is within 17 the report. So I still used the basic map from it. 18 your OneDrive account? 18 Q. Let me look at what I've marked as Exhibit 10 to 19 A. Yes. 19 this, "03-Part-6-1.R." 20 Q. All right. So based on this document, all of 20 (Exhibit 10 identified.) 21 your files related to the simulation would have been 21 Q. (By Mr. Williams) Do you see that? 22 stored in your working directory; is that fair to say? 22 A. Yes. 23 A. At least the documents that were produced from 23 Q. What does this code do, Doctor? Or Mr. Trende? 24 I assume you've not yet received your Ph.D. Is that 24 the "get data" script. 25 Q. And would it be fair to characterize Exhibit 8 as 25 correct? 26 28 1 a collection of functions that assist you in making 1 A. That's right. My dissertation defense is 2 visualizations to use in your report? 2 September 25th. So we can bicker about whether I get A. No, not entirely. 3 3 called Dr. Trende at trial or not. Q. What else does it do? Q. Right. A. Well, you've scrolled down to about line 114. A. But no, as of today, I have not defended my 5 5 6 So, actually, if you could, scroll up again, please, to 6 dissertation. 7 page 2. Certainly page 1 makes visualizations. 7 Q. And so, Mr. Trende, on Exhibit 10, what does this That "make_dotplot_index" is a "ggplot." So 8 code do? 9 yeah, I guess everything on page 2 that I can see makes 9 A. So this code would generate the illustrations 10 plots. Lines 116 through 131 are functions for 10 used in part 6.1 of my report. 11 compactness metrics. And then it looks, from there, 11 Q. All right. I'm putting up on the screen what 12 that it is data processing. 12 I've marked as Exhibit 11, titled "04-Part-6-2.R." 13 13 (Exhibit 11 identified.) Q. Are you actually processing data there, or are 14 you just aggregating data from files? Q. (By Mr. Williams) Do you see that? 14 15 A. Well, we can use the more colloquial term of data 15 A. I do. 16 munging. But yeah, it's putting the various data 16 Q. And what does this code do, Mr. Trende? 17 sources in a more usable format. 17 A. So this is meant to replicate the output for 6.2 18 Q. All right. Let's look at what I'm marking as 18 of my report. 19 Exhibit 9. And what is the purpose of Exhibit 9, titled 19 Q. All right. I'm going to show you what I've 20 "02-methods.R"? 20 marked as Exhibit 12 to this deposition. It is titled 21 A. So it looks like the first chunk from roughly 21 "05-Part-6-4.R." (Exhibit 12 identified.) 22 lines 4 to 54 generates a table entitled "toy numbers," 22 23 and it looks like the chunk from 59 to 70 generates a 23 Q. (By Mr. Williams) Do you see that? 24 map of New Mexico's counties with the regions 24 A. Yes. Q. Now, this is the first place where you actually 25 superimposed over it. 25

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	29		31
1	begin to perform simulations; is that correct?	1	Q. Did you perform the simulation work before or
2	A. Correct.	2	after that portion of your code which precedes the 6.4
3	Q. And these are the simulations that you reference	3	section?
4	in section or this is part of the simulations that	4	A. I would have done the simulations, at least some
5	you reflect in section 6.4 of your report; is that	5	version of the simulations, first.
6	right?	6	Q. What do you mean by "some version of the
7	A. Correct.	7	simulations"?
8	Q. I'm going to show you what I've marked as	8	A. Well, typically, when I do simulation code, I run
9	Exhibit 13 to this deposition, titled "06-Part-6-4b.R."	9	it with a very low number of simulations so it will, you
10	(Exhibit 13 marked.)	10	know, produce the output. You know, a thousand
11	Q. (By Mr. Williams) Do you see this code?	11	simulations produces the output in, like, five seconds.
12	A. Yes.	12	So that's how I make sure the code works and get a sense
13	Q. And this is a continuing set of simulations that	13	of whether I have something sensible, a basic report of
14	you have performed that are referenced underneath	14	where things will likely come down, because the
15	section 6.4; is that correct?	15	simulations don't change all that much as you increase
16	A. Correct.	16	the number of maps that you draw. So I would have done
17	Q. And finally, on Exhibit 14, which is titled	17	that first.
18	"07-Additional Figures.R," what does this code do?	18	But as to how far I went with it, I mean, I know
19	A. I believe this creates the output for part 7 of	19	that I did some simulations towards the end. You always
20	my report, "Additional Considerations."	20	get ideas as you go through. So it is kind of mixed up,
21	(Exhibit 14 identified.)	21	but I definitely would have started writing the
22	Q. (By Mr. Williams) All right. I want to talk to	22	simulation code before I started the report.
23	you a little bit, Doctor, about how you wrote this	23	Q. I'm going to show you, again, what I've marked as
24	report. While I'm doing that, let's pull your report up	24	Exhibit 4.1. Let's look at these files that are listed.
25	here. I am looking at Exhibit 1.3, which is lower case	25	I'm going to highlight these starting at 01 through 07
			I m going to nightight these starting ut of through off
-	- 20		I m going to nightight these stateing at the one of the
1	30 Roman Numeral 11, your Table of Contents . Do you see	1	The going to arguing to choose boarding at the emotion of the set
1	30 Roman Numeral ii, your Table of Contents. Do you see that on the screen?	1	Do you see that?
1 2 3	30 Roman Numeral ii, your Table of Contents. Do you see that on the screen?	1 2 3	32 Do you see that? A. Yes.
1 2 3 4	30 Roman Numeral 11, your Table of Contents. Do you see that on the screen? A. Yes. O All right. How long did it take you to author	1 2 3 4	32 Do you see that? A. Yes. Q. All right. Would you have written I'm just going to refer to these by their number that you have
1 2 3 4	30 Roman Numeral ii, your Table of Contents. Do you see that on the screen? A. Yes. Q. All right. How long did it take you to author this report?	1 2 3 4	32 Do you see that? A. Yes. Q. All right. Would you have written I'm just going to refer to these by their number that you have put on their file names. So this would be file 01
1 2 3 4 5	30 Roman Numeral ii, your Table of Contents. Do you see that on the screen? A. Yes. Q. All right. How long did it take you to author this report? A. 50 to 60 hours total. By Mauthoring the report "	1 2 3 4 5	32 Do you see that? A. Yes. Q. All right. Would you have written I'm just going to refer to these by their number that you have put on their file names. So this would be file 01 through file 07. If L cay that do you understand what
1 2 3 4 5 6 7	30 Roman Numeral ii, your Table of Contents. Do you see that on the screen? A. Yes. Q. All right. How long did it take you to author this report? A. 50 to 60 hours total. By "authoring the report," do you mean writing the actual report or doing the	1 2 3 4 5 6 7	32 Do you see that? A. Yes. Q. All right. Would you have written I'm just going to refer to these by their number that you have put on their file names. So this would be file 01 through file 07. If I say that, do you understand what
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1 2 3 4 5 6 7 8	30 Roman Numeral ii, your Table of Contents. Do you see that on the screen? A. Yes. Q. All right. How long did it take you to author this report? A. 50 to 60 hours total. By "authoring the report," do you mean writing the actual report or doing the analysis and writing the report?	1 2 3 4 5 6 7 8	32 Do you see that? A. Yes. Q. All right. Would you have written I'm just going to refer to these by their number that you have put on their file names. So this would be file 01 through file 07. If I say that, do you understand what I'm talking about, Mr. Trende? A. Yes.
1 2 3 4 5 6 7 8 9	30 Roman Numeral ii, your Table of Contents. Do you see that on the screen? A. Yes. Q. All right. How long did it take you to author this report? A. 50 to 60 hours total. By "authoring the report," do you mean writing the actual report or doing the analysis and writing the report? Q. Well, yes, let's start with the whole kit and caboedle. I want to understand it from the boringing to	1 2 3 4 5 6 7 8 9	32 Do you see that? A. Yes. Q. All right. Would you have written I'm just going to refer to these by their number that you have put on their file names. So this would be file 01 through file 07. If I say that, do you understand what I'm talking about, Mr. Trende? A. Yes. Q. All right. Would you have written file 01 before 02. 04. 05. 06 and 072
1 2 3 4 5 6 7 8 9 10	30 Roman Numeral ii, your Table of Contents. Do you see that on the screen? A. Yes. Q. All right. How long did it take you to author this report? A. 50 to 60 hours total. By "authoring the report," do you mean writing the actual report or doing the analysis and writing the report? Q. Well, yes, let's start with the whole kit and caboodle. I want to understand it from the beginning to the ord. Wr. Trendo	1 2 3 4 5 6 7 8 9 10	32 Do you see that? A. Yes. Q. All right. Would you have written I'm just going to refer to these by their number that you have put on their file names. So this would be file 01 through file 07. If I say that, do you understand what I'm talking about, Mr. Trende? A. Yes. Q. All right. Would you have written file 01 before 02, 03, 04, 05, 06 and 07?
1 2 3 4 5 6 7 8 9 10 11	30 Roman Numeral ii, your Table of Contents. Do you see that on the screen? A. Yes. Q. All right. How long did it take you to author this report? A. 50 to 60 hours total. By "authoring the report," do you mean writing the actual report or doing the analysis and writing the report? Q. Well, yes, let's start with the whole kit and caboodle. I want to understand it from the beginning to the end, Mr. Trende.	1 2 3 4 5 6 7 8 9 10 11	32 Do you see that? A. Yes. Q. All right. Would you have written I'm just going to refer to these by their number that you have put on their file names. So this would be file 01 through file 07. If I say that, do you understand what I'm talking about, Mr. Trende? A. Yes. Q. All right. Would you have written file 01 before 02, 03, 04, 05, 06 and 07? A. No.
