

No. 141, Original

**In the
SUPREME COURT OF THE UNITED STATES**

STATE OF TEXAS,
Plaintiff,

v.

STATE OF NEW MEXICO and
STATE OF COLORADO,
Defendants,

UNITED STATES OF AMERICA,
Intervenor.

**UNITED STATES' MOTION FOR LEAVE TO DESIGNATE
SUPPLEMENTAL EXPERT TESTIMONY**

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The United States respectfully moves for leave to expand the scope of the previously disclosed testimony of its expert witness, Dr. Ian M. Ferguson, to include the matters addressed and already disclosed by his January 20, 2023 declaration in support of the United States’ opposition to the States’ proposed consent decree. *See* Doc. 754¹ (Declaration of Ian M. Ferguson, Ph.D., P.E In Support of the United States’ Opposition to the Proposed Decree) (Declaration) (Attachment A). The basis for this motion is set forth below.

I. INTRODUCTION

The United States and Texas previously prepared an integrated case in chief – with several jointly designated witnesses – in which their positions aligned on many issues. That alignment included the shared position that New Mexico had breached the Rio Grande Compact (Compact) by allowing groundwater pumping that far exceeded that which existed when the States signed the Compact in 1938 and that the increased pumping intercepted and interfered with the Rio Grande Project’s (Project) delivery of water below Elephant Butte Reservoir. Both Texas and New Mexico developed separate and competing numerical models to show the effect of groundwater pumping on Rio Grande surface flows and surface water

¹ Document numbers for documents filed before August 28, 2024, are to the Eighth Circuit docket reflected on that Court’s website, whereas document numbers for documents filed on or after August 28, 2024, are to the Third Circuit docket on PACER established after the appointment of Special Master D. Brooks Smith as Special Master.

deliveries from the Project. The United States designated expert testimony using Texas's model.

But the prior alignment in positions between the United States and Texas has now fundamentally changed. Rather than supporting a 1938 condition as the measure of New Mexico's Compact compliance, Texas has changed its position. The United States understands that Texas now contends that the applicable baseline for measuring New Mexico's Compact compliance is the "D2 Period" of 1951 to 1978. The D2 Period saw a dramatic increase in groundwater pumping in New Mexico.

With this fundamental change in alignment between the United States and Texas, the United States now seeks to address the likelihood that Texas no longer intends to introduce much of its previously developed expert testimony concerning the effects of increased groundwater pumping. The United States therefore makes a modest request – that it be permitted to expand the scope of Dr. Ferguson's previously designated expert testimony to include the matters addressed and disclosed by the Declaration. Given the limited time before trial resumes in June, the United States has determined that the schedule likely would not allow a more extensive reopening of supplemental expert disclosures – complete with a supplemental expert report from the United States, a potential rebuttal report from the States, and accompanying discovery – as it had previously contemplated.

The United States has good cause for its request. First, it can show reasonable diligence in making this request and that the request resulted from the act of another party – namely, Texas’s change in position. The United States stated the potential need for the supplementation of its expert disclosures at both status conferences before the Special Master in light of the change in alignment between the United States and Texas and promptly moved for its requested relief as directed by the Special Master shortly after the most recent conference.

Second, no party can show prejudice from this request. The United States filed the Declaration on January 20, 2023, Doc. 754, and the States responded to the Declaration over two years ago through a declaration that they attached to their joint reply in support of the States’ proposed consent decree, filed February 3, 2023. Doc. 755 (Second Declaration of Gregory K. Sullivan, P.E. In Support of Joint Motion of the State of Texas, State of New Mexico, and State of Colorado for Entry of Consent Decree Supporting the Rio Grande Compact). In fact, the Declaration has already been presented to the Supreme Court in connection with its review of the United States’ exception to the States’ proposed consent decree as part of the record before the Special Master and the Court, Doc. 754, and through its citation in the United States’ exception brief. *See* Doc. 787 at 7-8, 22 (Exception of the U.S. and Brief in Support). Further, the United States does not seek to introduce any new modeling or methodologies. Rather, the Declaration

uses New Mexico’s own modeling and expert analysis – without mounting any critique of that modeling – to show the increase in groundwater pumping in New Mexico that occurred during and after the D2 period and the resulting effects on Project deliveries. There is no harm in allowing this same testimony to be developed through trial, and the States cannot reasonably oppose the use of New Mexico’s own modeling results in support of the United States’ case in chief.

Finally, the parties should develop a robust factual record for the Supreme Court’s review of the merits of this case. The Declaration reports what New Mexico’s modeling shows as to particular questions of relevance to the United States’ claim. Denying the United States the opportunity to present these results would risk producing an under-developed trial record.

The United States has shown good cause for expanding the scope of Dr. Ferguson’s expert testimony to include the matters addressed by the Declaration.

II. PROCEDURAL BACKGROUND

In its trial brief filed before the commencement of the trial in October 2021, the United States reported that “[t]he United States and Texas are presenting an integrated case-in-chief due to the overlapping allegations in their claims.” Doc. 600 (U.S. Trial Brief) at 5. The United States also described the coordinated lay and expert witness testimony that it and Texas would present. *See id.* (“In the fall session, the United States and Texas will present testimony and evidence to

establish the current and historical operation of the Project.”); *id.* at 6 (“In the spring session, the United States and Texas will present expert witness testimony demonstrating the extent to which groundwater pumping within New Mexico has interfered with Project operations on an annual and long-term basis. The United States will present rebuttal testimony during this phase of trial to address the expert opinion testimony offered by New Mexico to support its allegations about the 2008 Operating Agreement in its counterclaims against Texas.”).

