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Date: September 3, 1993
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No of pages, including cover sheet: 5

COMMENTS: Reply of the United States to Kansas' and Colorado's responses to Special Master's 14 questions.
The Honorable Arthur L. Littleworth
Special Master
United States Supreme Court
Best, Best & Krieger
3750 University Avenue
Riverside, California 92502

Re:  State of Kansas v. State of Colorado,
No. 105 Original

Dear Mr. Littleworth:

The United States hereby responds to the August 24, 1993 letters of Colorado and Kansas.

QUESTION 7

Kansas' answer to question 7 reflects the difficult predicament Kansas has created for itself by trying to keep the status of the 1980 Agreement in limbo. The WWSP is inextricably tied to the 1980 Operating Agreement and helps to make extra water available to Kansas. We don't see how Kansas can accept a portion of the WWSP water stored under the 1980 Agreement and at the same time demand the same schedule of inflows that would have occurred had the WWSP not been implemented. While the WWSP does shift the timing of water use in the basin, a shift which the Kansas method tends to translate into depletions by removing accretions from its accounting, 1/ Kansas seems to have accepted

1/ A significant benefit of the 1980 Operating Agreement is the greater control and discretion it gives to each state over when and how water should be released; it follows that, given the choice, the states will shift water calls from months of low need to months of high need. The prejudice created by the procedure of eliminating accretions can be seen in Run 9 on Def. Exh. 916 (continued...
these shifts in timing as a fair trade-off for benefits it receives under the 1980 Operating Agreement.

QUESTION 9

In its response to Question 9, Colorado states that it did not quantify the amounts of transmountain return flow offset or the clear water effects. Colorado's response gives the impression that there is no evidence in the record quantifying the impacts of transmountain return flows. While we do not subscribe to the accuracy or reliability of the Kansas model for reasons given in our briefs, we do think you should be aware that there is evidence in the record quantifying transmountain return flows as calculated by that model. Run 8 of Def. Ex. 916, an exhibit prepared by Colorado using the Kansas Model, isolates the calculated stateline effects of transmountain water.

It is interesting to note that, as with model results for the isolated 1980 Operating Agreement, see n. 1, Run 8 illustrates how misleading and prejudicial it can be to arbitrarily remove accretions from the calculations. When the Kansas method of interpreting model results is applied to the isolated transmountain return flow run, the result is 18,527 acre feet of depletions. By contrast, when accretions and depletions are counted, the model calculates 220,102 acre feet of accretions, surely a more realistic representation of transmountain return flow effects on Kansas. See Def. Ex. 916.

1/ [...continued]

which isolates the effects of the 1980 Agreement. It is beyond dispute that the 1980 Agreement is a benefit to Kansas. Yet, Run 9 shows that when Kansas' procedure for interpreting model effects is applied, i.e., all months having accretions eliminated, the effect of the 1980 Agreement is computed to be a depletion of 117,165. By contrast, when accretions are included, the timing of which would in large part be determined by Kansas, the 1980 Agreement is shown to be a significant benefit to Kansas in the amount of 44,776 acre feet of accretions. Only by counting accretions can a realistic indication of the benefits of the 1980 Agreement be obtained.
QUESTION 10

In its answer to question 10, Kansas states that the "actual violation" of the Compact due to the WWSP is 40,000 acre feet, a figure taken from Pl. Ex. 111***. Kan. Ltr. at 5-6. We have already explained our views on the reliability of the Kansas model to calculate WWSP effects and will not repeat those points here. We will respond to Kansas' contention that the isolated effects shown on Pl. Ex. 111**, rather than a combined effects figure, is the relevant indicator of a Compact violation.

Our understanding of the common sense meaning of Article IV(D) of the Compact is that it prohibits "actual" rather than hypothetical depletions. Under this common sense meaning, new development will not violate the Compact, even if it has the isolated potential of reducing stateline flows, so long as any potential depletions are offset or compensated for at the stateline by additional water from other new development or other sources such as transmountain return flows. In other words, there is no Compact violation, and no liability, unless the combined effect of all operations, including new development, results in a material depletion of usable flow.

In its answer to question 10, Kansas asserts that the "actual" violations of the Compact are measured by the model runs which isolate the effects of pumping and the WWSP. There is no support for this approach. First, to the extent the effects of pumping or the WWSP are offset at the stateline by other water, such as the transmountain return flows, there is no Compact violation at all. Furthermore, the Kansas experts have testified that the "actual" effects of the WWSP and pumping on the stateline are not strictly cumulative when operated together. See, e.g., Tr. Vol. 89 at 75 (Spronk). Comparing the combined effects output on Pl. Ex. 111*** (489,000 acre feet) with the sum of the isolated effects runs (620,000; 40,000) demonstrates that Kansas would be seeking recovery for almost 200,000 acre feet of depletions which, according to its own model, never actually occurred.

Finally, it must be recalled that all of the depletion figures shown in the last column of Pl Ex. 111*** are exaggerated since accretions have been removed from the calculation. While an argument can be made that some depletions may not be cured by earlier or later accretions, the arbitrary removal of all accretions distorts effects and omits relevant benefits. Indeed, under the 1980 Agreement Kansas may intentionally reduce calls in one month in favor of higher calls in another, to make more
efficient use of its share of the water. The Kansas legal theory on depletions and accretions, as reflected in its method for interpreting model results, would count even a Kansas-initiated voluntary stateline reduction to be a Compact depletion and likewise would omit Kansas-initiated voluntary accretions. See n. 1, above.

Ultimately, if the Kansas model is used and the interpretation of Article IV(D) of the Compact outlined above is correct, then the appropriate comparison for determining a Compact violation must be one that compares the combined effects of new development and extra water to the effects of an adequately represented Compact-era condition. The combined figure used by Kansas on Pl. Ex. 111*** is not adequate because it omits the actual beneficial impacts of the 1980 Agreement and eliminates the accretions resulting from the operation of the WWSP and the 1980 Agreement. As discussed above, the benefits of the 1980 Agreement are reduced or lost when accretions are eliminated from the calculation. See run 9 on Def. Ex. 916. However, for the many reasons given in our briefs, we still do not believe that any run of the Kansas model can be used to estimate WWSP effects.

Sincerely,

Patricia L. Weiss
James J. Dubois
Attorneys
General Litigation Section
Environment and Natural Resources Division

cc:  David Robbins, Esquire
     John Draper, Esquire
     The Honorable George G. Grover
September 1, 1993

Hon. Arthur L. Littleworth
Special Master, U.S. Supreme Court
Best, Best & Krieger
400 Mission Square
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P. O. Box 1028
Riverside, CA 92502

Re: Kansas v. Colorado, No. 105,
Original (U.S.Supreme Court)

Dear Mr. Littleworth:

We have reviewed Mr. Draper's letter to you dated July 10, 1992, concerning proposed changes to the summaries showing the final status of the Kansas, Colorado, United States, and Joint Exhibits. Colorado agrees with Mr. Draper's proposed changes to the exhibit summaries, with two exceptions:

Pl.Exh. 566G-L -- Mr. Draper's list proposes to remove Schroeder as a witness for this exhibit; however, Mr. Schroeder did discuss Pl.Exh. 566L. See RT Vol. 87 at 118-19 (05/30/91). Therefore, we believe that he should be listed as a witness for this exhibit.