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1 2 3 4 5 6 7 8 9 10 11 12 13	30 Roman Numeral ii, your Table of Contents. Do you see that on the screen? A. Yes. Q. All right. How long did it take you to author this report? A. 50 to 60 hours total. By "authoring the report," do you mean writing the actual report or doing the analysis and writing the report? Q. Well, yes, let's start with the whole kit and caboodle. I want to understand it from the beginning to the end, Mr. Trende. So did you start to write the report first, or did you perform your simulations first?	1 2 3 4 5 6 7 8 9 10 11 12 13	32 Do you see that? A. Yes. Q. All right. Would you have written I'm just going to refer to these by their number that you have put on their file names. So this would be file 01 through file 07. If I say that, do you understand what I'm talking about, Mr. Trende? A. Yes. Q. All right. Would you have written file 01 before 02, 03, 04, 05, 06 and 07? A. No. Q. All right. When would you have written file 01? A. So file 01 and 02 were originally part of what probably would have hear file 05 and were split off as
1 2 3 4 5 6 7 8 9 10 11 12 13 14	30 Roman Numeral 11, your Table of Contents. Do you see that on the screen? A. Yes. Q. All right. How long did it take you to author this report? A. 50 to 60 hours total. By "authoring the report," do you mean writing the actual report or doing the analysis and writing the report? Q. Well, yes, let's start with the whole kit and caboodle. I want to understand it from the beginning to the end, Mr. Trende. So did you start to write the report first, or did you perform your simulations first? A. I'm sure I did at least some of the coding first.	1 2 3 4 5 6 7 8 9 10 11 12 13 14	32 Do you see that? A. Yes. Q. All right. Would you have written I'm just going to refer to these by their number that you have put on their file names. So this would be file 01 through file 07. If I say that, do you understand what I'm talking about, Mr. Trende? A. Yes. Q. All right. Would you have written file 01 before 02, 03, 04, 05, 06 and 07? A. No. Q. All right. When would you have written file 01? A. So file 01 and 02 were originally part of what probably would have been file 05 and were split off as
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Republican Party of NM, et tal vs. Oliver, et al

	33		35
1 all f	the hash tags out.	1	Doctor, parts 03 and 04 were used to draw graphics for
2	You don't want to run it with no hash tags,	2	those relative sections of your report. Is that
3 beca	ise then every time you run the script, it's going	3	correct?
4 to re	eproduce the data you've already created, which	4	A. That's right.
5 could	l take some time. So it's a useful way for me to do	5	Q. Is there anything that would be dependent upon
6 it, a	and it's certainly a kinder way to produce it to	6	your simulation code that is in parts 05 and 06 that
7 your	experts.	7	would be dependent upon those graphics that you
8 Q	. And to make sure that I understand I'm going	8	generated in 6.1 and 6.2?
9 to ma	ake this a little larger. The one that we have	9	A. I would have to look at the code to be sure, but
10 talk	ed about previously contains some support functions	10	I don't think so, because the regions, I think, are
11 for 1	making graphics; is that correct?	11	defined in the earlier shapefiles in 6.1. That's the
12 A	. Yes.	12	only thing I can think of you might need to load for
13 Q	. And then it imported those two files that we	13	other parts of the report.
14 talk	ed about earlier; is that right?	14	Q. Okay. I have put Exhibit 12 back up on the
15 A	. That's right.	15	screen. Do you recognize that to be the part 6.4 that
16 Q	. And then it did, I think you described it as,	16	you provided to your counsel?
17 data	munging?	17	A. Yes.
18 A	Yeah.	18	Q. Okay. And I noticed there are some typos in
19 Q	. All right. So you would not run this code	19	here; for example, "Simultated Maps." Do you see that?
20 repea	atedly; is that right?	20	A. Yes.
21 A	. I would not want to, that's for sure. I'm not	21	Q. And I noticed that did not make it into your
22 sayin	ng I didn't actually do it a few times before I	22	report with that typo. Is that correct?
23 real:	Lzed, "Let's take this out." But yeah, that's why	23	A. Let me see. Oh, yeah, you're right, it does not.
24 this	file exists.	24	Q. All right. So how did that get corrected between
25 O	Sure.	25	this source code. Mr. Trende, and your report?
			the starte trans, her stonat, and jour report.
	24		26
1 2	34	1	36 Can you go back to part 01 of my code?
1 A	34 . I started getting productions in litigation from Imai from Harvard, and be always did this, and I	1	36 A. Can you go back to part 01 of my code?
1 A 2 Dr. :	34 I started getting productions in litigation from Imai from Harvard, and he always did this, and I periated it. And so it just seemed a much more	1 2 3	36 A. Can you go back to part 01 of my code? Q. Sure. Bear with me.
1 A 2 Dr. 3 3 appre	34 I started getting productions in litigation from Imai from Harvard, and he always did this, and I eciated it. And so it just seemed a much more be way to organize data and produce it.	1 2 3 4	36 A. Can you go back to part 01 of my code? Q. Sure. Bear with me. A. And then scroll up, please. Stop, please. Well, no. that is not it. Can you scroll up more, please.
1 A 2 Dr. 3 3 appro 4 human 5 0	34 I started getting productions in litigation from Imai from Harvard, and he always did this, and I ectated it. And so it just seemed a much more he way to organize data and produce it.	1 2 3 4	36 A. Can you go back to part 01 of my code? Q. Sure. Bear with me. A. And then scroll up, please. Stop, please. Well, no, that is not it. Can you scroll up more, please. Q. Sure.
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4 0. Institue that it is \$5 of that exhibit it also is contains the word "Simultade." is that another example of some hanged to generate your report \$5 within this file? 4 first simulation. Did you write all of the code that is for a signal provide on the hasic idea for the	3	A. Yes.	3	Let me back up. Exhibit 12, this is the 6-4, the
 5 outline the word "simulated." Is that another sample of the source of the s	4	Q. I notice that at line 65 of that exhibit it also	4	first simulation. Did you write all of the code that is
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7 8 opposed to whit was provided to us in plaintifs' 9 8 production' 9 9 production' 9 10 generated in the LaTeX software, not in the actual 11 11 report. 10 assically, it's the instruction small that Drs. Dail 11 in Matty are no generated your report? 11 and Matty are no generated your report? 12 Q. So then would this line have been commanted out 11 in Matty are no generate your report? 13 in Matty are no generate your report? 11 and Matty are noting are the intervolution would have run it 14 A. Ho: draw, vis does any sort of testing of your code to wrify 15 here you accessed a figure, it would not have 13 Q. All right, Bo the is ny question, Mr. Trender 15 h. Tit's dif with a hard "a." it's like Hbridge 24 A. Mil, for regroundials realing 14 oc. Star you done any sort of testing of your code to wrify 21 A. Mil, for regroundials realing 20 or or draw, wish end is it? 23 A. Mil, for regroundials realing 24 deerry pronunced his name Gerry, but i'm not going to get a bunch for 25 36 21<	6	of the code having been changed to generate your report	6	A. You know, that is always a tricky question,
 For orderition? A. That's an example of where the tilles were in the larkey for the inthe sectual in the larkey for the inthe sectual into the larkey for the inthe sectual into the larkey for the sector and reproducible into the sector and reproducible into the inter sector into the sector and reproducible inter sector into the sector and reproducible inter sector into the sect	7	as opposed to what was provided to us in plaintiffs'	7	because code gets reused and you get ideas from the
9 A. The''s an example of where the tills were the securation of the securation in the securation of the secure securetis the securatis the securation of the secura	8	production?	8	for example, I know that the basic idea of the
 10 pearated in the LaTeX software, not in the actual 11 report. 2 0. So them would this line have been commented out 11 and McCartan I think Cory is a Ph.D. now that they 12 pervise online, but if was creately put together by me. 13 in what you ran to generate your report? 14 A. No. I would have commented it in Figure 1. 15 There is a line I don't how if I used *Labe' or 16 egritle, * but I would have commented that out so that 19 rotaces at a tigne, it would not have 19 rotaces at a tigne, it would not have 19 rotaces at a tigne, it would not have 10 e. All right. So this is ny question, Mr. Trende 20 e. You cost at at "	9	A. That's an example of where the titles were	9	simulation code is taken from a vignette that Dr
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41	43
1 Q. Okay. I want to point you to your expert report.	1 this simulation?
2 I want to walk through portions of this. All right. On	2 A. Yes.
3 page 9 of your report, Exhibit 1.13, you discuss I	3 Q. All right. Okay. Let's look at section 6.4.1,
4 believe this is section 5.1 where you're talking about	4 titled "Baseline Simulations." I'm going to go to your
5 Justice Kagan's opinion. Do you see that?	5 report page number 44, exhibit page 1.48. Is that
6 A. Yes.	6 correct? Do you see that?
7 O. All right. I'm going to highlight the first full	7 A. Huh-huh.
8 paragraph on page 9, Exhibit 1.13, that begins, "As	8 0. All right. I'm going to highlight the sentence
9 discussed in more detail below" Do you see that?	9 that begins on the prior page, "After unifying the data
10 A. Yes.	10 at the precinct level. I instructed the simulation to
11 O. All right. You represent that in Rucho, there is	11 create 1,000,000 sets of three reasonably compacted
12 a total of 24.518 total maps, while your report offers	12 districts, which respect county subdivisions." Does
13 several million maps for analysis using more	13 that reflect the code that you produced to us?