Consistent with that trial plan, the United States and Texas submitted joint witness lists just prior to the commencement of trial in October 2021. *See* Doc. 598 (Texas and United States’ Joint Witness List for the October 4, 2021 Trial Setting); Doc. 587 (Texas and U.S. Proposed Witness Lists for 2021 Fall Setting). Texas’s more detailed disclosure of the anticipated substance of its witnesses’ testimony, filed August 25, 2021, likewise commingled the listing of its experts with those of the United States. Doc. 568, Exhibit A (Texas’s Final Trial Witness List); *cf.* Doc. 564 at 4 (U.S. Pretrial Conference Statement) (reserving “the right to call any of the witnesses identified by any other party, including expert witnesses who have been listed either in other parties’ expert disclosures, their disclosures pursuant to Rule 26(a), their discovery responses, or their pretrial statements”).

The United States and Texas both argued for a 1938 baseline condition in their trial briefs. *See, e.g.*, Doc. 600 (U.S. Trial Brief) at 1 (“At trial, the United

States will show that New Mexico is not fulfilling its duty under the Rio Grande Compact because it is not administering state law to protect Project return flows and hydrologically connected groundwater from the influence of groundwater pumping developed after 1938.”); Doc. 602 at 11 (Texas’s Trial Brief) (“[T]he Compact’s underlying assumptions are that (1) depletions in Rio Grande flow in the upstream states including New Mexico would not exceed those occurring prior to 1938 or compromise downstream uses as of 1938 Thus, the Rio Grande water available to Texas as of 1938 – i.e., Reservoir releases, return flows, drainage water, and tributary groundwater captured in drains – would continue to be available to Texas without further depletion by new and additional uses in New Mexico.”).

The United States’ argument for a 1938 baseline reflected the United States’ longstanding position in this case. In its 2024 opinion, the Supreme Court affirmed that the United States’ and Texas’s complaints both encompass a 1938 baseline:

The States and the dissent also assert that the United States failed to allege a “1938 baseline”—a shorthand for the claim that New Mexico’s groundwater pumping should be restricted to levels in effect when the Compact was enacted. See Joint Reply 36-37; *post*, at 1781-1785, and nn. 2-3 (opinion of GORSUCH, J.). But that argument, too, is foreclosed by our prior decision. There, we explained that Texas had alleged New Mexico was “breaching its Compact duty” by allowing downstream water “users to siphon off water . . . in ways the Downstream Contracts do not anticipate.” *Texas*, 583 U.S., at 411; see Texas’s Complaint 10, ¶18 (alleging that current pumping “changed the conditions that existed in 1938”). And we recognized that the United States asserted “essentially the same claims Texas

already has.” *Texas*, 583 U.S., at 409; see *id.*, at 411 (United States’ claims “parallel Texas’s”); *id.*, at 415 (United States seeks “substantially the same relief” as Texas). Whether the United States’ complaint uses the term “1938 baseline” is beside the point. Both Texas and the United States pleaded that New Mexico was violating the Compact by pumping more groundwater than the Compact contemplates, and that is still the claim that the United States wishes to pursue now.

Texas v. New Mexico, 602 U.S. 943, 958 (2024); see also *id.* at n. 3 (rejecting assertion that the United States ever disclaimed a 1938 baseline). And since the filing of the United States’ complaint, the United States has repeatedly argued for a 1938 baseline. See, e.g., Doc. 207 at 9 (U.S. Response to Legal Motions of Texas and New Mexico Re: Issues Decided in This Action); Doc. 414 at 25; Doc. 600 at 3-5 (U.S. Trial Brief).

In support of their parallel claims, the United States and Texas developed complementary expert testimony. Texas developed a groundwater model and expert reports/disclosures using that model, which analyzed the depletive effects of groundwater pumping on the Rio Grande below Elephant Butte. In turn, the United States retained Stetson Engineers Inc. to produce an original report dated May 31, 2019, and a supplemental report dated September 17, 2019, evaluating the Texas model and discussing its quantitative results. The United States also designated Dr. Ferguson as a non-retained expert witness on the current operations of the Project, as well as an expert rebuttal witness responding to the reports and opinions of New Mexico’s designated modeling experts. The United States’ pre-

trial conference witness listing for Dr. Ferguson stated that his testimony would generally encompass “facts and opinions relating to Rio Grande Project water supply and operations, including Project allocation and accounting; groundwater/surface-water interactions within and in the vicinity of the Project, including the impacts of groundwater pumping in New Mexico and Texas on Project deliveries; water demand and factors related to water demand below Elephant Butte Reservoir; and hydrogeologic modeling.” Doc. 564 (U.S. Pretrial Conference Statement), Attachment A at 3. Finally, the United States designated the consulting engineers for the Project’s two irrigation districts – Dr. Al Blair and Dr. Phillip J. King – and Michelle Estrada-Lopez of the Bureau of Reclamation as non-retained expert witnesses. *Id.* at 2-4.

This was the state of affairs throughout pretrial proceedings, including when the prior Special Master set a September 30, 2020 deadline for supplemental expert disclosures. Doc. 390 at 2 ¶ A.3. It remained the state of affairs throughout the first phase of trial completed from October 4 to November 10, 2021, which included testimony from 27 fact witnesses and expert historians. *See* Doc. 701 (trial transcript compilation). But the coordinated approach developed by the United States and Texas abruptly ended with the States’ submission of their proposed consent decree in November 2022 (Doc. 720) – before the commencement of the second part of the liability phase that was to include expert

testimony about the effect of New Mexico groundwater pumping on Project operations and deliveries.