Jt.Exh. 66 -- We agree that Sharma and Danielson should be added as witnesses for this exhibit, but Durbin, RT Vol. 49 at 72 (01/29/91), and Major should also be added, RT Vol. 129 at 13 (09/25/92).

Very truly yours,

David W. Robbins

cc: The Honorable George Grover
John B. Draper, Esq.
Patricia Weiss, Esq.
James DuBois, Esq.
Wendy C. Weiss, Esq.
Dianna M. Valdez
Via Telefax and Mail

The Honorable Arthur I. Littleworth
Special Master
United States Supreme Court
Best, Best & Krieger
3750 University Avenue
Riverside, California 92502

Re: State of Kansas v. State of Colorado,
No. 105 Original

Dear Mr. Littleworth:

This responds to your July 22, 1993 letter, which poses certain questions to the parties. As you requested, we are responding to questions 1, 2, and 14.

1. Do Colorado and the United States agree that this is a compact enforcement action?

Your question refers to the Kansas Opening Brief, p. 31, where Kansas distinguishes this case from an "equitable apportionment" case and continues:

One result of this is that the burden of proof in this proceeding is not the same as it was in the 1943 proceeding . . ."

Id. We agree with Kansas that this is a compact enforcement rather than an equitable apportionment action, but we do not agree that the "compact enforcement" character of the suit compels a different conclusion about standard of proof or brings it within the burden of proof analysis of the recent decision in Nebraska v. Wyoming, a case which involved enforcement and modification of an equitable decree. As these issues have already been fully briefed by the parties, we will not repeat those arguments here. See, e.g. Reply Brief of the United States at pp. 3-6. However, if the compact enforcement character of the case becomes an important basis for resolving other disputed
issues not already briefed, we would appreciate the opportunity to provide our views on those issues in advance of your decision.

2. What is the appropriate standard of proof which should be applied in this case?

Because the Supreme Court has not established a standard of proof for general application to interstate compact enforcement cases and, in our view, Kansas has failed to satisfy even the preponderance standard, we do not believe the issue of standard of proof is squarely presented. If you conclude that Kansas has failed to satisfy the preponderance of evidence standard or, conversely, that Kansas has satisfied the "clear and convincing" standard on one or more issues, you need not decide which standard applies. If, however, like the Judge in In Re Winship, 397 U.S. 358, 369 (1970) (Harlan, J. concurring), you conclude that the preponderance standard has been met although the higher standard has not, then a decision on standard of proof would be required.

In our view, the appropriate standard of proof for this case under those circumstances is the "clear and convincing" standard applied in Colorado v. Kansas, 320 U.S. 383, 393-94 (1943). Our reasoning is based upon the Court’s holdings, as outlined in our briefs, that a high standard of proof is necessary when important public interests are at risk, so that any findings necessary to the decision will have the requisite degree of certainty. The higher standard also comports with the prudential concerns the Court has often expressed when considering a request for injunctive relief by one State against another.

We are aware of Kansas' concern that the preponderance standard "has the effect" of favoring Colorado, the upstream State. However, the same argument would apply to equitable apportionment cases, a context in which the Court has consistently applied the higher standard out of recognition of the special sovereign status of the States. The same argument can be made in other litigation where the Court has found it necessary to have the extra degree of certainty supplied by application of the "clear and convincing" standard. In these other cases, the focus of the Court has been on protecting public interests by keeping the risk of an incorrect decision small. In this case, an incorrect decision would have the misfortune of derailing a significant program of known benefits, while also disrupting many lives and important settled interests in Colorado. Under similar circumstances, as we outlined in our briefs, the Court has insisted on that extra margin of certainty supplied by the application of the higher "clear and convincing" standard of proof.
14. As I recall, Mr. Binder and Mr. Finlayson testified for the United States that they were unable to determine whether or not the WWSP was operated in compliance with the Compact. Of course, this was apart from the major thrust of their testimony that the Kansas modeling results could not be relied upon to show a Compact violation. What is the position of the United States on the compliance of the WWSP with the Compact? Is it that the United States doesn't know whether the program complies, or that it does comply? If the latter, could you please cite to the evidence on which the United States relies.

The question seems to suppose that the WWSP cannot be deemed to be in compliance with the Compact absent conclusive evidence of stateline effects. Put another way, the question implies an interpretation of the Compact that precludes beneficial development for which a "no depletion" determination cannot be affirmatively shown. However, the question of Compact compliance ultimately rests on the intention of the Compact parties as represented in the Compact itself. We do not believe that an interpretation of the Compact as prohibiting new development absent conclusory proof of "no depletions" reflects the intentions of the parties or the understanding of those charged with implementing the Compact, the Compact representatives of the two States.

Under our interpretation, the WWSP is in compliance with the Compact, which specifically provides for new beneficial development such as the WWSP. While the Compact disallows material depletions of usable stateline flows due to such development, it does not require affirmative proof of "no depletion" before the development can go forward. Rather, the Compact seems to permit beneficial development unless and until it becomes evident, either through the enforcement procedures of Paragraph VIII{(H) or otherwise, that the activity causes depletions. The notable exceptions are the specific activities described in Paragraph V{(H), for which preliminary confirmation of "no . . . depletion or adverse effect" is a prerequisite to going forward. Otherwise, beneficial developments with no known or obvious adverse impacts seem to be permitted under the Compact unless shown to have caused disallowed depletions. If the Compact were otherwise, requiring an affirmative showing of "no depletion" before any activity could go forward, no matter how benign the activity, the Compact would have the effect of "impeding" new development, an effect the Compact specifically disavows in Paragraph IV{(D).

There is ample reason to believe the WWSP is the sort of benign beneficial activity favored by Paragraph IV{(D) of the Compact, despite the fact that a quantification of effects
appears to be beyond the capability of existing technology and information. Conceptually there is no basis for assuming the WWSP has an adverse impact on stateline flow since it involves simply a change of season of use of water, with no reasonable evidence that usage in either season will increase or decrease overall consumption. See, e.g. Reply Brief of the United States at 28-30. In addition, John Martin Reservoir is available to bridge seasonal reductions and enhancements. This view of the benign impact of the WWSP was supported by pre-implementation studies showing no adverse impact due to the WWSP and seemed to have been shared by Kansas' representatives to the Compact Administration who, as the evidence at trial confirmed, viewed the WWSP as uncontroversial and of no threat to Kansas. See, Def. Exhs. 538, 539; Tr. Vol. 85 at pp. 54-55, 58-70 (Thompson); Def. Exh. 532.

Furthermore, the WWSP appears to be exactly the type of activity for which Paragraph VIII(H) was adopted. That paragraph expresses the intentions of the parties that "enforcement" is to be a cooperative effort through the Compact Administration and, ultimately, through state officials. The very existence of the provision confirms that the Compact parties understood there would be ongoing factual questions about impacts to be resolved. There is no suggestion in the provision that activities are to be held up until impact determinations can be made. To the contrary, action is to be taken only after the Compact Administration has made its findings on impacts. By contrast, the specific activities described in Paragraph V(H) may not proceed without affirmative showing of no impact, suggesting by comparison, that the Compact parties intended other beneficial activities with apparently benign effects to go forward absent meaningful evidence of adverse impacts.