14 sophisticated techniques. Do you see that?	14 A It should unless I changed the n sime after I
15 a vec	15 wrote the report to check something and never changed
16 O Te there comething deficient in using the 24 518	16 it back. But yeah if you look at the histogram on
17 mana as appased to the sourceal million mana for analysis	17 page 46 that has the sounts of mans. I mean that is
17 maps as opposed to the several million maps for analysis	17 page 46, that has the counts of maps. I mean, that is
18 that you reference here?	18 going to hit a million pretty quick when you're going
A. A bigger sample size is always useful for you,	19 over 40,000 in those bars every time. So yean, it was a
20 but I don't think there's necessarily anything wrong	20 million maps.
21 with 24,518.	21 Q. Let's look at your source code, Doctor. So I am
22 Q. I'm looking at page 48 of your report, Exhibit	22 looking at Exhibit 12, which is your part 05, which is
23 1.52. Do you see that?	23 the first simulation. Do you see that?
24 A. Yes.	24 A. Huh-huh.
25 O. You have a sentence that says "In short, you	25 Q. Let's look at line 2. I've highlighted that.
42	44
42 1 cannot plot 3 million dots on a 8.5 by 11 inch page	44 1 What number do you see there being assigned to n_sims?
42 1 cannot plot 3 million dots on a 8.5 by 11 inch page 2 without a significant amount of overplotting." Do you	44 1 What number do you see there being assigned to n_sims? 2 A. That's 100,000.
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42 1 cannot plot 3 million dots on a 8.5 by 11 inch page 2 without a significant amount of overplotting." Do you 3 see that? 4 A. Yes. 5 Q. Is that 3 million dots that is referenced there 6 first, does that reflect maps that were generated by 7 your software? 8 A. So each dot is a district from a map, is a 9 representation of a district from a map. 10 Q. So when you say "3 million dots," that would be 11 1 million maps? 12 A. Correct. 13 Q. Okay. So at page 48, Exhibit 1.52, you're 14 referencing again the 1 million maps that you say that 15 you did in this project? 16 A. That's right. 17 Q. On page 1.82, your report page number 78, there 18 is a sentence that reflects "Across millions of maps, 19 under multiple assumptions and scenarios, the Enacted 20 Map presents as an extreme outlier." Is that sentence 21 part of your report? 22 A. Yes. 23 Q. And with this sentence, you're hoping to 24 communicate to the Court that SB-1 is an extreme outlier	44 1 What number do you see there being assigned to n_sims? 2 A. That's 100,000. 3 Q. Is 100,000 a million? 4 A. No. 5 Q. So the code that you sent us, does it generate a 6 million maps? 7 A. If a competent computer programmer changes 8 100,000 to a million, it will, but not run in its raw 9 form, no. 10 Q. Do you think a competent expert would produce 11 monkey code? 12 MS. DIRAGO: Objection. 13 A. I don't know what monkey code is, but it appears 14 that I changed it from a million to 100,000 for some 15 purpose and didn't change it back for you. It's 16 obvious, from the histograms in the report, that it was 17 a million maps. 18 Q. (By Mr. Williams) Well, do you have those maps 19 so that we can verify that? 20 A. No. 21 Q. Could you have saved those maps, Mr. Trende? 22 A. Not the maps themselves. You can save the block 23 assignment files for them. 24 Q. Well, let's walk through your code and discuss
Sean P. Trende 9/6/2023

12

	45		47
1	of Exhibit 12. Do you see that?	1	A. Yes.
2	A. Yes.	2	Q. All right. That line of code says
3	Q. Can you describe to me what line 4 of your code	3	set.seed(8675309)." Did you choose that seed or did
4	does?	4	somebody else choose that seed for you?
5	A. It creates the map file that is used to generate	5	A. I think one of my professors used that seed in
6	the simulation software.	6	code once, and I thought it was funny. So I will use
7	Q. All right. What does line 5 of your code do?	7	' that, or sometimes I'll do the date. It doesn't matter
8	A. That runs the simulation.	8	what seed you choose. That's a reference to a Tommy
9	Q. So line 5 would output the results of the	9	Tutone song.
10	simulation into a variable called "results." Is that	10) Q. I am old enough to be familiar with it. All
11	correct?	11	. right. And the very next line, 178, again, sets up a
12	A. Correct.	12	simulation; is that correct?
13	Q. And it would be somewhat trivial, would it not,	13	A. Correct.
14	to convert that object "results" into a matrix or a	14	Q. And then line 179 runs that simulation; correct?
15	table? Is that right?	15	A. Correct.
16	A. Right. You can turn it into a matrix, although	16	Q. And in line 179, it uses the same variable,
17	it would be a, depending which way you put it, 1 million	17	"n_sims." Do you see that?
18	by 2,200 matrix, but yeah.	18	A. Correct.
19	Q. And in fact, you have code that, in part, does	19	Q. Which, as we know, is 100,000. Is that right?
20	that at line 7; is that right?	20	A. Unless your competent coding expert realizes it's
22	A. That's correct.	21	producing 100,000 and changes it to a million, but yes,
22	Q. And you could take the matrix and save that to a	22	mans
24	A That's correct	24	0. Mr. Trende, I am taken aback somewhat by your
25	0. And do you know how to do that?	25	notion that someone else should fix the code that you
	10		40
1	46	1	48
1	46 A. I guess you would do "save_csv," whatever you want to call it and then "get plans matrix(results) "	1	48 produced to us. Why should anybody other than you, Sean P. Trende, have to fix the code you produced?
1 2 3	46 A. I guess you would do "save_csv," whatever you want to call it and then "get_plans_matrix(results)." O. So between line 5, which when executed creates	1 2 3	48 produced to us. Why should anybody other than you, Sean P. Trende, have to fix the code you produced? MS. DIRAGO: Objection.
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1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25	<pre>46 A. I guess you would do "save_csv," whatever you want to call it and then "get_plans_matrix(results)." Q. So between line 5, which when executed creates some number of maps, and when you turned off your computer or turned off your R environment, those maps existed; correct? A. A file that contains the assignments for the maps existed, not the maps themselves. Q. Well, the data that would be used to generate the maps; is that correct? A. Correct. Q. The output of your simulations; is that correct? A. Correct. Q. Which you refer to repeatedly in your expert report as "the maps." Is that correct? A. Correct. Q. All right. So that existed after the execution of line 5, and you chose not to save that output; is that correct? A. That's correct. That's typically how this stuff has been produced in cases I've been involved in. And so I didn't save it. I just ran it this last time and reported the output. Q. All right. Let's look at line 177 of that same source code. Do you see that there?</pre>	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25	48 produced to us. Why should anybody other than you, Sean P. Trende, have to fix the code you produced? MS. DIRAGO: Objection. MR. WILLIAMS: You can answer the question, MR. WILLIAMS: You can answer the question, I to see and reproduce the maps that were created and, noticing that n_sims is 100,000, would realize that to Preplicate that would be set to a million and would do so, perhaps Q. Do you think it would be reasonable A. Can I finish my answer? Q. Sure. A perhaps sending a clarification through counsel, "Hey, was this supposed to be a million?" Q. Mr. Trende, you understood that, when you Produced this, you were supposed to produce what you used to generate your report; is that right? MS. DIRAGO: Objection. Q. (By Mr. Williams) Is that right? A. When I produced this, I produced the code from my report. There is, obviously, something that was changed at some point after the fact for some purpose that I didn't change back. O. And definitionally, this is not the code that you

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1 used to generate your report; correct?	1 you run through your code, every random choice is going
2 A. Definitionally, it has an easily correctable	2 to produce the same value.
3 mistake in it.	3 Q. What is your understanding of the scoping of the
4 Q. Are there any other mistakes in this code that	4 set.seed operator in R?
5 you're aware of, Mr. Trende, that you changed after you	5 A. I don't understand your question.
6 generated your report?	6 Q. Well, I see that you set the seed at line 177.
7 A. Well, as I said before, I wouldn't have thought	7 Do you see that?
8 of this one until we went over it or the fact that the	8 A. Yes.
9 titles produce in this but not in my report. So I don't	9 Q. Immediately before performing a simulation; is
10 know, but I don't think so.	10 that correct?
11 Q. So based upon the code that you produced to us or	11 A. That's right.
12 that you produced to your counsel and they produced to	12 Q. Well, let's look up here at lines 1 through 5 of
13 us, if I run this code, I will not get the results that	13 this same code where you purport to perform another
14 you did in your report; is that correct?	14 100,000 simulations. Do you see that?
15 A. If you run this code, you will get 100,000 maps,	15 A. It was a million simulations, but yes, the number
16 not the million from the report.	16 there says "100,000."
17 Q. Yeah, but we don't know that there was a million,	17 Q. Do you see those lines?
18 because you didn't save them; is that correct?	18 A. I do see those lines.
19 A. Well, we know there's a million because you can	19 Q. What was the seed for that simulation?
20 look at the histograms and see it was a million, unless	20 A. 8675309.