The United States understands that Texas and the other States now all support the D2 Period as the baseline against which New Mexico's Project interference is to be measured. This contrasts with Texas's position as recently as February 3, 2023, when it filed a brief in support of the proposed consent decree stating that if this case were to return to trial, its "position will be that the 1938 condition should be the proper baseline." Doc. 756 at 8.

In light of this change in Texas's position, counsel for the United States at the October 23, 2024 status conference stated that it should have the opportunity to develop supplemental expert testimony because of the fundamental change in alignment between the United States and Texas. Doc. 22 at 125:19-126:19; 127:3-23 (October 23, 2024, Status Hearing Transcript). Counsel for the United States made similar representations at the February 27, 2025 status conference.

In response to those representations and following that status conference, the Special Master set a March 10 deadline for the United States to file "a brief motion and accompanying supporting memorandum to reopen discovery." Doc. 29 at 3, ¶ 4. The order directed that "[i]n such motion, the United States shall: show good cause for reopening discovery; explain why such discovery has not been conducted to date; and identify what form of discovery is requested." *Id.* That order also set

June 9, 2025 as the date for the resumption of trial. *Id.* at 2, ¶ 1. Finally, that order recognized the optimism expressed by the parties “that they had identified a path toward settlement,” but that “more work needed to be done, especially with regard to aspects of any potential agreement which will require input and advice from technical experts.” *Id.* at 2. Accordingly, the order recognized that mediation efforts among the parties would continue concurrently with trial preparation. *Id.*

Against this background, the United States submits the present motion. To be clear, as the United States stated at the February 27 status conference, it does not seek additional discovery but instead seeks something much more modest – the expansion of Dr. Ferguson’s expert testimony to include the matters previously disclosed by the Declaration.

III. LEGAL STANDARDS

A. Extension of Expert Disclosure Deadline

“[T]he Federal Rules are only a guide to procedures in an original action.” *Arizona v. California*, 460 U.S. 605, 614 (1983), decision supplemented, 466 U.S. 144 (1984); *see also* Sup. Ct. R. 17.2 (In original actions, the Federal Rules of Civil Procedure are “followed” only with respect to “[t]he form of pleadings and motions,” and “[i]n other respects . . . may be taken as guides”). Subject to that limitation, Federal Rule of Civil Procedure 16(b)(4) states that “[a] schedule may be modified only for good cause and with the judge’s consent.” Fed. R. Civ. P.

16(b)(4). The Special Master similarly directed that the United States must show “good cause” for its motion. Doc. 29 at 3, ¶ 4.

The precise circumstances constituting “good cause” vary from case to case, and a court may consider a variety of factors:

What constitutes good cause sufficient to justify the modification of a scheduling order necessarily varies with the circumstances of each case. Nonetheless, some description of the kinds of considerations that courts have found persuasive may be useful. In general, if the party seeking relief can show that the deadlines cannot reasonably be met despite the party’s diligence, relief may be given. Similarly, relief may be granted if the court finds that the movant has not unduly delayed the action and that the opponent will not be prejudiced by the modification. When the modification is necessitated by acts of the opposing party or by the opponent’s failure to act, relief also has been deemed appropriate. Applying these principles, courts have allowed scheduling orders to be amended so as to permit amended pleadings alleging new claims, to extend discovery deadlines, to allow dispositive motions to be filed after the deadline, and in many other situations illustrated by the cases set out in the note below.

Wright & Miller, 6A Fed. Prac. & Proc. Civ. § 1522.2, Modifying Scheduling Orders (3d ed. June 2024) (footnotes omitted).

B. The Supreme Court favors the development of a full factual record in original jurisdiction cases

Alongside the foregoing considerations, the Supreme Court in *Florida v. Georgia*, 585 U.S. 803, 819 (2018), emphasized the need for a “full range of factual findings” in original jurisdiction cases. The Court explained:

Without the full range of factual findings, we have said, the Court may lack an adequate basis on which to make “the delicate adjustment of interests” that the law requires. *Nebraska v. Wyoming*, *supra*, at 618;

Washington v. Oregon, 297 U.S., at 519, 523-524 (emphasizing that “the Master’s Report, which finds the facts fully”); see also *Colorado I, supra*, at 183, 189-190 (remanding “with instructions to the Special Master to make further findings of fact”); *Colorado II*, 467 U.S., at 312-315 (explaining that because “the Master’s report [was] unclear,” the Court remanded to the Special Master “for additional factual findings on five specific issues” even after “a lengthy trial at which both States presented extensive evidence” in order “to assist this Court in balancing the benefit and harm”); *Texas v. New Mexico*, 462 U.S. 554, 575-576, and n. 21 (1983) (“[W]e return this case to the Special Master for determination of the unresolved issues framed in his pretrial order”); 3 A. Kelley, *Water and Water Rights* § 45.02(c), p. 45-14 (3d ed. 2018) (“If the factual findings in the report are insufficient for the Court to decide whether the master correctly applied the doctrine of equitable apportionment, the Court may refer the case back to the master for additional findings”).