Finally, the conduct of the parties confirms that neither Kansas nor Colorado believed that the absence of depletions would have to be absolutely proven before beneficial development like the WWSP could go forward. The evidence at trial showed that the Kansas representatives to the Compact Administration, men experienced in water matters, considered the implementation of the WWSP to be noncontroversial and not prejudicial to Kansas. When Kansas did begin to object to the WWSP, it was not on the basis of any specific negative impact that Kansas could identify.

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1 As explained extensively in the Briefs of the United States, because of the biases and other problems in its conceptualization and simulation of the hydrologic regime, the HI Model is not a reasonable or reliable tool to be considered as evidence of adverse impacts from the operation of the WWSP.
but rather solely on the procedural argument that it should have the power to stop the Program by withholding its approval. Finally, Kansas enthusiastically entered into the 1980 Agreement, which specifically provides for benefits to Kansas resulting from a portion of the WWSP. One may conclude that Kansas' endorsement and continued acceptance of the 1980 Agreement and its benefits is prima facie evidence that Kansas does not actually believe the WWSP adversely affects Kansas stateline flows, but merely wants to shift the burden of showing no impacts to Colorado.

In sum, we believe the WWSP fully complies with the Arkansas River Compact because it is beneficial development with no known or apparent adverse effects.

Sincerely,

Patricia L. Weiss
James J. Dubois
Attorneys
General Litigation Section
Environment and Natural Resources Division

cc: Mr. David Robbins, Esquire
    Mr. John Draper, Esquire
    The Honorable George G. Grover
August 24, 1993

BY TELECOPY AND MAIL

The Honorable Arthur L. Littleworth
Special Master
Best, Best & Krieger
3750 University Avenue
Riverside, California 92502

Re: Kansas v. Colorado, No. 105, Original (U.S. Supreme Court)

Dear Mr. Littleworth:

You addressed a number of questions to the parties by your letter of July 22, 1993. Thank you for the extension which you accorded us in responding to your letter. We are answering only the four questions addressed to Kansas. If we have any disagreement with the responses of the other parties, we will address that in our reply.

Question No. 1: Kansas states that this action is not a request for an equitable apportionment of the Arkansas River, but rather constitutes "an enforcement action under [the] Compact." (Kan. Opening Brief at 31) Do Colorado and the United States agree that this is a Compact enforcement action?

Answer No. 1: This question is directed to Colorado and the United States.

Question No. 2: Colorado argues that I should apply the "clear and convincing" burden of proof articulated by the Supreme Court in cases between States. The position of the United States appears to be close in result, but not necessarily based upon the same rationale. I would appreciate a sharper statement from the United States as to its view on the appropriate standard of proof in a case of this kind.
Answer No. 2: This question is directed to the United States.

Question No. 3: Colorado argues that Kansas should be barred from asserting any complaints arising from well development that occurred prior to 1965. Would Colorado please explain why the year 1965 was selected. That is, what is the significance of that year as opposed to any other?

Answer No. 3: This question is addressed to Colorado.

Question No. 4: Kansas states that it retained a consulting firm in 1983 "after several years of fruitless efforts to resolve the problem of postcompact depletions." (Kan. Opening Brief at 41) Would Kansas please refer me to the evidence that supports this assertion.

Answer No. 4: With respect to operation of Trinidad Reservoir, please see the following evidence in the record:

2. J. Ex. 18-33, at 49-52 (ARCA Annual Report 1981)
3. J. Ex. 18-34, at 38, 57-59 (ARCA Annual Report 1982)
4. J. Ex. 23, at 4-5 (Bureau Report 1988)
6. J. Ex. 19 (Esp. Minutes of 6/30/80 ARCA Meeting)
7. Tr. vol. 17, at 97-103 (11/22/90) (Spronk)

With respect to wells, the Winter Water Program, Trinidad and shortages at the stateline, please see the following evidence in the record:

2. D. Ex. 21, at 121-23 (2/9/90 Deposition of Howard Corrigan)

Question No. 5: Colorado states that it does not dispute the fact that wells drilled east of the Buffalo Canal headgate after 1965 depleted stateline flows "to some extent during the 1970's." (Colo. Closing Brief re Wells at 19) Is there evidence from which such depletion can be quantified, apart from the argument that such depletion should be offset by benefits accruing under the 1980 Plan?

Answer No. 5: This question is directed to Colorado.
Question No. 6: Mr. Helton testified that benefits under the 1980 Plan "largely" offset any post-Compact well development below John Martin. (RT Vol. 81 at 156; RT Vol. 133 at 70-74) Is there evidence by which benefits from the 1980 Plan can be quantified?

Answer No. 6: This question is directed to Colorado.

Question No. 7: Does Kansas agree that while the 1980 Operating Plan has been in effect, and so long as it remains in effect, Kansas may not claim releases from John Martin other than in accordance with the Plan? (See Colo. Closing Brief re Wells at 57)

Answer No. 7:

No, Kansas does not agree with the referenced statement by Colorado.

The Colorado statement referred to suggests that Kansas' only entitlement under the Compact consists of releases from John Martin Reservoir. This is not correct. Kansas is also entitled to maintenance of flows into the conservation pool at John Martin Reservoir, of return flows below John Martin Reservoir, and of flows through John Martin Reservoir which contributed to usable flows at the stateline under institutional conditions (viz., wells and reservoir operations) existing at the time of the Compact's adoption. None of these entitlements are addressed by the Colorado statement referred to.

With respect to future releases from John Martin, given the fact that the 1980 Operating Plan is inconsistent with the Compact, it is not enforceable, and Kansas, as a matter of law, is entitled to call for releases, if it should choose to do so, consistent with the Compact rather than the 1980 Operating Plan.

With respect to releases during the period from 1980 to the present, Kansas claims that it was entitled to the releases that would have been made to Kansas in accordance with the 1980 Operating Plan absent the depletions above John Martin Reservoir caused by post-Compact well pumping and the Winter Water Program in Colorado. One effect of post-Compact well pumping and the Winter Water Program above John Martin is to reduce inflows into conservation storage and thus allocations to the accounts, including the Kansas account.

The effect below John Martin Reservoir of post-compact well pumping and the WWSP is to decrease stateline flows that occur
independent of John Martin releases, which in turn affects the need in Kansas to call for releases.

Kansas did not, by agreeing to the 1980 Operating Plan, waive any rights guaranteed to Kansas by the Compact, including those afforded by Article IV-D. The parties to the 1980 Operating Plan agreed to this principle in Article VI of the Plan.

Question No. 8: Beyond the testimony of Mr. Helton, are there any exhibits or testimony that relate to the history of the negotiations leading to the 1980 Operating Plan, and to the intent of the negotiators?

Answer No. 8: Beyond the testimony of Mr. Helton, there is the testimony of Mr. Corrigan in D. Ex. 21, at 132-43, in which the purpose of the 1980 Operating Plan is discussed. Mr. Corrigan agrees that the purpose of the negotiations was to "hammer out a better way to get water out of the reservoir to the benefit of both states." Id., at 132. But the impact of well pumping or the Winter Water Program was never mentioned as a Compact violation which the 1980 Operating Plan was meant to remedy. The first whereas clause of the 1980 Operating Plan itself is in accord with this. See J. Ex. 21, Doc. 11, at 1.