21 you're trying to suggest that I made up the histograms.	21 Q. How do you know that, Mr. Trende?
22 But yeah, we know there's a million just as much as we	22 A. Because it was in part 2 of the code.
23 would know there was 100,000 if we ran this through.	23 Q. Well, let's get back to my question about
24 Q. I want to talk to you about line 177, Doctor,	24 scoping, Mr. Trende. What is the scoping of the
25 "set.seed(8675309)." Do you see that?	25 set.seed operator in R?
AA 4.0 0	2.437
50	50
50	52
50 1 A. Yes.	52 1 A. If you run the code through like I suggested, the 2 first time you set the seed it sets the seed and it
50 1 A. Yes. 2 Q. What is the purpose of setting the seed to 3 8575309 at line 1772	52 1 A. If you run the code through like I suggested, the 2 first time you set the seed, it sets the seed and it 3 will reproduce every time you run it through So
50 1 A. Yes. 2 Q. What is the purpose of setting the seed to 3 8675309 at line 177? 4 B. 8675309 would set it up so that it would make the	52 1 A. If you run the code through like I suggested, the 2 first time you set the seed, it sets the seed and it 3 will reproduce every time you run it through. So 4 0 And I believe you testified go abead
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1	all the way through the seventh; is that correct?	1	It's the same thing with these maps. When you
2	A. That's right, with the titles hash tagged out,	2	add constraints to them, there are certain ways that the
3	because I produced these titleless documents when I put	3	simulation enjoys drawing them, and so you'll get
4	this in to LaTex.	4	duplicates. That is part of the reason you wouldn't do
5	Q. Was there any interaction on your part while that	5	an ensemble of, like, 500, the way you might do a
6	code was running?	6	traditional poll.
7	A. Can you rephrase that question?	7	Q. In any of your other expert work using ensemble
8	Q. Were you interacting with the scripting	8	analysis, Mr. Trende, have you ever experienced
9	environment in any way while you were running that code?	9	duplicates in the amount of half of your dataset?
10	A. I don't believe so.	10	A. Oh, I don't know about that. Duplicates happen
11	Q. Is there any portion of the code that you	11	all the time.
12	produced to us that does nothing?	12	Q. Have you ever experienced a 50 percent duplicate
13	A. No, I don't know if anything is commented out.	13	rate?
14	It wouldn't do anything.	14	A. Like I said, I don't know. I do know that
15	Q. Well, let's look at line 7 of this code. Do you	15	duplicates are common, both in mine and Dr. Chen's work.
16	see line 7 on the screen there?	16	So it doesn't bother me, unless it gets extreme to where
17	A. Yes.	17	you end up having, like, 20 maps.
18	Q. What does that code do, Mr. Trende?	18	Q. What is a confidence interval in a statistical
19	A. It tells you how many of the plans are	19	analysis?
20	duplicated.	20	A. A confidence interval is a measure of, if you
21	Q. All right. And in what way does it tell you how	21	repeated the experiment, what percentage of the time the
22	many of the plans are duplicated?	22	true value would be contained within that interval. Or
23	A. It goes through the block assignment files and	23	I guess I'm explaining more of what a p-value is.
24	looks for columns with identical output.	24	You have a certain alpha that you set, which is
25	Q. Columns or rows?	25	your tolerance for false positives or for errors, and
-	54		56
1	54 A. Columns. That's why you have to do the	1	56 it's a measurement assuming you choose 0.05 as your
1	54 A. Columns. That's why you have to do the transpose.	1	56 it's a measurement assuming you choose 0.05 as your alpha, which is typically what is chosen, it means that,
1 2 3	54 A. Columns. That's why you have to do the transpose. Q. Okay. And how would it report that information	1 2 3	56 it's a measurement assuming you choose 0.05 as your alpha, which is typically what is chosen, it means that, if you repeated the experiment a hundred times,
1 2 3 4	54 A. Columns. That's why you have to do the transpose. Q. Okay. And how would it report that information to you, Mr. Trende?	1 2 3 4	56 it's a measurement assuming you choose 0.05 as your alpha, which is typically what is chosen, it means that, if you repeated the experiment a hundred times, 95 percent of the time your confident interval would
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1 2 3 4 5 6	54 A. Columns. That's why you have to do the transpose. Q. Okay. And how would it report that information to you, Mr. Trende? A. It would print it out. Q. In the interactive console?	1 2 3 4 5 6	56 it's a measurement assuming you choose 0.05 as your alpha, which is typically what is chosen, it means that, if you repeated the experiment a hundred times, 95 percent of the time your confident interval would contain the true value. Q. What is the confidence interval using the
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1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	54 A. Columns. That's why you have to do the transpose. Q. Okay. And how would it report that information to you, Mr. Trende? A. It would print it out. Q. In the interactive console? A. Yeah, that's where it would be printed. Q. All right. Do you do anything with that information? A. Not really. If it duplicated, like, 999,000 maps, you might have a problem. But I think the duplication rate here is way lower than that. Q. How many were duplicated, Mr. Trende? A. Fewer than half, I think. Q. Fewer than half a million? A. Fewer than half of the maps. So half a million. Q. Okay. So when you were talking about millions of simulated maps, it's really more like about half a million? A. No, because whenever you do these I mean, Dr. Chen's maps have duplicates, too. Whenever you do these, you're sampling with replacement. So just like if you were to sample heights of US males, you would get a bunch of numbers around 5-11, 6 foot, whatever, and	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	56 it's a measurement assuming you choose 0.05 as your alpha, which is typically what is chosen, it means that, if you repeated the experiment a hundred times, 95 percent of the time your confident interval would contain the true value. Q. What is the confidence interval using the simulation methods you have employed in this case for developing three congressional districts? A. I don't know. Q. Do you think it would require a sample size of less than a million maps? A. Oh, I'm sure you could do it with fewer than a million maps. But you know, when you have a million draws and over a half million unique draws, you get a pretty good sense of what the sample is. I'm not sure of any statistical metric that suggests you need more than that. Q. Are you aware of any statistical metric that suggests you need a million maps? A. Oh, as I've said, I don't know if you need a million maps. But whenever you're increasing your N, it's good. You get a better sense of what the distribution really looks like. Q. If you had selected a half million maps,

18

	69		71
1	Control and Beautification Act is?	1	A. I don't know.
2	A. I would assume it's to protect New Mexico's	2	Q. As it relates to the northeast region, what is
3	scenic areas from being overrun with trash and having	3	the unifying principle behind placing Union County and
4	billboards put up all over the place and things of that	4	San Miguel County in the same region?
5	nature, but I don't know.	5	A. I don't know.
6	Q. Would it be fair to say that you have told the	6	Q. Do you know if Union County and San Miguel County
7	Court in this case that map drawers need to respect the	7	have similar economies?
8	trash routes that the Tourism Board is using under the	8	A. I don't.
9	Litter Control and Beautification Act? Is that right?	9	Q. Do you know if they have similar populations?
10	A. No.	10	A. No. And that's the whole point of finding a
11	Q. Okay.	11	definition that has been used by a government agency
12	A. I don't see anything there about trash routes. I	12	which presumably knows the commonalities and structure
13	see regions of the state that are tourism districts that	13	of the state's economy and tourism and the like better
14	the legislature has apparently used to divvy up the	14	than I do.
15	state. I didn't realize that there was statutory	15	Q. And so it's your expert testimony today that it's
16	definition. So that is helpful. But I don't see	16	more important for you to rely upon the Litter Control
17	anything in here about trash routes.	17	and Beautification Act to decide what the regions of New
18	Q. Do you know when this statute was enacted?	18	Mexico are than to actually do any sort of independent
19	A. It looks like it's part of the Annotated Code	19	work to figure that out?
20	from 1978.	20	A. Well, it certainly seems more reasonable to rely
21	Q. Let me highlight this part for you. Do you see	21	on the legislature's definition of regional tourism
22	where it says "Effective 2017"?	22	districts than my own understanding of the state's
23	A. Yes.	23	geography.
24	Q. All right. And we'll go down here. And prior to	24	Q. Do you know if those regional tourism districts
25	2017, 2001 was the last iteration of that statute. Do	25	have any relationship whatsoever with political or
-	70		72
1	70 you see that?	1	72 physical geographies?
1 2	70 you see that? A. I guess. I see 1985 is the first one, but I	1 2	72 physical geographies? A. Certainly, physical geography, since they are
1 2 3	70 you see that? A. I guess. I see 1985 is the first one, but I don't know how to I mean	1 2 3	72 physical geographies? A. Certainly, physical geography, since they are roughly at least for three of the geographic
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1 2 3 4 5	70 you see that? A. I guess. I see 1985 is the first one, but I don't know how to I mean Q. 2017. A. I see that.	1 2 3 4 5	72 physical geographies? A. Certainly, physical geography, since they are roughly at least for three of the geographic quadrants of the state, and it looks like the northeastern one follows the mountain range in North
1 2 3 4 5 6	70 you see that? A. I guess. I see 1985 is the first one, but I don't know how to I mean Q. 2017. A. I see that. Q. And then before that, we have laws, 2001,	1 2 3 4 5 6	72 physical geographies? A. Certainly, physical geography, since they are roughly at least for three of the geographic quadrants of the state, and it looks like the northeastern one follows the mountain range in North Central New Mexico.
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19

	73	75
1	Q. Now we've got two independent typographical	1 Q. Let's look at page 31 of your report,
2	errors that don't agree with the million?	2 Exhibit 1.35. Tell me when you get there.