Consistent with that opinion, the Supreme Court in 2004 issued a *Guide for Special Masters in Original Cases Before the Supreme Court of the United States* that likewise affirms the importance of developing a robust evidentiary record:

- “It is very important that the Master . . . ensure that a record is developed that will provide the Court with all the information it needs.” *Guide for Special Masters in Original Cases Before the Supreme Court of the United States* at 6.
- “Since Masters are neither ultimate factfinders nor ultimate decisionmakers, they should err on the side of overinclusiveness in the record.” *Id.* at 9.

In accordance with this guidance, Special Master Siler of the Sixth Circuit in *Mississippi v. Tennessee*, 595 U.S. 15 (2021), erred on the side of overinclusiveness when it came to evidence in a series of rulings in that case:

- “To determine how to rule, the Special Master may use the Federal Rules of Evidence as a guide. Supreme Court Rule 17(2). As always, however, the

Special Master will err on the side of overinclusiveness.” No. 143, Original, Report of the Special Master, dated Nov. 5, 2020, at 9.

- “[T]his case will proceed to an evidentiary hearing to build a robust record for the Supreme Court’s review.” Doc. 93 at 3 (Ruling on Defendants’ Motion for Summary Judgment) (Nov. 29, 2018); *see also id.* at 27 (“Original Actions require a robust record for the Supreme Court’s review.”).
- “Special Masters have only the authority to provide recommendations for findings of fact and law that the Court must then adopt or reject. Accordingly, they have been advised to err on the side of over-inclusiveness in the record for the purpose of assisting the Court in making its ultimate determination.” Doc. 55 at 35-36 (Ruling on Motions to Dismiss) (Aug. 12, 2016).

IV. ARGUMENT

Before the recent status conference, the United States contemplated requesting more extensive relief – namely, leave to submit a supplemental expert report to address subject matter that the United States understands Texas no longer intends to present due to its change in position. In addition to the time it would take the United States’ expert to prepare such a report and for the States to complete discovery on that report, seeking such leave could foreseeably result in the States being granted leave to submit a rebuttal report, together with additional discovery. That process could easily take several months, and possibly longer.

But things have now changed. Under the current schedule, the United States and the other parties have approximately three months to attempt to resolve the remaining issues among them through mediation while concurrently preparing for

the resumption of trial on June 9. The United States and New Mexico estimate that these settlement efforts alone – particularly the technical issues that they need to address between them and the Project’s irrigation districts – will take approximately three months, even with their commitment to meeting on a weekly basis and more frequently in smaller technical groups. These mediation efforts involve the same counsel and technical representatives for the parties who will simultaneously be preparing for trial. This leaves little to no time for additional litigation activities, including for the preparation of a supplemental expert report, rebuttal report(s), and resulting discovery, as the United States had previously contemplated seeking. Rather than attempting to complete what could prove infeasible, the United States makes a much simpler and unburdensome ask – leave to expand the scope of Dr. Ferguson’s testimony to include the matters he addressed in his Declaration in January 2023.

The United States has good cause for its request. The United States can readily show “diligence,” that the need for the requested relief was “necessitated by acts of the opposing party,” and that it has not “unduly delayed the action.” Wright & Miller, 6A Fed. Prac. & Proc. Civ. § 1522.2. As explained above, the United States’ modeling expert prepared a report evaluating Texas’s model. Now, due to Texas’s change in position, it is not clear how, or even if, Texas will introduce its model or what it will use that model to show. Texas’s change in

position is what necessitated this motion.

Nor has the United States unduly delayed making this request. Following the remand of this case in June 2024 and the appointment of the new Special Master in August 2024, the United States stated at both ensuing status conferences its potential need to develop additional expert testimony in light of its change in alignment with Texas. With the setting of a June trial date following the February 27, 2025 status conference, the United States promptly filed this motion in accordance with the schedule set by the Special Master. The United States did not previously file a motion, consistent with the Special Master's indication at the October 23, 2024 status conference that he was inclined to grant a limited stay of the case for purposes of conducting mediation. Doc. 22 at 94:14-20 (October 23, 2024, Status Hearing Transcript). There has been no unreasonable delay.

The United States can also show that the other parties – including particularly New Mexico as the only defendant to the United States' complaint – will not be “prejudiced” by the requested relief. Wright & Miller, 6A Fed. Prac. & Proc. Civ. § 1522.2. The United States proposes using the existing Declaration – as opposed to a new expert report – to avoid the difficulties and additional burdens on the parties that would likely result from trying to complete the latter approach under the current schedule. Further, New Mexico and the other States have had the Declaration for over two years, they have submitted a responsive declaration to it

in support of their proposed consent decree, and the Declaration uses New Mexico's own modeling results rather than seeking to introduce new methodologies or model runs. This negates any claims of prejudice that New Mexico or the other States might allege. And again, the Supreme Court had the Declaration before it when it reviewed the States' proposed consent decree.

The States themselves have previously supported allowing supplemental disclosures and limited discovery in connection with their proposed consent decree. In their October 4, 2024 joint status report, the States proposed that they be permitted to "submit disclosures to supplement the declarations that they have already submitted" in support of their proposed consent decree, that the United States have the opportunity to submit supplemental disclosures opposing the proposed decree, and that there be a limited period of discovery on the proposed decree. Doc. 9 at 21-22; *see also* Doc. 19 (States' Joint Suppl. Status Report) at 5-6. The United States should have the same opportunity to use the Declaration in support of its case in chief on liability. In fact, the United States' request is narrower than that previously proposed by the States, as it will not result in new disclosures and should not necessitate discovery because it uses New Mexico's own modeling results.²

² New Mexico did allege two errors in the Declaration in its responsive declaration. Doc. 755, Exhibit G at 5, ¶ 15 and n.1; *id.* at 6, ¶ 18 and n.2. But these minor numerical discrepancies do not provide a basis for re-opening discovery.