Mr. Helton testified that the 1980 Operating Plan grew out of a discussion of "ways which the water might be utilized with a greater efficiency and achieve a greater beneficial use." Tr. vol. 81, at 129, 93-95, 128-39 (5/21/91) (Helton). It should be noted that no one, including Mr. Helton, testified that the intent of the 1980 Operating Plan was to offset post-Compact well depletions or Winter Water Program depletions in violation of the Compact.

Question No. 9: Mr. Helton also testified that the impact from pumping above John Martin Reservoir was "largely offset" by return flows from transmountain imports, and reduced efficiency resulting from the clear water effects. (RT Vol. 81 at 155, RT Vol. 115 at 62) Is there evidence, first, by which the amount of the impact can be quantified without offset, and secondly, by which the amount of the offset can be quantified?

Answer No. 9: This question is directed to Colorado.

Question No. 10: The Kansas HI Model shows that depletions to usable flow caused by post-compact pumping from 1950 to 1985 amounted to 620,000 acre feet, and that depletions due to the WWSP were 40,000 acre feet. Yet the combined impact is only 489,000, that is, less than the depletions from wells alone.
Would Kansas please explain this apparent anomaly. I notice that the "switches" are different in the combined impact run. Also, is it possible on the basis of evidence in the record to apportion the 489,000 acre feet between wells and the WWSP?

Answer No. 10: As suggested in the question, the reduced figure of 489,000 is the result of a different switch setting for transmountain water. The reason that the combined effects (shown on P. Ex. 111*** are calculated to be less than the historical pumping effects is that the historical pumping effects of 620,000 acre feet of usable depletions is calculated independently of any transmountain return flow offset. The 620,000 acre foot figure is therefore the actual violation of the Compact by well pumping.

The question of any offset from transmountain return flows is arguably something that could be reserved to the remedies phase of this litigation. However, Kansas has provided the results obtained if one does offset the transmountain return flows against both the historical pumping and the winter water effects. This is done in the combined effects run by changing the transmountain switch from historical (H) to zero (0). Offsetting the return flows against both historical pumping and winter water together results in a net depletion of usable flows of 489,000 acre feet. Again, this is arguably something that could be reserved to the remedies phase, with the actual calculated violations due to pumping being 620,000 acre feet of usable depletions and the effects of the Winter Water Program being 40,000 acre feet of usable depletions. The transmountain deliveries are reported in P. Exs. 34, 34A. It is the return flows from these deliveries that are offset against the effects of historical pumping and the Winter Water Program to arrive at the reduced net effect of 489,000 acre feet.

There is no direct evidence of apportionment of the 489,000 acre feet combined impact between wells and the WWSP because there may not be a way to specifically apportion that combined impact. One may be able to indirectly approximate the apportionment of the effects by using P. Ex. 651. On that exhibit, the HHHH v. CHHO run (pumping with transmountain offset) shows usable flow depletions of 464,000 acre feet. The HHHH v. CCHO run (pumping and winter water with transmountain offset) shows usable flow depletions of 496,000 acre feet. Accordingly, the difference between 496,000 acre feet and 464,000 acre feet is 32,000 acre feet, which represents the best approximation in evidence of the incremental amount of depletions caused by the WWSP, using transmountain as an offset.

The important point to recognize in this context is that the actual violations of the Compact are specified separately and do
not include transmountain offsets. Those violations consist of 620,000 acre feet of usable flows for post-Compact well pumping and 40,000 acre feet for the WWSP.

Question No. 11: Colorado’s "What If 2" scenario showed depletions from well pumping for 1950-85 of 582,696 acre feet. It is my understanding that this figure relates to total depletions and not to depletions of usable flow, but that it does reflect any offset for return flows from transmountain imports. (RT Vol. 115 at 75). If this understanding is correct, is there evidence in the record upon which this amount of depletion could be modified to address only usable flows?

Answer No. 11: This question is directed to Colorado.

Question No. 12: Colorado states that if its analysis calculates higher depletions than the Kansas HI Model, the Colorado analysis nonetheless leads to very different conclusions. (Colo. Reply Brief at 35) Would Colorado please elaborate on this statement, and explain what the different conclusions are.

Answer No. 12: This question is directed to Colorado.

Question No. 13: Colorado Exhibit 135*, page 6.1 indicates an average "potential impact" under the "What If 2" scenario of 7755 acre feet annually over the 1950-85 period. This represents 40% of the change in conservation storage in John Martin, and all of the change in stateline flows during the irrigation season from April through October. Over the 1950-85 period, the total impact under this analysis would amount to 279,180 acre feet. In the Colorado view, is this "potential impact" the same as a material depletion of usable stateline flow? Is the change in April-October stateline flows the same as a change in usable flows?

Answer No. 13: This question is directed to Colorado.

Question No. 14: As I recall, Mr. Binder and Mr. Finlayson testified for the United States that they were unable to determine whether or not the WWSP was operated in compliance with the Compact. Of course, this was apart from the major thrust of their testimony that the Kansas modeling results could not be relied upon to show a Compact violation. What is the position of the United States on the compliance of the WWSP with the Compact? Is it that the United States doesn’t know whether the program complies, or that it does comply? If the latter, could you please cite to the evidence on which the United States relies.
The Honorable Arthur L. Littleworth  
August 24, 1993  
Page 7

Answer No. 14: This question is directed to the United States.

Sincerely yours,

[Signature]

John B. Draper  
Counsel of Record  
for the State of Kansas

JBD:lg  
10389-88-01  
Copy to: David W. Robbins, Esq.  
Patricia L. Weiss, Esq.  
Andrew F. Walch, Esq./James J. DuBois, Esq.
August 24, 1993

Hon. Arthur L. Littleworth
Special Master, U.S. Supreme Court
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Dear Mr. Littleworth:

Colorado's responses to the questions posed in your July 22, 1993 letter are as follows:

1. Kansas states that this action is not a request for an equitable apportionment of the Arkansas River, but rather constitutes "an enforcement action under [the] Compact." (Kan. Opening Brief at 31) Do Colorado and the United States agree that this is a Compact enforcement action?

Response: Colorado agrees that Kansas did not request an equitable apportionment of the Arkansas River in its complaint, which alleged that Colorado and its water users have violated the Arkansas River Compact. However, to describe this "as an enforcement action under [the] Compact" suggests that Kansas is seeking an order to enforce the Compact's provisions; whereas, the specific relief Kansas sought in its complaint is damages. Therefore, it would be more accurate to describe this as an action for violation or breach of the Arkansas River Compact rather than
an enforcement action under the Compact. In any event, however, Colorado does not believe that characterization of this case as "an enforcement action under [the] Compact" should be determinative of the burden of proof that should be applied. See Colorado's Reply Brief at 13-15 (May 17, 1993).

2. Colorado argues that I should apply the "clear and convincing" burden of proof articulated by the Supreme Court in cases between States. The position of the United States appears to be close in result, but not necessarily based upon the same rationale. I would appreciate a sharper statement from the United States as to its view on the appropriate standard of proof in a case of this kind.

Response: No comment.