3	A. Yeah. You can see a million, again, from the	3 A. Okay.
4	histogram.	4 Q. Below the figure, you write "In other words, New
5	Q. Let's look at page 14 of your report, Mr. Trende.	5 Mexico's lines have been more-or-less stable over the
6	That would be Exhibit 1.18. Are you on that page?	6 course of the past three redistricting cycles." Do you
7	A. Yes.	7 see that?
8	Q. The paragraph beginning with "Thus, the best-case	8 A. Yes.
9	scenario for a gerrymanderer" Do you see that?	9 Q. Who was drawing congressional maps in the past
10	A. Yes.	10 three redistricting cycles in New Mexico?
11	Q. "Thus, the best case scenario for a gerrymanderer	11 A. Well, in 2010, you would have had a Republican
12	would be drawing three districts that President Biden	12 governor with a democratic legislature. So I believe
13	won by around 11 points." That is referring to the	13 that was done by a court.
14	three congressional districts in New Mexico; is that	14 In 2002, you would have had Governor Johnson, and
15	right?	15 I don't know if I am confident Republicans didn't
16	A. Yes.	16 control the entire legislature, but I don't know if they
17	Q. The next sentence or actually, the third	17 had one house or the other, probably not. So either
18	sentence in that paragraph reads, "Democrats would be	18 that was a compromised map or a Court map.
19	favored in such districts; Republicans currently occupy	19 And then, in 1992, I think you would have had
20	only five districts with a PVI of D+3 or more." Is that	20 King as the governor. So you would have had complete
21	correct?	21 control by the Democrats. So I would imagine that was
22	A. Correct.	22 the Democrats. I'm not sure, though.
23	Q. What are the districts you're referring to there	23 Q. Is there any difference between political
24	in your expert report?	24 redistricting by a legislature as opposed to a court?
25	A. I think it's New York's Fourth District,	25 A. No. Politicians are much more likely to
123		-
	74	- 76
1	74 California's the district occupied by Valadao, the	76 1 gerrymander in their favor than a court.
1 2	74 California's the district occupied by Valadao, the district occupied by Garcia, whoever won the Thirteenth	76 1 gerrymander in their favor than a court. 2 Q. Do you know how New Mexico's courts go about
1 2 3	74 California's the district occupied by Valadao, the district occupied by Garcia, whoever won the Thirteenth District, and then there's one more I'm blanking on,	76 1 gerrymander in their favor than a court. 2 Q. Do you know how New Mexico's courts go about 3 political redistricting?
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1 2 3 4 5 6	74 California's the district occupied by Valadao, the district occupied by Garcia, whoever won the Thirteenth District, and then there's one more I'm blanking on, which I think is in New York as well, because I think they're all in New York or California. Q. So that sentence is not meant to reflect	76 1 gerrymander in their favor than a court. 2 Q. Do you know how New Mexico's courts go about 3 political redistricting? 4 A. It looks, from these maps, if I'm right about 5 them being court drawn, that they drew these changes 6 maps.
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2

	145		147
1	code that Ms. DiRago references in that email?	1	modified code that you produced after your
2	A Yes.	2	deposition, he could have regenerated the simulations
3	(Exhibit 20 was marked.)	3	that you used to formulate your expert report?
4	Q (By Mr. Williams) All right. I want to	4	MS. DiRAGO: Object to the form. You can
5	show you what I have marked as Exhibit 20. Do you	5	answer.
6	see that code on the screen?	6	A Yes.
7	A Yes.	7	Q (By Mr. Williams) All right. I want to
8	0 All right. I will represent to you that is	8	narrow this down so Ms. DiRago doesn't object to
9	the file that she produced to us. As I appreciate	9	this.
10	it, the only change you have made to that code is at	10	Ts it true that if Dr. Chen had used the
11	Line 2 where it now reads 1 million: is that correct?	11	source code that you produced prior to your
12	A Thelieve that's right	12	denosition substituting the module that you produced
12	A i berieve char b right.	12	appointed, substituting the mould have recovered the
14	Q All right. Fou say you believe that's	14	alter your deposition, he would have regenerated the
14	right. Did you make any other modifications to	14	simulations that you used in your expert report?
15	05-Part-6-4.R?	15	A He should have.
16	A I certainly don't remember doing so.	16	Q Okay. And that is because, as I appreciate
17	Q Okay. And the 1 million that you've set at	17	your testimony earlier, Mr. Trende, you used the
18	Line 2, that populates the n sims variable, correct?	18	set.seed (8675309) instruction in your code; is that
19	A Correct.	19	correct?
20	Q And the n sims variable is what makes	20	A That's correct.
21	1 million now simulations be performed at Line 5; is	21	(Exhibit 22 was marked.)
22	that correct?	22	Q (By Mr. Williams) All right. I want to
23	A Yes.	23	show you what I've marked as Exhibit 22 to this
24	Q And similarly at Line 179, that same n sims	24	deposition. I'll represent to you that this is the
25	variable is what causes the line of code at 179 and	25	output of a directory tree search of the files that
	146		148
1	146 180 to perform an additional 1 million simulations;	1	148 were produced to us last night. Would you please
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1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	<pre>146 180 to perform an additional 1 million simulations; is that correct?</pre>	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	<pre>148 were produced to us last night. Would you please verify that those are the regenerated map files that were produced that you generate you regenerated and that were produced to us last night? A Can you scroll down? Q Yes, sir. A And keep going, please. Q Yes, sir. A It does appear that way. Q All right. And your recollection is that you generated 204 files? A Yes. Q All right. And I realize that these are approximate file sizes that are to the left of the file names. I'm not trying to pin you down on that, but do they look approximately right? A I couldn't tell you because I didn't check that. (Exhibit 23 was marked.) Q (By Mr. Williams) Fair enough. All right. I want to turn your attention to what I've marked as Exhibit 23. That is a file that Ms. DiRago produced to us today titled file_savel.r. Do you see that? A Yes.</pre>
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25	<pre>146 180 to perform an additional 1 million simulations; is that correct?</pre>	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25	<pre>148 were produced to us last night. Would you please verify that those are the regenerated map files that were produced that you generate you regenerated and that were produced to us last night? A Can you scroll down? Q Yes, sir. A And keep going, please. Q Yes, sir. A It does appear that way. Q All right. And your recollection is that you generated 204 files? A Yes. Q All right. And I realize that these are approximate file sizes that are to the left of the file names. I'm not trying to pin you down on that, but do they look approximately right? A I couldn't tell you because I didn't check that. (Exhibit 23 was marked.) Q (By Mr. Williams) Fair enough. All right. I want to turn your attention to what I've marked as Exhibit 23. That is a file that Ms. DiRago produced to us today titled file_savel.r. Do you see that? A Yes. Q All right. What is that file. Mr. Trende?</pre>

4

15	3 155
1 the way you ran the Redist smc function when you	1 machine configured the same as it was when you
2 regenerated the maps?	2 initially ran the simulations as when you generated
3 A I don't think so. I certainly don't	3 or regenerated the simulations?
4 remember doing anything.	4 A I don't know. I don't think I've done
5 Q Okay.	5 anything to change the chip.
6 A I didn't remember changing the n sims to	6 Q Do you recall at your first deposition,
7 100,000 from a million, though, so	7 Mr. Trende, that you testified you understood how
8 Q Certainly. Mr. Trende, I want to turn your	8 Redist works under the hood?
9 attention back to Exhibit 1 of your deposition, and	9 MS. DiRAGO: Objection. I'm not sure
10 I'm going to show you Page 20 of Exhibit 1 of your	10 that's what he testified to.
11 deposition. Do you see that?	11 Q (By Mr. Williams) Well, we can pull the
12 A Yes.	12 transcript up.
13 Q Highlighted on Page 20 is a sentence that	13 A I think that's a good idea.
14 reads, Indeed, these simulations were run at home on	14 Q Bear with me. Our document management
15 a Dell Alienware desktop computer with an i9	15 system is sometimes slow.
16 processor. Do you see that?	16 All right. Do you see the deposition of
17 A Yeah. Actually, I think it's a AMD Ryzen	17 Sean Trende, at least the first page of it?
18 processor. But yeah.	18 A I do.
19 0 Why did you tell us that it was an Intel i9	19 0 All right. Let me do a guick search for
20 processor?	20 "under the hood." All right. At Line at
21 A That is probably a leftover from having	21 Page 121, Line 14, I asked you, Are you familiar with
22 done it on a laptop once and forgetting that I didn't	22 how Redist works under the hood? And you said, Yes.
23 get an Intel chip on this, I got an AMD chip. But	23 Have you seen that?
24 the AMD chip and the i9 are functionally equivalent.	24 A Yeah. Yeah. I see some of the
25 0 Are seen under that seen commuter wight and	25 clarifications afterwards. But yeah.
125 U Are vou using that same computer right now?	
25 Q Are you using that same computer right now:	
15 V Are you using that same computer right now?	
15 1 A Yes. 2 O Would you mind looking at the task papager	1 Q And when you say that, you do that without 2 build a reviewed the servers adds is that serverst?