Finally, the requested relief will serve the Supreme Court’s interest in having a full evidentiary record to resolve this case. New Mexico previously recognized the importance of developing an expansive record in original actions in opposing a motion in limine filed by the United States. *See* Doc. 554 at 1 (New Mexico Response in Opp. to U.S. Motion in Limine Re: Dismissed Counterclaims) (“The Court, ‘in original actions, passing as it does on controversies between sovereigns which involve issues of high public importance, has always been liberal in allowing full development of the facts.’”) (citing *United States v. Texas*, 339 U.S. 707, 715 (1950)). New Mexico argued that this principle favored a generous standard for the admissibility of evidence in original actions “‘in order to enable both parties to present their respective claims in their full strength.’” *Id.* (quoting *Rhode Island v. Massachusetts*, 39 U.S. 210, 257 (1840)). This same principle favors granting the United States’ motion.

Granted, the United States is not without expert testimony to support its affirmative case. The United States’ previously disclosed expert testimony – including Stetson Engineer’s expert disclosures using Texas’s model, Dr. Ferguson’s expert disclosure concerning Project operations, and Dr. Ferguson’s rebuttal testimony to New Mexico’s expert modeling reports – remains available for use at trial. But expanding the scope of Dr. Ferguson’s testimony to include the matters contained within the Declaration would help the United States address

Texas's change in position concerning a 1938 condition. Though the Declaration does not use the modeling results from Texas's previously developed testimony, it does reflect similar results, albeit using New Mexico's model. Allowing the introduction of this additional testimony – the content of which has previously been presented to the Supreme Court through the Declaration – will more readily fit within the existing schedule and serve the Court's interest in reviewing a more robust evidentiary record.

V. CONCLUSION

For the foregoing reasons, the United States respectfully requests leave to expand the scope of Dr. Ferguson's previously disclosed expert testimony to include the matters addressed and already disclosed by the Declaration.

Respectfully submitted this 10th day of March, 2025.

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STATE OF TEXAS,

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v.

**STATE OF NEW MEXICO and
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Defendants

UNITED STATES OF AMERICA,

Intervenor.

CERTIFICATE OF SERVICE

This is to certify that on the 10th day of March, 2024, I caused a true and correct copy of the **UNITED STATES' MOTION FOR LEAVE TO DESIGNATE SUPPLEMENTAL EXPERT TESTIMONY** to be served on the parties and filed with the Special Master through the Third Circuit Case Management and Electronic Case Filing (CM/ECF) System.

Respectfully submitted,
/s/ Thomas K. Snodgrass
Thomas Snodgrass, Senior Attorney

No. 141, Original

**In the
SUPREME COURT OF THE UNITED STATES**

STATE OF TEXAS,
Plaintiff,

v.

STATE OF NEW MEXICO and
STATE OF COLORADO,
Defendants,

UNITED STATES OF AMERICA,
Intervenor.

**ATTACHMENT A TO
UNITED STATES' MOTION FOR LEAVE TO DESIGNATE
SUPPLEMENTAL EXPERT TESTIMONY**

No. 141, Original

**In the
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STATE OF TEXAS,

Plaintiff,

v.

**STATE OF NEW MEXICO and
STATE OF COLORADO,**

Defendants

OFFICE OF THE SPECIAL MASTER

**DECLARATION OF IAN M. FERGUSON, Ph.D., P.E.
IN SUPPORT OF THE UNITED STATES' OPPOSITION TO PROPOSED DECREE**

I, Dr. Ian M. Ferguson, declare as follows:

1. I am over 18 years of age and have personal knowledge of the facts stated herein.
2. I earned a Bachelor of Science and Engineering degree (with Honors) in Civil and Environmental Engineering from Princeton University and a Master's and Doctorate in Civil and Environmental Engineering from the University of California at Berkeley. My Ph.D. work involved analysis of regional drought conditions.

3. From 2005 to 2008, I was a Student Employee Graduate Research Fellow at Lawrence Livermore National Laboratory, where my work focused on evaluating the influence of ocean-atmosphere interactions on regional precipitation and drought characteristics and quantifying the potential predictability of regional drought events at seasonal-to-interannual timescales.

4. From 2008 to 2009, I was a Lawrence Scholar at Lawrence Livermore National Laboratory, where my work focused on validating simulated hydroclimatic variability and ocean-atmosphere interactions in global climate models and using global climate models to evaluate potential impacts of climate change on large-scale precipitation patterns and regional drought characteristics.

5. From 2009 to 2011, I was a postdoctoral research fellow at the Colorado School of Mines, where my work focused on the development and application of integrated hydrologic models to evaluate the impacts of climate change, land use change, and water management practices on surface water and groundwater resources and groundwater/surface-water interactions.

6. Since 2011, I have been employed as a hydrologic civil engineer at the Bureau of Reclamation's Technical Service Center in Denver, Colorado. During my career with the Technical Service Center, I have provided technical support for planning and operation of Reclamation projects in California, Oregon, Washington, New Mexico, Texas, Colorado, Nebraska, Kansas, and Oklahoma. I have developed and applied surface water, groundwater, and water operations models, including models that simulate the operation of river and reservoir systems, surface water irrigation systems, and conjunctive management of surface water and groundwater.