3. Colorado argues that Kansas should be barred from asserting any complaints arising from well development that occurred prior to 1965. Would Colorado please explain why the year 1965 was selected. That is, what is the significance of that year as opposed to any other?

Response: Colorado should have stated that Kansas should be barred from asserting any complaints arising from well development that occurred prior to 1966 rather than 1965. The year 1965 was selected for practical reasons. In 1965 legislation was enacted giving the Colorado State Engineer authority to deny the issuance of new well permits if the vested rights of others would be materially injured. See generally RT Vol. 15 at 107-08 (Spronk) (describing statutory changes in the administration of ground water
After 1965, the State Engineer essentially stopped issuing new well permits in the Arkansas River Valley except for those east of the Buffalo Canal headgate. RT Vol. 130 at 28-29 (Simpson). Although the existence of well development which had occurred in Colorado up through and including 1965 was clearly known to Kansas officials, e.g., Def. Exh. 21 at 165-66, 167-68 (Corrigan), and the potential effect of such development would have been clear at that time, Kansas made no complaint about such development.


2/ Colorado's tabulation of high-capacity irrigation wells shows that 1,950 wells out of a total of 2,062 wells have appropriation dates of 1965 or earlier. Def. Exh. 165*, Table A.1. Additional investigation by Mr. Simpson, the Colorado State Engineer, indicated that of the 112 wells with appropriation dates after 1965, 76 were east of the Buffalo Canal headgate. RT Vol. 130 at 29-32. Of the remainder, some were constructed into bedrock aquifers and some were permitted in 1965 or earlier, but were decreed appropriation dates after 1965. Id. Only eleven well permits were issued by the State Engineer to construct wells in the Valley Fill Aquifer west of the Buffalo Canal headgate after 1965. Id.
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As Dr. Danielson testified, the Colorado State Engineer continued to issue well permits east of the Buffalo Canal headgate for several years after 1965 based on the fact that sizeable amounts of water were passing Garden City unused and that Kansas was allowing unrestricted construction of wells in Kansas right up to the Stateline. RT Vol. 76 at 112-15 ("KANSAS HAD NO RESTRICTIONS WHATSOEVER ON PERMITS. IT WAS SIMPLY 'GO DRILL YOUR WELL.'"); see also RT Vol. 115 at 63-64 (Helton). While Kansas also delayed in complaining about these wells, many of them were not permitted until the early 1970s. See Def. Exh. 165*, Table A.1 (Reach 4). Furthermore, the substitute supply plan of the Lower Arkansas Water Management Association (LAWMA), which relied upon wells as alternate points of diversion to the Buffalo Canal water right, did not become operational until approximately 1976, see Def. Exh. 135*, page 1.3 (column headed "Buffalo"), and shortly afterwards the 1980 Operating Plan was adopted to address complaints about transit losses on Kansas releases from John Martin Reservoir. Thus, while Kansas also delayed in complaining about wells drilled east of the Buffalo Canal headgate after 1965, Colorado did not want to weaken the force of its arguments based on Kansas' delay by
trying to stretch them to include wells which were permitted after 1965. While the wisdom of issuing well permits east of the Buffalo Canal headgate after 1965 may seem questionable today,\(^3\) the effects of those wells were addressed through the 1980 Operating Plan.

4. Kansas states that it retained a consulting firm in 1983 "after several years of fruitless efforts to resolve the problem of postcompact depletions." (Kan. Opening Brief at 41) Would Kansas please refer me to the evidence that supports this assertion.

Response: Although this question was directed to Kansas, the statement in Kansas' opening brief is disputed by Colorado insofar as it implies that Kansas complained about post-compact well development in Colorado prior to the request for an investigation by the Compact Administration in 1985.

5. Colorado states that it does not dispute the fact that wells drilled east of the Buffalo Canal headgate after 1965 depleted stateline flows "to some extent during the 1970's." (Colo. Closing Brief re Wells at 19) Is there evidence from which such depletion can be quantified, apart from the argument that such depletion should be offset by benefits accruing under the 1980 Plan?

Response: Yes. Mr. Schroeder quantified depletions and accretions to Stateline flows by wells drilled east of the Buffalo Canal headgate after 1965 using his modified version of the H-I

\(^3\) But see RT Vol. 76 at 112-15 (Danielson). Kansas' failure to restrict well development in southwestern Kansas in the late 1960s and 1970s, despite warnings from federal agencies about the impacts of over-development on aquifer water levels, Jt. Exh. 105 at 29, 40, 130, seems even more subject to reproach.
Model. See RT Vol. 139 at 25. The results are shown on Def. Exh. 1011, Comparison 11,' as follows:

<table>
<thead>
<tr>
<th>Total Depletions</th>
<th>Total Depletions &amp; Accretions</th>
<th>HCI's Usable (Helton's Coeff.) Depletions</th>
<th>HCI's Usable (Helton's Coeff.) Accretions</th>
</tr>
</thead>
<tbody>
<tr>
<td>57,595</td>
<td>57,051</td>
<td>31,150</td>
<td>29,749</td>
</tr>
</tbody>
</table>

During his testimony, Mr. Helton described how the impacts of wells drilled east of the Buffalo Canal headgate after 1965 were quantified by Mr. Schroeder. See RT Vol. 133 at 58-68. Although both Mr. Helton and Mr. Schroeder had substantial criticisms of the H-I Model, even as modified by Mr. Schroeder, Mr. Helton testified that he used the H-I Model for this purpose because it was relatively convenient to use and because he wanted to be able to compare the depletions from the wells drilled east of the Buffalo Canal headgate after 1965 with the benefits of the 1980 Operating Plan. RT Vol. 133 at 60-61. He pointed out that the wells drilled east of the Buffalo Canal after 1965 were downstream from any Colorado water user. Id. at 65. Therefore, the elimination of pumping by those wells would not affect diversions predicted by the model. Id. While Mr. Helton was unwilling to agree that the results of this comparison were accurate, he did feel they were reasonable. Id. at 66.

4/ The results are also shown on Def. Exh. 1013, which Mr. Schroeder prepared to summarize the most important comparisons shown on Def. Exh. 1011. RT Vol. 139 at 35. The results shown on Def. Exh. 1013 do not include the results of applying the Spronk usable flow analysis because Mr. Schroeder did not consider that analysis appropriate. Id. Therefore, the results of the Spronk usable flow analysis are not shown in these responses.
6. Mr. Helton testified that benefits under the 1980 Plan "largely" offset any impact of post-Compact well development below John Martin. (RT Vol. 81 at 156; RT Vol. 133 at 70-74) Is there evidence by which benefits from the 1980 Plan can be quantified?

**Response:** Yes. Mr. Schroeder quantified the depletions and accretions resulting from the 1980 Operating Plan using his modified version of the H-I Model. See RT Vol. 139 at 24-25. The results are shown on Def. Exh. 1011, Comparison 9, as follows:

<table>
<thead>
<tr>
<th>Total</th>
<th>Depletions &amp; Accretions</th>
</tr>
</thead>
<tbody>
<tr>
<td>101,444</td>
<td>-125,591</td>
</tr>
</tbody>
</table>

HCI's Usable (Helton's Coeff.)