 23 Q Are you using that same computer right now? 15 1 A Yes. 2 Q Would you mind looking at the task manager 2 for me Wm Trendo and telling me what processor 	156 Q And when you say that, you do that without 2 having reviewed the source code; is that correct? 2 2 2 York When you acked me her it works under
15 1 A Yes. 2 Q Would you mind looking at the task manager 3 for me, Mr. Trende, and telling me what processor 4 mm/me actually using for these simulations?	 1 Q And when you say that, you do that without 2 having reviewed the source code; is that correct? 3 A Yeah. When you asked me how it works under 4 the head I the with you asked me how it works under
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Republican Party of NM, et al vs. Oliver, et al

		157				159
1	downloaded a very long tim	e ago.	1	reproducil	pility is desired, set ncores equals 1.	Do
2	Q Okay. So lookin	g at Exhibit 5 (sic), which	2	you see th	hat?	
3	is the API manual for Redi	st; is that right?	3	A	Yes.	
4	A Uh-huh. Yes.		4	Q	Do you take issue with this documentatio	n?
5	Q You've looked at	this document before?	5	A	No.	
6	A Yes.		6	0	All right. You just don't know if this	
7	0 All right Twa	nt to turn T want to	7	documental	tion applies to Redist as you're running	i+2
,	y All light. I wa	ne co cum i want co	0	aocumenca	Ver	10.
8	go		8	A		100420
9	A To I'm sorry.	To clarify, this looks	9	Q	All right. When did you install Redist	on
10	like the April 3rd, 2003 (sic) revision. I don't	10	your compu	iter, Mr. Trende?	
11	know if I've read it since	April 3, 2003, and I don't	11	A	I would have updated it a couple of week	s
12	know if the version of Red	ist I use is post	12	ago.		
13	April 3rd, 2023, but I hav	e looked at the	13	Q	A couple of weeks ago? Would that have	
14	documentation.		14	been after	r your initial simulations?	
15	Q Do you know what	is there any way for	15	A	Yes.	
16	you to tell me, Mr. Trende	, what version of Redist	16	Q	So your and then the Redist that you	ran
17	that you use to generate y	our simulations?	17	these new	simulations on would be a newer version?	
18	A I don't think so		18	А	No.	
19	0 Are you telling	me vou're not aware of how	19	0	All right. So explain that to me.	
20	to do that?	me you it not aware of now	20	× Mr Trond	Tf you undeted Bediet often you	
20	to do that?		20	mr. irende	. If you updated kedist after you	
21	A Yes.		21	periormed	your expert report, now is it the same	
22	Q All right. I wa	nt to go to Page 121. On	22	version of	t Redist?	
23	Page 121 of Exhibit 5 (sic), do you see the beginning	23	A	Because I ran the second simulations on :	my
24	of the section documenting	the function Redist_smc?	24	laptop, wh	hich has an older version of Redist	
25	A Yes.		25	installed.		
		158				160
1	Q Have you read t	158 his documentation before,	1	Q	Okay. So now I believe I had asked y	160 ou
1	Q Have you read t Mr. Trende?	158 his documentation before,	1 2	Q if you use	Okay. So now I believe I had asked y ed the same computer, Mr. Trende, for bot	160 ou h
1 2 3	Q Have you read t Mr. Trende? A I'm sure I've r	158 his documentation before, ead a version of it. I	1 2 3	Q if you use the origin	Okay. So now I believe I had asked y ed the same computer, Mr. Trende, for bot nal simulations and the regenerations, an	160 ou h d
1 2 3 4	Q Have you read t Mr. Trende? A I'm sure I've r don't know if I've read o	158 his documentation before, ead a version of it. I ff of this version of it	1 2 3 4	Q if you use the origin	Okay. So now I believe I had asked y ed the same computer, Mr. Trende, for bot hal simulations and the regenerations, an	160 ou h d
1 2 3 4	Q Have you read t Mr. Trende? A I'm sure I've r don't know if I've read o	158 his documentation before, ead a version of it. I ff of this version of it.	1 2 3 4	Q if you use the origin you told n	Okay. So now I believe I had asked y ed the same computer, Mr. Trende, for bot nal simulations and the regenerations, an me yes. Now you're saying you ran them o	160 ou h d n
1 2 3 4 5	Q Have you read t Mr. Trende? A I'm sure I've r don't know if I've read o But yes.	158 his documentation before, ead a version of it. I ff of this version of it.	1 2 3 4 5	Q if you use the origin you told n an AMD, an	Okay. So now I believe I had asked y ed the same computer, Mr. Trende, for bot hal simulations and the regenerations, an me yes. Now you're saying you ran them o nd then you regenerated them on a laptop;	160 ou h d n is
1 2 3 4 5 6	Q Have you read t Mr. Trende? A I'm sure I've r don't know if I've read o But yes. Q Okay. I want t	158 his documentation before, ead a version of it. I ff of this version of it. o turn your attention to	1 2 3 4 5 6	Q if you use the origin you told n an AMD, an that corre	Okay. So now I believe I had asked y ed the same computer, Mr. Trende, for bot nal simulations and the regenerations, an me yes. Now you're saying you ran them o nd then you regenerated them on a laptop; ect?	160 ou h d is
1 2 3 4 5 6 7	Q Have you read t Mr. Trende? A I'm sure I've r don't know if I've read o But yes. Q Okay. I want t Page 122 of that document	158 his documentation before, ead a version of it. I ff of this version of it. o turn your attention to ation that describes the	1 2 3 4 5 6 7	Q if you use the origin you told n an AMD, an that corre A	Okay. So now I believe I had asked y ed the same computer, Mr. Trende, for bot nal simulations and the regenerations, an me yes. Now you're saying you ran them o nd then you regenerated them on a laptop; ect? I don't think you asked me if I regenera	160 ou h d is ted
1 2 3 4 5 6 7 8	Q Have you read t Mr. Trende? A I'm sure I've r don't know if I've read o But yes. Q Okay. I want t Page 122 of that document arguments for the Redist_	158 his documentation before, ead a version of it. I ff of this version of it. o turn your attention to ation that describes the smc function. Do you see	1 2 3 4 5 6 7 8	Q if you use the origin you told r an AMD, an that corre A them on th	Okay. So now I believe I had asked y ed the same computer, Mr. Trende, for bot hal simulations and the regenerations, an me yes. Now you're saying you ran them o hd then you regenerated them on a laptop; ect? I don't think you asked me if I regenera he same computer I used.	160 ou h d is ted
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		161				163
1	Mr. Trend	е.	1	reproduc	ibility	is desired, set ncores equals one; is
2	A	It's pretty straightforward. I updated	2	that cor	rect?	
3	Redist	you asked me when I updated Redist on my	3	A	Yes.	
4	desktop.	I updated it after I submitted the expert	4	Q	Mr. T	rende, how can you testify today that
5	report in	this litigation.	5	the rege	nerated	simulations that you produced to us
6	Q	And have you ever updated Redist on your	6	yesterda	y are t	he same as those you claim to have
7	laptop?		7	used in	your ex	pert report?
8	A	No.	8		MS. D	VIRAGO: Objection to form.
9	Q	So it is running on the same earlier	9	A	I tes	tified that way because I use the
10	version o	f Redist that was on your desktop?	10	set.seed	comman	d, which is how you typically make
11	Α	Yes.	11	sure tha	t somet	hing is reproducible.
12	Q	What version of Redist is that, Mr. Trende?	12	Q	(By M	(r. Williams) And would you agree with
13	A	I told you, I don't know.	13	me that	the doc	umentation of the function that you
14	Q	How can you know that if you don't know	14	use says	that c	on a multi-core machine, without
15	what vers	ion is on either the laptop or the desktop?	15	setting	ncores	equals 1, set.seed does not accomplish
16	A	Because I got the laptop and the desktop at	16	that goa	1?	
17	about the	same time and installed Redist at the same	17	A	That'	s what it says.
18	time.		18	Q	Yep.	Do you have any reason to disagree
19	Q	When was that, Mr. Trende?	19	with the	author	s of Redist_smc?
20	A	That would have been in April of 2022.	20	A	No.	
21		(Exhibit 26 was marked.)	21	Q	So, M	r. Trende, as you're sitting here
22	Q	(By Mr. Williams) All right, Mr. Trende.	22	today, c	an you	testify that the regenerated source
23	I want to	turn your attention to what I am marking as	23	code tha	t was p	roduced to us yesterday is or
24	Exhibit 2	6 to this deposition. This is the source	24	strike t	hat.	
25	code to t	he Redist smc module that is part of Redist.	25		Mr. I	rende, as you're sitting here today,
		162				164
1	Have you	ever looked at this code?	1	can you	testify	164 that the regenerated maps that were
1 2	Have you	ever looked at this code? No.	1 2	can you produced	testify to us	164 that the regenerated maps that were last night are the same as the maps
1 2 3	Have you A Q	162 ever looked at this code? No. All right. What is the date on that source	1 2 3	can you produced you gene	testify to us rated t	164 that the regenerated maps that were last night are the same as the maps o form your expert report?