7. Since 2011, I have provided ongoing technical support related to planning and operation of the Rio Grande Project. My technical support has included: the compilation and review of historical Project records; analysis of historical Project operations; review and evaluation of previous modeling and analysis of the Project area; development and application of models of the Project area; and review and analysis of proposed changes to Project allocation and accounting procedures, among other tasks.

8. Since 2013, I have served as Reclamation's technical lead on the development of two hydrologic models of the Rincon and Mesilla Basins in collaboration with the U.S. Geological Survey: the Rincon and Mesilla Basins Hydrologic Model (RMBHM), completed in 2015, and the Rio Grande Transboundary Integrated Hydrologic Model (RGTIHM), completed in 2018 and subsequently updated in 2020 and 2022. Both models simulate Project releases, diversions, deliveries, and return flows, groundwater pumping for irrigation and non-irrigation uses, and groundwater/surface-water interactions within the Rincon and Mesilla Basins.

9. My involvement in *Texas v. New Mexico*, Original No. 141 began in 2014, when I was assigned to provide technical support for the litigation. I was disclosed as an expert witness for the United States in 2019. My deposition was taken on February 19 and 20, 2020. The opinions and subject matter of my expected testimony are included in United States' Trial Exhibit Nos. 283, 284, 296, 297, 299, and 301. My curriculum vitae and list of my publications are United States' Trial Exhibit Nos. 302 and 303, respectively.

10. I have reviewed the Supreme Court's 2018 decision in this case and the Special Master's Order of May 21, 2021.

11. I have reviewed the filings made by the States on November 14, 2022, including the proposed consent decree and the declarations of Robert Brandes, William Hutchinson, Margaret

Barroll, Gregory Sullivan, Michael Hamman, and Robert Skov. I have also reviewed the attachments to those declarations. I am familiar with all of the technical and operational components of the proposed decree, including but not limited to the Effective El Paso Index, the Departure Limits, Management Triggers, and the changes to Project operations, allocations, and accounting outlined in Section 8 of Appendix 1. I am also familiar with the data and methods that were used to develop the Index.

12. I have been asked to provide a declaration stating my opinions regarding the hydrologic conditions and state of water use in the Rincon and Mesilla Valleys in 1930s as compared to those during the period 1951-1978, referred to as the D2 Period; impacts of those changes on Project surface water supplies; and implications of those impacts with respect to the States' proposed decree. This declaration presumes familiarity with the general history and operation of the Project as described by the Supreme Court and the Special Master's Order of May 21, 2021 Order.

Hydrologic Conditions and Water Use during the 1930s

13. The 1930s were generally characterized by average to above average hydrologic conditions. During this time, Project releases were measured from the Rio Grande Below Elephant Butte Dam gage from 1930 to 1937, and measured from the Rio Grande Below Caballo Dam gage beginning in 1938. Analysis of daily flow records from these gages shows that annual Project releases during the 1930s ranged from approximately 636,000 acre-feet in 1934 to more than 831,000 acre-feet in 1932, with an average annual release of approximately 771,000 acre-feet. Rio Grande Project History reports from the 1930s show that Project releases were sufficient to provide a final allotment to Project lands of at least 3.0 acre-feet per acre in all years 1930 to 1939.

14. The Rio Grande Joint Investigation in the Upper Rio Grande Basin (Joint Investigation) evaluated and characterized water uses throughout the Basin in the 1930s, including water use for irrigation and non-irrigation purposes in the Rincon and Mesilla Valleys. Data collection and analysis were completed in 1936-1937 and a final report detailing the study's key findings and conclusions was published in February 1938 ("Joint Investigation Report" or "JIR").

15. At the time of the Joint Investigation, irrigation was by far the dominant water use in all sections of the Basin [JIR at p. 87]. Irrigation water in the Elephant Butte-Fort Quitman section of the Basin, which includes the Rincon and Mesilla Valleys, was supplied by the Project.

16. There was no appreciable groundwater pumping for irrigation below Elephant Butte Reservoir and "no immediate probability of extensive ground-water development as a basic supply" for irrigation in this section of the Basin [JIR at p. 55-56].

17. The JIR states that there was a small amount of groundwater pumping associated with domestic uses in the villages and towns between San Marcial, New Mexico and the Texas state line, which resulted in an estimated stream depletion of approximately 2,400 acre-feet annually [JIR at p. 105].

18. At the time of the Joint Investigation, drainage return flows were recognized and understood to be an important source of water within the Basin and specifically within the Project [JIR at p. 47-49]. During the period 1930-1936, approximately half of Project's net diversions returned to the Rio Grande as drainage return flows [JIR at Table 45] and drainage return flows made up approximately 17% of the Project's total net diversions [JIR at Table 90]. The JIR further noted that the portion of Project net diversions made up of drainage return flows

increased with distance downstream, with more than 35% of net diversions in the upper El Paso Valley (Franklin Canal) and more than 57% of net diversions in the lower El Paso Valley (Tornillo Canal) made up of drainage return flows [JIR at Table 90].

19. The Special Master's May 21, 2021 Order and the expert witnesses for the parties have also recognize that drainage return flows were an important component of the Project's water supply and that groundwater pumping for irrigation and other uses in New Mexico below Elephant Butte was minimal prior to the 1950s.