<table>
<thead>
<tr>
<th>Total</th>
<th>Depletions &amp; Accretions</th>
</tr>
</thead>
<tbody>
<tr>
<td>79,456</td>
<td>-30,000</td>
</tr>
</tbody>
</table>

Mr. Helton relied on Comparisons 9 and 11 on Def. Exh. 1011 as part of the basis for his opinion that the 1980 Operating Plan had effectively offset the depletions caused by wells drilled east of the Buffalo Canal headgate after 1965. RT Vol. 133 at 68-70.5/

In addition, Mr. Helton quantified certain benefits from the 1980 Operating Plan that he could easily quantify, including the increase in conservation storage by eliminating Colorado demands for releases of up to 100 cfs of river flow during the winter storage season, the reduced evaporation losses on conservation storage, and the amounts stored in the Kansas transit loss account. Def. Exh. 290**; RT Vol. 84 at 94-110. See also RT Vol. 133 at 70-74. These benefits alone averaged 18,710 acre-feet per year, Def. Exh. 290**, but did not include the benefits to Kansas from guaran-

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5/ Mr. Helton also relied in part on his own analysis of the benefits of the 1980 Operating Plan. RT Vol. 133 at 70-74.
teeing Kansas 40 percent of the water stored in conservation storage in John Martin Reservoir or the change in timing of releases allowing Kansas to call for water when it is most beneficial. See RT Vol. 84 at 106-110. Mr. Helton assumed that Kansas received 40 percent of the benefits which he was able to quantify. RT Vol. 133 at 72. For the years 1979-85, Mr. Helton calculated that these direct benefits to Kansas were 49,111 acre-feet. Id.

7. Does Kansas agree that while the 1980 Operating Plan has been in effect, and so long as it remains in effect, Kansas may not claim releases from John Martin other than in accordance with the Plan? (See Colo. Closing Brief re Wells at 57)

Response: No comment.

8. Beyond the testimony of Mr. Helton, are there any exhibits or testimony that relate to the history of the negotiations leading to the 1980 Operating Plan, and to the intent of the negotiators?

Response: Yes. Mr. Bentrup, Mr. Corrigan, and Mr. Hilmes discussed the history of the negotiations leading to the 1980 Operating Plan and the intent of the negotiators to a limited extent in their depositions. See Def. Exh. 17 at 80-98; Def. Exh. 21 at 132-45; and Def. Exh. 31 at 34-47. Mr. Gibson, the former Kansas Chief Engineer, also briefly discussed the negotiations leading to the 1980 Operating Plan in his deposition. Def. Exh. 27 at 77-79. Their testimony is generally consistent with the testimony of Mr. Helton. It should be noted that although Kansas identified several non-expert witnesses who were expected to
testify concerning the 1980 Operating Plan, Kansas did not call any of those witnesses for that purpose.

9. Mr. Helton also testified that the impact from pumping above John Martin Reservoir was "largely offset" by return flows from transmountain imports, and reduced efficiency resulting from the clear water effects. (RT Vol. 81 at 155, RT Vol. 115 at 62) Is there evidence, first, by which the amount of the impact can be quantified without offset, and secondly, by which the amount of the offset can be quantified?

Response: No. Colorado's "What If 2" scenario (Def. Exh. 135*) did not separately quantify the amount of the impact without offset or the amount of the offset. What Colorado did was to quantify the net change in river flow and conservation storage over the period 1950-85, assuming there had been no post-compact well pumping, no transmountain return flows, and no clear water effects from Pueblo Reservoir. RT Vol. 84 at 40-43 (Helton). The net change in river flow above John Martin Dam averaged 1,294 acre-feet per year and the net change in conservation storage averaged 841 acre-feet per year. Def. Exh. 135*, page 6.1, Cols. (9) and (13); RT Vol. 84 at 41-44, 51-52, 56-63 (Helton). For the purpose of determining the potential impact on Kansas, Mr. Helton assumed that Kansas would be entitled to 40 percent of the changes in conservation storage. Def. Exh. 135*, page 6.1, note (c); RT Vol. 84 at 43.\(^6\)

\(^6\) In addition, in response to a question by the Special

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\(^6\) By assuming that Kansas would be entitled to 40 percent of the changes in conservation storage, Mr. Helton over-estimated the potential impact on Kansas. RT Vol. 134 at 32-34. His reasoning was that the actual impact on Kansas could not exceed this amount. See RT Vol. 115 at 78.
Master, RT Vol. 134 at 19, Mr. Helton prepared an exhibit to compare the pre- and post-Pueblo Reservoir canal and lateral losses to demonstrate that the clear water effects of Pueblo Reservoir were relatively small. Def. Exh. 1017; see RT Vol. 139 at 68-78, for Mr. Helton's testimony concerning this exhibit. See also RT Vol. 84 at 61 (clear water effect is a relatively small increment).

10. The Kansas HI Model shows that depletions to usable flow caused by post-Compact pumping from 1950 to 1985 amounted 620,000 acre-feet, and that depletions due to the WWSP were 40,000 acre-feet. Yet the combined impact is only 489,000, that is, less than the depletions from wells alone. Would Kansas please explain this apparent anomaly. I notice that the "switches" are different in the combined impact run. Also, is it possible on the basis of evidence in the record to apportion the 489,000 acre-feet between wells and the WWSP?

Response: The Special Master asked Mr. Durbin, the developer of the H-I Model, if he had apportioned his "combined effects" comparison between wells and the WWSP. See RT Vol. 44 at 128. Mr. Durbin responded by saying that he had prepared other comparisons showing the isolated effects of wells and the WWSP. Id. at 128-29. However, he later testified that it was not possible to take comparisons of the individual impacts of wells and the WWSP and add them together to get the combined impacts, RT Vol. 45 at 48-50, and never explained how he would apportion the combined effects between wells and the WWSP. The Kansas replacement experts did not apportion the 489,000 acre-feet between wells and the WWSP and did not offer any testimony on how such an apportionment might be made.
11. Colorado's "What If 2" scenario showed depletions from well pumping for 1950-85 of 582,696 acre-feet. It is my understanding that this figure relates to total depletions and not to depletions of usable flow, but that it does reflect any offset for return flows from trans-mountain imports. (RT Vol. 115 at 75). If this understanding is correct, is there evidence in the record upon which this amount of depletion could be modified to address only usable flows?

Response: The Special Master's understanding concerning Colorado's "What If 2" scenario is correct. With regard to evidence of the amount of depletion to usable flows, Mr. Helton calculated the impact on usable flow for the period 1950 through 1969. This is shown on page 7.3 (substitute page) of Def. Exh. 135*. For the period 1950-69, the annual depletion to usable flow averaged 1,683 acre-feet per year or 33,660 acre-feet for the 20-year period. Id. See RT Vol. 86 at 89.