1 2 3 4	Have you A Q code ther	162 ever looked at this code? No. All right. What is the date on that source e, Mr. Trende?	1 2 3 4	can you produced you gene A	testify to us rated t Not t	164 That the regenerated maps that were last night are the same as the maps to form your expert report? that they're completely identical, for
1 2 3 4 5	Have you A Q code ther A	162 ever looked at this code? No. All right. What is the date on that source e, Mr. Trende? January 31st, 2021.	1 2 3 4 5	can you produced you gene A certaint	testify to us rated t Not t y, no.	164 That the regenerated maps that were last night are the same as the maps to form your expert report? That they're completely identical, for
1 2 3 4 5 6	Have you A Q code ther A Q	162 ever looked at this code? No. All right. What is the date on that source e, Mr. Trende? January 31st, 2021. And is that before or after you installed	1 2 3 4 5 6	can you produced you gene A certaint	testify to us rated t Not t y, no. MR. W	164 That the regenerated maps that were last night are the same as the maps to form your expert report? That they're completely identical, for TLLLIAMS: Thank you, Mr. Trende. I
1 2 3 4 5 6 7	Have you A Q code ther A Q Redist on	162 ever looked at this code? No. All right. What is the date on that source e, Mr. Trende? January 31st, 2021. And is that before or after you installed your desktop computer and your laptop	1 2 3 4 5 6 7	can you produced you gene A certaint	testify to us rated t Not t y, no. MR. W s the w	164 That the regenerated maps that were last night are the same as the maps to form your expert report? That they're completely identical, for MILLIAMS: Thank you, Mr. Trende. I witness.
1 2 3 4 5 6 7 8	Have you A Q code ther A Q Redist on computer?	162 ever looked at this code? No. All right. What is the date on that source e, Mr. Trende? January 31st, 2021. And is that before or after you installed your desktop computer and your laptop	1 2 3 4 5 6 7 8	can you produced you gene A certaint will pas	testify to us rated t Not t y, no. MR. W s the w	164 That the regenerated maps that were last night are the same as the maps to form your expert report? That they're completely identical, for TILLIAMS: Thank you, Mr. Trende. I witness. EXAMINATION
1 2 3 4 5 6 7 8 9	Have you A Q code ther A Q Redist on computer? A	162 ever looked at this code? No. All right. What is the date on that source e, Mr. Trende? January 31st, 2021. And is that before or after you installed your desktop computer and your laptop Before.	1 2 3 4 5 6 7 8 9	can you produced you gene A certaint will pas BY MS. D	testify to us rated t Not t y, no. MR. W s the w iRAGO:	164 That the regenerated maps that were last night are the same as the maps to form your expert report? That they're completely identical, for TLLLIAMS: Thank you, Mr. Trende. I Titness. EXAMINATION
1 2 3 4 5 6 7 8 9 10	Have you A Q code ther A Q Redist on computer? A Q	162 ever looked at this code? No. All right. What is the date on that source e, Mr. Trende? January 31st, 2021. And is that before or after you installed your desktop computer and your laptop Before. All right. Let's go down on Exhibit 26 to	1 2 3 4 5 6 7 8 9 10	can you produced you gene A certaint will pas BY MS. D Q	testify to us rated t Not t y, no. MR. W s the w iRAGO: Mr. T	164 That the regenerated maps that were last night are the same as the maps to form your expert report? That they're completely identical, for TLLLIAMS: Thank you, Mr. Trende. I Titness. EXAMINATION
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1 2 3 4 5 6 7 8 9 10 11	Have you A Q code ther A Q Redist on computer? A Q the source Lines 62	162 ever looked at this code? No. All right. What is the date on that source e, Mr. Trende? January 31st, 2021. And is that before or after you installed your desktop computer and your laptop Before. All right. Let's go down on Exhibit 26 to e code's documentation of cores. At oh, shoot. That's going to be tough.	1 2 3 4 5 6 7 8 9 10 11	can you produced you gene A certaint will pas BY MS. I Q expert b A	testify rated t Not t y, no. MR. W s the w iRAGO: Mr. T efore t Yes.	164 That the regenerated maps that were last night are the same as the maps to form your expert report? That they're completely identical, for MILLIAMS: Thank you, Mr. Trende. I witness. EXAMINATION Trende, have you been engaged as an this case?
1 2 3 4 5 6 7 8 9 10 11 12 13	Have you A Q code ther A Q Redist on computer? A Q the sourc Lines 62 Let me set	162 ever looked at this code? No. All right. What is the date on that source e, Mr. Trende? January 31st, 2021. And is that before or after you installed your desktop computer and your laptop Before. All right. Let's go down on Exhibit 26 to e code's documentation of cores. At oh, shoot. That's going to be tough. e if I can do it this way.	1 2 3 4 5 6 7 8 9 10 11 12 13	can you produced you gene Certaint will pas BY MS. I Q expert h A Q	testify rated to Not t y, no. MR. W s the w iRAGO: Mr. T efore t Yes. Appro	164 That the regenerated maps that were last night are the same as the maps to form your expert report? That they're completely identical, for TLLIAMS: Thank you, Mr. Trende. I witness. EXAMINATION Trende, have you been engaged as an this case?
1 2 3 4 5 6 7 8 9 10 11 12 13 14	Have you A Q code ther A Q Redist on computer? A Q the sourc Lines 62 Let me set	162 ever looked at this code? No. All right. What is the date on that source e, Mr. Trende? January 31st, 2021. And is that before or after you installed your desktop computer and your laptop Before. All right. Let's go down on Exhibit 26 to e code's documentation of cores. At oh, shoot. That's going to be tough. e if I can do it this way. At Lines 62 through 67 is the source codes	1 2 3 4 5 6 7 8 9 10 11 12 13 14	can you produced you gene certaint will pas BY MS. I Q expert b A Q A	testify rated t Not t y, no. MR. W s the w iRAGO: Mr. T efore t Yes. Appro Proba	164 That the regenerated maps that were last night are the same as the maps to form your expert report? That they're completely identical, for TLLIAMS: Thank you, Mr. Trende. I witness. EXAMINATION Trende, have you been engaged as an this case? Trimately how many times? bly 20. It's listed in my report.
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Republican Party of NM, et al vs. Oliver, et al

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I 1	165		167
1	other side. I guess I mean how many times have you	1	at least isn't guaranteed to work fully if you don't
2	created simulation maps?	2	set the number of cores to 1. So, you know, that
3	A Probably about half of them.	3	wasn't done. But I don't think I've ever seen that
4	Q Okay. The question now is: How many times	4	done, including cases with Dr. Imai, so
5	did you produce the simulation maps to the opposing	5	But I don't know. Without looking at the
6	counsel in that case in those cases?	6	actual maps, I don't know whether what or looking
7	A I don't think I've ever been asked to or	7	at the actual output, whether what was produced is
8	at least I don't think we've ever produced mans in	8	similar or even identical to what the first go-around
	a rada	9	was
10	Q Have you ever received many from the	10	And do you think that this will prejudice
11	Q have you ever received maps from the	11	And do you think that this will prejudice
11	opposite party in a case:	11	defendants in this case to hot have the exact maps,
12	A Inree times.	12	potentially, that you used?
13	Q Okay. What were the circumstances under	13	A I can't see how it would because the actual
14	which you received maps in those cases?	14	output that we're interested in is the probability
15	A In the Texas case, it was because of it	15	distribution, not the individual maps.
16	was written in a programming language that I don't	16	MS. DiRAGO: Okay. Thank you. I don't
17	even execute in. The second case was something	17	have any more questions.
18	similar to the circumstance in this case. Dr. Imai	18	MR. WILLIAMS: I have no further questions.
19	was using an algorithm that ran so slowly that we	19	(The deposition concluded at 1:37 p.m.
20	wouldn't have had the output by the time the response	20	Mountain Time.)