Hydrologic Conditions and Water Use during the D2 Period (1951-1978)

20. In contrast to the 1930s, the D2 Period was generally characterized by dry hydrologic conditions with below normal reservoir inflow, storage, and releases. Analysis of daily flow records for the Caballo gage shows that annual Project releases ranged from approximately 206,000 acre-feet in 1964 to 737,100 acre-feet in 1958, with an average annual release of approximately 506,000 acre-feet.

21. The D2 Period was also characterized by extensive development of groundwater in the Rincon and Mesilla Valleys. This development is characterized in the C.S. Conover reports of 1947 and 1954, in Project Histories, and in Project investigations from this era. In the 1940s, irrigators within the Project began to drill irrigation wells in response to declining inflows and storage in Elephant Butte Reservoir and Caballo Reservoirs, and projections of low surface water supplies [Conover 1954; Gunaji 1967; Expert Report of Margaret Barroll, Ph.D., October 31, 2019]. The well-drilling and development of groundwater as a source for irrigation water accelerated in 1951, when drought conditions resulted in reduced Project surface water supplies [Expert Report of Margaret Barroll, Ph.D., October 31, 2019].

22. New Mexico's modeling and expert analysis indicates that groundwater pumping for irrigation within Elephant Butte Irrigation District (EBID) exploded from less than 5,500 acre-feet in 1949 to approximately 94,000 acre-feet in 1951 and 290,000 acre-feet by 1956. Groundwater pumping remained entrenched as a source of supply even when conditions improved. Over the entire D2 period of 1951 to 1978, average annual groundwater pumping within EBID exceeded 150,000 acre-feet per year. Annual pumping exceeding 100,000 acre-feet 20 out of 28 years during this period. [Expert Report of Gregory K. Sullivan and Heidi M. Welsh (2nd Edition), July 15, 2020].

23. In addition to groundwater pumping *within* EBID, groundwater development in New Mexico *outside* of EBID increased significantly during the D2 Period, both for irrigation and for other purposes. Irrigated lands outside of EBID do not receive surface water from the Project; these lands are irrigated solely using groundwater and are referred to by New Mexico as "groundwater-only lands" or "primary groundwater lands." New Mexico's modeling and expert analysis does not reflect any groundwater-only lands in the Rincon and Mesilla Valleys in New Mexico prior to 1948.

24. New Mexico's modeling and expert analysis shows that between 1948 and 1950, approximately 1,200 acres of groundwater-only lands were developed in this area, and by 1955, there were more than 4,200 acres of groundwater-only lands. New Mexico's experts estimate that the average annual groundwater pumping for irrigation of groundwater-only lands in New Mexico during the D2 Period was more than 14,800 acre-feet per year. The acreage of groundwater-only lands and corresponding consumptive use in Texas remained negligible throughout the D2 Period [Expert Report of Gregory K. Sullivan and Heidi M. Welsh (2nd Edition), July 15, 2020].

25. The New Mexico modeling and expert analysis also show that annual groundwater pumping in New Mexico in the Rincon and Mesilla Valleys for DCMI uses increased from less than 750 acre-feet per year in 1940, to approximately 2,800 acre-feet in 1950, to approximately 20,000 acre-feet per year by the end of the D2 Period in 1978 [Expert Report of Gregory K. Sullivan and Heidi M. Welsh (2nd Edition), July 15, 2020].

26. As a result of drought conditions and the reduction in Project surface water supplies due to groundwater pumping, Project releases were sufficient to provide a final allotment to Project lands of 3.0 acre-feet in only 10 out of the 28 years in the D2 Period, with reduced allotments in the remaining 18 years, as reflected in the Project Histories from this period.

Impacts on Project Water Supply

27. Groundwater pumping in the Rincon and Mesilla Valleys reduces Project surface water supplies by reducing drainage return flows and reducing seepage gains to, or increasing seepage losses from, the Rio Grande.

28. The effects of groundwater pumping on available surface water supplies were recognized in the Joint Investigation. The JIR states that “in general, extensive development of ground water for irrigation would add no new water to the Upper Rio Grande Basin and that recharge of the ground-water basins would necessarily involve a draft on surface water supplies which are now utilized otherwise” [JIR at p. 56]. The authors of the JIR thus understood that rather than providing additional supply to the basin, use of groundwater would instead reduce the available surface water supply [JIR at p. 56].

29. Table 1 (below) summarizes the impacts of New Mexico groundwater pumping in the Rincon and Mesilla Valleys on average annual gross diversions to EBID and EPCWID and average annual streamflow at the Rio Grande at El Paso gage over the D2 Period. I calculated

the figures in Table 1 using data from two simulations of New Mexico's Integrated Lower Rio Grande Model (ILRGM): "Historical Base Run" (Run 1) and "NM Pumping Off" (Run 3) [Rebuttal Expert Report of Gregory K. Sullivan and Heidi M. Welsh (2nd Edition), September 15, 2020]. The difference between Run 1 and Run 3 can be interpreted as the impact of New Mexico groundwater pumping [Expert Report of Gregory Sullivan and Heidi Welsh (2nd Edition), July 15, 2020].

30. Under the "NM Pumping Off" condition (Run 3), average annual diversions to EBID during the D2 Period increase by 52,204 acre-feet per year (+14%) and average annual diversions to EPCWID increase by 34,639 acre-feet per year (+14%) compared to the "Historical Base Run" (Run 1). Average annual streamflow at the Rio Grande at El Paso gage ("El Paso gage") increased by 63,548 per year (+25%) compared to the Historical Base Run. New Mexico's modeling results demonstrate that groundwater pumping in New Mexico substantially reduced Project diversions and streamflows at the El Paso gage during the D2 Period.