Mr. Helton calculated the impact on usable flow from the potential impact on Kansas, which he based on the change in Stateline flow during the months April through October and 40 percent of the change in conservation storage. RT Vol. 84 at 43, 46, 64-66. The potential impact on Kansas for the years 1950-69 is shown on page 7.1 of Def. Exh. 135*. 7/ Next, Mr. Helton determined on a monthly basis the Stateline flow which was not diverted in

7/ Mr. Helton did not consider depletions to Stateline flow during the months of November through March to be a potential impact on usable flow because Kansas diversions during these months were small in comparison to the unused flow passing the Farmers diversion. See RT Vol. 83 at 64; Vol. 115 at 77-78; Vol. 134 at 27-30. See also RT Vol. 53 at 121-51; Vol. 54 at 22-31 (cross-examination of Durbin on the fact that Kansas diversions in the winter were only a small fraction of Stateline flows).
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Kansas and which flowed unused past the headgate of the Farmers Ditch in Kansas. RT Vol. 86 at 41-61. The monthly amounts of Stateline flow not diverted in Kansas for the years 1950 through 1969 are shown on page 7.2 (substitute page) of Def. Exh. 135*. Finally, Mr. Helton compared the monthly potential impact to the monthly Stateline flow not diverted in Kansas. RT Vol. 86 at 82. If the potential impact was greater than the Stateline flow not diverted in Kansas, he treated the difference as an impact on usable flow.\(^8\) Id. at 82, 84. The impact of post-compact well development in Colorado on usable flow for the years 1950-69 is shown on page 7.3 (substitute page) of Def. Exh. 135*. See RT Vol. 86 at 80-81, 92-93.

Mr. Helton was not able to do an analysis of the impact on usable flow for the years 1970-85 because the streamflow gage at Garden City had been removed, RT Vol. 86 at 44-46; Vol. 134 at 14-15; thus, he was not able to calculate the Stateline flow which was not diverted in Kansas and which flowed unused past the Farmers diversion. However, Mr. Helton testified that the impact on usable flow for the years 1970-85 would be less than the potential impact he had calculated. RT Vol. 86 at 93.

12. Colorado states that if its analysis calculates higher depletions than the Kansas HI Model, the Colorado analysis nonetheless leads to very different conclusions. (Colo. Reply Brief at 35) Would Colorado please elabo-

\(^8\) Mr. Helton did not use the term "usable Stateline flow" because the potential impact on Kansas includes 40 percent of the change in John Martin Reservoir conservation storage.
rate on this statement, and explain what the different conclusions are.

Response: Colorado's "What If 2" scenario showed changes in Stateline flow for the period 1950 through 1985 of 582,696 acre-feet. The results of this scenario cannot be compared directly to any of the comparisons shown on Pl. Exh. 111*** because the Colorado analysis uses different estimates of pre- and post-compact pumping, different institutional conditions, and does not reoperate John Martin Reservoir based on changes in conservation storage, which would affect diversions in Water District 67 and releases for Kansas. Mr. Larson prepared a comparison (Pl. Exh. 642), using the H-I Model as revised by the Kansas replacement experts, for the same amount of change in post-compact pumping as used in Colorado's "What If 2" scenario. This comparison showed depletions to Stateline flows of 395,000 acre-feet. That was the basis for Colorado's statement that its analysis may calculate higher depletions than the Kansas H-I Model.

The Colorado analysis leads to very different conclusions because Colorado did its analysis by reaches, which allowed Mr. Helton to determine changes in conservation storage in John Martin Reservoir as well as changes in Stateline flow. The Colorado analysis also considered the quantities of water that were unused in Kansas and the effects of post-compact well development in Kansas. Based on the Colorado analysis, Mr. Helton concluded that the impacts of post-compact well pumping in Colorado above John Martin Reservoir had been largely offset by transmountain return
flows and the clear water effects of Pueblo Reservoir. RT Vol. 81 at 155-56; Vol. 84 at 51. See response to Question 9 above. Second, Mr. Helton concluded that impacts of pumping above the Buffalo Canal headgate were largely absorbed by Colorado ditches and the main impact on Stateline flow occurred as a result of pumping in the reach below the Buffalo Canal headgate. RT Vol. 84 at 52. Third, Mr. Helton concluded that post-compact well development in Colorado had a small impact on usable flow to Kansas through 1969 (1,683 acre-feet per year average for 1950 through 1969). RT Vol. 86 at 89. See response to Question 11 above. However, he concluded that there was a much larger amount of Stateline flow passing the Farmers diversion unused (72,640 acre-feet per year average for 1950 through 1969, excluding 1965). Def. Exh. 244*; RT Vol. 86 at 77.\textsuperscript{9} As Mr. Helton testified, this was water which was surplus to the needs of water users in Colorado and Kansas and was available for development by both States under the Compact. RT Vol. 86 at 78. While both States undoubtedly knew

\textsuperscript{9} The average shown on Def. Exh. 244* for the years 1950 through 1969, excluding 1965, is based on the annual Stateline flow past the Farmers diversion unused, corrected for diversions in excess of the vested rights of the Kansas ditches. RT Vol. 86 at 72-75. On page 7.2 of Def. Exh. 135*, Mr. Helton showed the Stateline flow past the Farmers diversion unused for the months of April through October. The monthly values shown on page 7.2, which were used to calculate the impact on usable flow to Kansas shown on page 7.3, were taken from Def. Exh. 238* and were not corrected for diversions in excess of the vested rights of the Kansas ditches. See RT Vol. 86 at 41-59. The average Stateline flow past the Farmers diversion unused during the months of April through October for the years 1950 through 1969 (including 1965) was 60,323 acre-feet per year. Def. Exh. 135*, page 7.2 (substitute page).
that post-compact well development in both States might deplete usable flows to some extent, they also came to realize that additional well development was the only feasible method to develop the substantial amounts of unused flow, and both States allowed it. *Id.* at 78-79. To the extent diversions in Kansas were reduced by post-compact well development in both States, Kansas allowed farmers with surface rights to drill wells to supplement their surface supplies. Moreover, to the extent well development in Colorado depleted return flows at the Stateline, Kansas could demand additional releases of better quality water from John Martin Reservoir.

Thus, while the Colorado analysis may calculate higher depletions to Stateline flows for a similar change in post-compact pumping, the Colorado analysis allowed Mr. Helton to identify the cause of the depletions to Stateline flows. As Mr. Helton showed, the depletions to Stateline flow were not due to post-compact well pumping in Colorado generally, but were due primarily to wells which had been constructed east of the Buffalo Canal headgate after 1965. Finally, Mr. Helton concluded that the 1980 Operating Plan had been beneficial to the water users in both Colorado and Kansas by allowing water stored in John Martin Reservoir to be used more efficiently and by increasing the water supply that accrued to conservation storage, *RT Vol.* 84 at 106-10, and that the 1980 Operating Plan had effectively offset the depletions caused by
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wells constructed east of the Buffalo Canal headgate after 1965. RT Vol. 133 at 68-70.

With regard to the wells constructed east of the Buffalo Canal headgate after 1965, Mr. Helton was not able to quantify the impact on usable flow from those wells or the benefits of the 1980 Operating Plan with the Colorado analysis; however, using the modified H-I Model, Mr. Schroeder calculated the depletions from those wells and the benefits from the 1980 Operating Plan. The benefits from the 1980 Operating Plan were considerably larger than the depletions caused by wells drilled after 1965 east of the Buffalo Canal headgate. RT Vol. 133 at 58-70. See response to Question 6 above.