21	was due. And then this case, where we seem to agree	21	
22	this algorithm runs slowly.	22	
23	Q So is it typical to exchange maps in	23	
24	gerrymandering cases?	24	
25	A No. Even in cases with Dr. Imai, it's just	25	
_		-	
1	166		168
1	166 been kind of understood you can reproduce the	1	168 FIFTH JUDICIAL DISTRICT COURT
1	166 been kind of understood you can reproduce the distribution by running the code on yourself. And	1	168 FIFTH JUDICIAL DISTRICT COURT COUNTY OF LEA
1 2 3	166 been kind of understood you can reproduce the distribution by running the code on yourself. And when you have competent experts, they can be trusted	1 2 3	168 FIFTH JUDICIAL DISTRICT COURT COUNTY OF LEA STATE OF NEW MEXICO NO: D-506-CV-2022-00041
1 2 3 4	166 been kind of understood you can reproduce the distribution by running the code on yourself. And when you have competent experts, they can be trusted to run the code.	1 2 3 4	168 FIFTH JUDICIAL DISTRICT COURT COUNTY OF LEA STATE OF NEW MEXICO NO: D-506-CV-2022-00041
1 2 3 4 5	166 been kind of understood you can reproduce the distribution by running the code on yourself. And when you have competent experts, they can be trusted to run the code. 0 So do you actually rely on individual maps	1 2 3 4 5	168 FIFTH JUDICIAL DISTRICT COURT COUNTY OF LEA STATE OF NEW MEXICO NO: D-506-CV-2022-00041 REPUBLICAN PARTY OF NEW MEXICO, DAVID GALLEGOS, TIMOTHY
1 2 3 4 5	166 been kind of understood you can reproduce the distribution by running the code on yourself. And when you have competent experts, they can be trusted to run the code. Q So do you actually rely on individual maps or sets of maps?	1 2 3 4 5 6	168 FIFTH JUDICIAL DISTRICT COURT COUNTY OF LEA STATE OF NEW MEXICO NO: D-506-CV-2022-00041 REPUBLICAN PARTY OF NEW MEXICO, DAVID GALLEGOS, TIMOTHY JENNINGS, DINAH VARGAS, MANUEL CONTALES LE BOBEY AND DEE ANN
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1 2 3 4 5 6 7 8 9	<pre>166 been kind of understood you can reproduce the distribution by running the code on yourself. And when you have competent experts, they can be trusted to run the code.</pre>	1 2 3 4 5 6 7 8 9 10	168 FIFTH JUDICIAL DISTRICT COURT COUNTY OF LEA STATE OF NEW MEXICO NO: D-506-CV-2022-00041 REPUBLICAN PARTY OF NEW MEXICO, DAVID GALLEGOS, TIMOTHY JENNINGS, DINAH VARGAS, MANUEL GONZALES, JR., BOBBY AND DEE ANN KIMBRO, and PEARL GARCIA, Plaintiffs, VS. MAGGIE TOULOUSE OLIVER, in her
1 2 3 4 5 6 7 8 9	<pre>166 been kind of understood you can reproduce the distribution by running the code on yourself. And when you have competent experts, they can be trusted to run the code.</pre>	1 2 3 4 5 6 7 8 9 9 10	168 FIFTH JUDICIAL DISTRICT COURT COUNTY OF LEA STATE OF NEW MEXICO NO: D-506-CV-2022-00041 REPUBLICAN PARTY OF NEW MEXICO, DAVID GALLEGOS, TIMOTHY JENNINGS, DINAH VARGAS, MANUEL GONZALES, JR., BOBBY AND DEE ANN KIMBRO, and PEARL GARCIA, Plaintiffs, VS. MAGGIE TOULOUSE OLIVER, in her official capacity as New Mexico Secretary of State, MICHELLE LUJAN
1 2 3 4 5 6 7 8 9 10	166 been kind of understood you can reproduce the distribution by running the code on yourself. And when you have competent experts, they can be trusted to run the code. Q So do you actually rely on individual maps or sets of maps? A No. Because the whole point of using these maps is to explore probability distribution of drawing maps what the probability distribution looks like for maps drawn without respect to	1 2 3 4 5 6 7 8 9 10 11	168 FIFTH JUDICIAL DISTRICT COURT COUNTY OF LEA STATE OF NEW MEXICO NO: D-506-CV-2022-00041 REPUBLICAN PARTY OF NEW MEXICO, DAVID GALLEGOS, TIMOTHY JENNINGS, DINAH VARGAS, MANUEL GONZALES, JR., BOBBY AND DEE ANN KIMBRO, and PEARL GARCIA, Plaintiffs, Vs. MAGGIE TOULOUSE OLIVER, in her official capacity as New Mexico Secretary of State, MICHELLE LUJAN GRISHAM, in her official capacity as
1 2 3 4 5 6 7 8 9 10 11	<pre>166 been kind of understood you can reproduce the distribution by running the code on yourself. And when you have competent experts, they can be trusted to run the code.</pre>	1 2 3 4 5 6 7 8 9 10 11	168 FIFTH JUDICIAL DISTRICT COURT COUNTY OF LEA STATE OF NEW MEXICO NO: D-506-CV-2022-00041 REPUBLICAN PARTY OF NEW MEXICO, DAVID GALLEGOS, TIMOTHY JENNINGS, DINAH VARGAS, MANUEL GONZALES, JR., BOBEY AND DEE ANN KIMBRO, and PEARL GARCIA, Plaintiffs, VS. MAGGIE TOULOUSE OLIVER, in her official capacity as New Mexico Secretary of State, MICHELLE LUJAN GRISHAM, in her official capacity as Governor of New Mexico, HOWIE MORALES, in his official capacity as
1 2 3 4 5 6 7 8 9 10 11 12	<pre>166 been kind of understood you can reproduce the distribution by running the code on yourself. And when you have competent experts, they can be trusted to run the code.</pre>	1 2 3 4 5 6 7 8 9 10 11 12 13	168 FIFTH JUDICIAL DISTRICT COURT COUNTY OF LEA STATE OF NEW MEXICO NO: D-506-CV-2022-00041 REPUBLICAN PARTY OF NEW MEXICO, DAVID GALLEGOS, TIMOTHY JENNINGS, DINAH VARGAS, MANUEL GONZALES, JR., BOBBY AND DEE ANN KIMBRO, and PEARL GARCIA, Plaintiffs, VS. MAGGIE TOULOUSE OLIVER, in her official capacity as New Mexico Secretary of State, MICHELLE LUJAN GRISHAM, in her official capacity as Governor of New Mexico, HOWIE MORALES, in his official capacity as New Mexico Lieutenant Governor and
1 2 3 4 5 6 7 8 9 10 11 12 13	<pre>166 been kind of understood you can reproduce the distribution by running the code on yourself. And when you have competent experts, they can be trusted to run the code.</pre>	1 2 3 4 5 6 7 8 9 10 11 12 13 14	168 FIFTH JUDICIAL DISTRICT COURT COUNTY OF LEA STATE OF NEW MEXICO NO: D-506-CV-2022-00041 REPUBLICAN PARTY OF NEW MEXICO, DAVID GALLEGOS, TIMOTHY JENNINGS, DINAH VARGAS, MANUEL GONZALES, JR., BOBBY AND DEE ANN KIMBRO, and PEARL GARCIA, Plaintiffs, VS. MAGGIE TOULOUSE OLIVER, in her official capacity as New Mexico Secretary of State, MICHELLE LUJAN GRISHAM, in her official capacity as Governor of New Mexico, HOWIE MORALES, in his official capacity as New Mexico Lieutenant Governor and President of the New Mexico Senate, MIMI STEWART, in her official capacity
1 2 3 4 5 6 7 8 9 10 11 12 13 14	166 been kind of understood you can reproduce the distribution by running the code on yourself. And when you have competent experts, they can be trusted to run the code. Q So do you actually rely on individual maps or sets of maps? A No. Because the whole point of using these maps is to explore probability distribution of drawing maps what the probability distribution looks like for maps drawn without respect to politics. So, frankly, drawing different types of maps and getting the same basic output only reinforces the conclusions drawn the first time	1 2 3 4 5 6 7 8 9 10 11 12 13 14	168 FIFTH JUDICIAL DISTRICT COURT COUNTY OF LEA STATE OF NEW MEXICO NO: D-506-CV-2022-00041 REPUBLICAN PARTY OF NEW MEXICO, DAVID GALLEGOS, TIMOTHY JENNINGS, DINAH VARGAS, MANUEL GONZALES, JR., BOBBY AND DEE ANN KIMBRO, and PEARL GARCIA, Plaintiffs, vs. MAGGIE TOULOUSE OLIVER, in her official capacity as New Mexico Secretary of State, MICHELLE LUJAN GRISHAM, in her official capacity as Governor of New Mexico, HOWIE MORALES, in his official capacity as New Mexico Lieutenant Governor and President of the New Mexico Senate, MIMI STEWART, in her official capacity as President Pro Tempore of the New Mexico
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	166 been kind of understood you can reproduce the distribution by running the code on yourself. And when you have competent experts, they can be trusted to run the code. Q So do you actually rely on individual maps or sets of maps? A No. Because the whole point of using these maps is to explore probability distribution of drawing maps what the probability distribution looks like for maps drawn without respect to politics. So, frankly, drawing different types of maps and getting the same basic output only reinforces the conclusions drawn the first time around because it's another it's like another poll	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	168 FIFTH JUDICIAL DISTRICT COURT COUNTY OF LEA STATE OF NEW MEXICO NO: D-506-CV-2022-00041 REPUBLICAN PARTY OF NEW MEXICO, DAVID GALLEGOS, TIMOTHY JENNINGS, DINAH VARGAS, MANUEL GONZALES, JR., BOBBY AND DEE ANN KIMBRO, and PEARL GARCIA, Plaintiffs, Vs. MAGGIE TOULOUSE OLIVER, in her official capacity as New Mexico Secretary of State, MICHELLE LUJAN GRISHAM, in her official capacity as Governor of New Mexico, HOWIE MORALES, in his official capacity as New Mexico Lieutenant Governor and President of the New Mexico Senate, MIMI STEWART, in her official capacity as President Pro Tempore of the New Mexico Senate, and JAVIER MARTINEZ, in his official capacity as Speaker of the
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1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17	<pre>166 been kind of understood you can reproduce the distribution by running the code on yourself. And when you have competent experts, they can be trusted to run the code.</pre>	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	168 FIFTH JUDICIAL DISTRICT COURT COUNTY OF LEA STATE OF NEW MEXICO NO: D-506-CV-2022-00041 REPUBLICAN PARTY OF NEW MEXICO, DAVID GALLEGOS, TIMOTHY JENNINGS, DINAH VARGAS, MANUEL GONZALES, JR., BOBEY AND DEE ANN KIMBRO, and PEARL GARCIA, Plaintiffs, VS. MAGGIE TOULOUSE OLIVER, in her official capacity as New Mexico Secretary of State, MICHELLE LUJAN GRISHAM, in her official capacity as Governor of New Mexico, HOWIE MORALES, in his official capacity as New Mexico Lieutenant Governor and President of the New Mexico Senate, MIMI STEWART, in her official capacity as President Pro Tempore of the New Mexico Senate, and JAVIER MARTINEZ, in his official capacity as Speaker of the New Mexico House of Representatives, Defendants. CERTIFICATE OF COMPLETION OF DEPOSITION
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