Table 1: Simulated Average Annual Diversions and Streamflows: 1951-1978

	Historical Base Run (Run 1)	NM Pumping Off (Run 3)	Difference (Run 3 - Run 1)	Percent Difference
Gross Diversion to EBID	382,246	434,450	52,204	+14%
Gross Diversion to EPCWID	247,087	281,726	34,639	+14%
Flows at El Paso gage	251,613	315,161	63,548	+25%

31. The modeling results summarized in Table 1 represent the impacts of groundwater pumping under the hydrologic conditions and water uses during the D2 Period. As discussed above, the D2 Period was characterized by dry hydrologic conditions and extensive groundwater development in New Mexico. However, New Mexico's modeling and analysis demonstrate that New Mexico groundwater pumping in the Rincon and Mesilla Valleys is not limited to dry

hydrologic conditions and also impacts Project surface water supplies under wetter hydrologic conditions.

32. The period 1979-2002, for example, was characterized by persistently wet conditions with above normal reservoir inflow, storage, and releases. Despite persistent wet conditions, New Mexico's modeling and expert analysis shows that New Mexico groundwater pumping in the Rincon and Mesilla Valleys remained prevalent throughout this period. New Mexico modeling and expert analysis show that the average annual groundwater pumping within EBID during this period was greater than 47,000 acre-feet per year. While this is far less than the average annual pumping within EBID during the D2 Period (which exceeded 150,000 acre-feet per year), it is far greater than the amount of pumping within EBID during the 1930s, which was negligible and potentially nonexistent. Moreover, New Mexico groundwater pumping for irrigation of groundwater-only lands in the Rincon and Mesilla Valleys increased from approximately 14,800 acre-feet per year during the D2 Period to approximately 17,250 acre-feet per year during the period 1979-2002, an increase of 2,450 acre-feet per year (+16%). Average annual groundwater pumping in New Mexico for DCMI uses showed an even greater increase from approximately 11,000 acre-feet per year during the D2 Period to approximately 30,000 acre-feet per year during the period 1979-2002, an increase of 19,000 acre-feet per year (+173%).

33. Under the "NM Pumping Off" condition (Run 3), average annual diversions to EBID during the period 1979-2002 increase by 2,049 acre-feet per year and average annual diversions to EPCWID increase by 11,105 acre-feet per year compared to the "Historical Base Run" (Run 1). New Mexico's modeling results thus demonstrate that New Mexico groundwater pumping in

the Rincon and Mesilla Valleys substantially reduced Project surface water supplies even under persistently wet hydrologic conditions.

Implications for the States' Proposed Consent Decree

34. The proposed consent decree defines the Compact apportionments to New Mexico and Texas below Elephant Butte based on the Effective El Paso Index ("EEPI" or "Index") [Decree at Appendix 1, Section 1]. The EEPI consists of the Index Obligation, Index Delivery, Index Departures, and other provisions.

35. Under the proposed decree, Texas's entitlement to water is defined by the Index Obligation, subject to Index Departures and other provisions of the decree [Decree at II.B.ii.b], and New Mexico's entitlement to water below Elephant Butte is the balance of water released from Caballo Dam and any other inflows in excess of the Index Obligation.

36. The Index Obligation was developed based on a regression analysis of measured and estimated data for the D2 Period of 1951-1978, including measured streamflows at the Rio Grande below Caballo Dam gage and at the El Paso gage [Decree at II.B.ii.e]. The Index Obligation is intended to reflect "the hydrologic conditions and the state of water use and groundwater development during the baseline D2 Period" [Declaration of Margaret Barroll, Ph.D., November 14, 2022 at ¶ 24], including the extensive development of groundwater for irrigation and non-irrigation uses in New Mexico during this period [Declaration of Margaret Barroll, Ph.D., November 14, 2022 at ¶ 26-27].

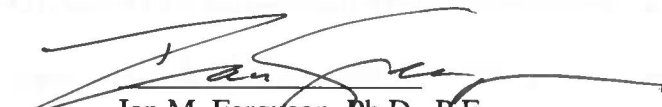
37. As discussed above, New Mexico groundwater pumping in the Rincon and Mesilla Valleys significantly reduced annual streamflow at the El Paso gage during the D2 Period of 1951-1978. Texas's entitlement to water under the proposed decree based on the Index Obligation therefore excludes the water that Texas would have received during the D2 Period but

for the impacts of New Mexico groundwater pumping. Conversely, New Mexico's entitlement to the "balance" of the water includes an entitlement to the post-Compact depletions of streamflow associated with New Mexico groundwater pumping during the D2 Period of 1951-1978.

38. Since 2003, the Project has experienced persistent dry conditions similar to – and by some measures, worse than – those during the D2 Period. New Mexico modeling and expert analysis show that, while groundwater pumping within EBID has returned to levels similar to the D2 Period, groundwater pumping by non-Project water users for irrigation of groundwater-only lands and for DCMI use have remained far above those during the D2 Period. New Mexico modeling results demonstrate that groundwater pumping by non-Project water users in New Mexico continues to reduce the Project surface water supply, including diversions to EBID and EPCWID and streamflows at the El Paso gage.

Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury that the foregoing is true and correct.

Executed this 20th day of January, 2023, at Golden, Colorado


Ian M. Ferguson, Ph.D., P.E.