13. Colorado Exhibit 135*, page 6.1 indicates an average "potential impact" under the "What If 2" scenario of 7755 acre-feet annually over the 1950-85 period. This represents 40% of the change in conservation storage in John Martin, and all of the change in stateline flows during the irrigation season from April through October. Over the 1950-85 period, the total impact under this analysis would amount to 279,180 acre-feet. In the

10/ The depletions and accretions to Stateline flows due to wells drilled after 1965 east of the Buffalo Canal headgate were a net depletion of 57,051 acre-feet. Def. Exh. 1011, Comparison 11. The depletions and accretions to Stateline flows from the 1980 Operating Plan were a net accretion of 125,591 acre-feet. Def. Exh. 1011, Comparison 9. In the case of the 1980 Operating Plan, it is more appropriate to compare the total depletions and accretions to Stateline flow rather than the total depletions and accretions to usable Stateline flows because the benefits of the 1980 Operating Plan to Kansas were in fact almost entirely usable. RT Vol. 133 at 74-75. The H-I Model calculates a smaller increase in usable Stateline flows because of the inaccuracies in modeling John Martin Reservoir, which holds water in storage, causing excessive spills. See id. at 75.
Colorado view, is this "potential impact" the same as a material depletion of usable Stateline flow? Is the change in April-October stateline flows the same as a change in usable flows?

Response: The answer to both questions is "no." The potential impact on Kansas shown in Column (17) on page 6.1 of Def. Exh. 135* is only that -- a potential impact on Kansas. See RT Vol. 84 at 52; Vol. 115 at 78; Vol. 134 at 22-23.

Pages 7.1, 7.2 (substitute page), and 7.3 (substitute page) of Def. Exh. 135* show Mr. Helton's analysis of the impact on usable flow for the years 1950 through 1969. The potential impact on Kansas for the years 1950-69 averaged 4,405 acre-feet per year (page 7.1, Col. (11)); however, Mr. Helton concluded that the impact on usable flow was only 1,683 acre-feet per year (page 7.3 (substitute page)). RT Vol. 86 at 89. Thus, the "potential impact" on Kansas is not the same as a material depletion of usable Stateline flow. See RT Vol. 83 at 64 (discussion by Mr. Helton of the difference between potential impact on Kansas and impact on usable flow).

14. As I recall, Mr. Binder and Mr. Finlayson testified for the United States that they were unable to determine whether or not the WWSP was operated in compliance with the Compact. Of course, this was apart from the major thrust of their testimony that the Kansas modeling results could not be relied upon to show a Compact violation. What is the position of the United States on the compliance of the WWSP with the Compact? Is it that the United States doesn't know whether the program complies, or that it does comply? If the latter, could
you please cite to the evidence on which the United States relies.

Response: No comment.

Very truly yours,

David W. Robbins

DWR:ncr
cc: Judge George Grover
    John B. Draper, Esq.
    Patricia L. Weiss, Esq.
    James J. DuBois, Esq.
    Wendy C. Weiss, Esq.

(287)
Dear Mr. Littleworth:

Attached is the response of the United States. It is also being faxed to Mr. Draper and Messrs. Robbins and Montgomery. A hard copy of this letter is also being mailed to all concerned.

James DuBois
Via Telefax and Mail

The Honorable Arthur L. Littleworth
Special Master
United States Supreme Court
Best, Best & Krieger
3750 University Avenue
Riverside, California 92502

Re: State of Kansas v. State of Colorado,
No. 105 Original

Dear Mr. Littleworth:

This responds to your July 22, 1993 letter, which poses certain questions to the parties. As you requested, we are responding to questions 1, 2, and 14.

1. Do Colorado and the United States agree that this is a compact enforcement action?

Your question refers to the Kansas Opening Brief, p. 31, where Kansas distinguishes this case from an "equitable apportionment" case and continues:

One result of this is that the burden of proof in this proceeding is not the same as it was in the 1943 proceeding . . ."

Id. We agree with Kansas that this is a compact enforcement rather than an equitable apportionment action, but we do not agree that the "compact enforcement" character of the suit compels a different conclusion about standard of proof or brings it within the burden of proof analysis of the recent decision in Nebraska v. Wyoming, a case which involved enforcement and modification of an equitable decree. As these issues have already been fully briefed by the parties, we will not repeat those arguments here. See, e.g. Reply Brief of the United States at pp. 3-6. However, if the compact enforcement character of the case becomes an important basis for resolving other disputed
issues not already briefed, we would appreciate the opportunity to provide our views on those issues in advance of your decision.

2. What is the appropriate standard of proof which should be applied in this case?

Because the Supreme Court has not established a standard of proof for general application to interstate compact enforcement cases and, in our view, Kansas has failed to satisfy even the preponderance standard, we do not believe the issue of standard of proof is squarely presented. If you conclude that Kansas has failed to satisfy the preponderance of evidence standard or, conversely, that Kansas has satisfied the "clear and convincing" standard on one or more issues, you need not decide which standard applies. If, however, like the Judge in In Re Winship, 397 U.S. 358, 369 (1970) (Harlan, J. concurring), you conclude that the preponderance standard has been met although the higher standard has not, then a decision on standard of proof would be required.

In our view, the appropriate standard of proof for this case under those circumstances is the "clear and convincing" standard applied in Colorado v. Kansas, 320 U.S. 383, 393-94 (1943). Our reasoning is based upon the Court's holdings, as outlined in our briefs, that a high standard of proof is necessary when important public interests are at risk, so that any findings necessary to the decision will have the requisite degree of certainty. The higher standard also comports with the prudential concerns the Court has often expressed when considering a request for injunctive relief by one State against another.

We are aware of Kansas' concern that the preponderance standard "has the effect" of favoring Colorado, the upstream State. However, the same argument would apply to equitable apportionment cases, a context in which the Court has consistently applied the higher standard out of recognition of the special sovereign status of the States. The same argument can be made in other litigation where the Court has found it necessary to have the extra degree of certainty supplied by application of the "clear and convincing" standard. In these other cases, the focus of the Court has been on protecting public interests by keeping the risk of an incorrect decision small. In this case, an incorrect decision would have the misfortune of derailing a significant program of known benefits, while also disrupting many lives and important settled interests in Colorado. Under similar circumstances, as we outlined in our briefs, the Court has insisted on that extra margin of certainty supplied by the application of the higher "clear and convincing" standard of proof.
14. As I recall, Mr. Binder and Mr. Finlayson testified for the United States that they were unable to determine whether or not the WWSP was operated in compliance with the Compact. Of course, this was apart from the major thrust of their testimony that the Kansas modeling results could not be relied upon to show a Compact violation. What is the position of the United States on the compliance of the WWSP with the Compact? Is it that the United States doesn't know whether the program complies, or that it does comply? If the latter, could you please cite to the evidence on which the United States relies.

The question seems to suppose that the WWSP cannot be deemed to be in compliance with the Compact absent conclusive evidence of stateline effects. Put another way, the question implies an interpretation of the Compact that precludes beneficial development for which a "no depletion" determination cannot be affirmatively shown. However, the question of Compact compliance ultimately rests on the intention of the Compact parties as represented in the Compact itself. We do not believe that an interpretation of the Compact as prohibiting new development absent conclusory proof of "no depletions" reflects the intentions of the parties or the understanding of those charged with implementing the Compact, the Compact representatives of the two States.

Under our interpretation, the WWSP is in compliance with the Compact, which specifically provides for new beneficial development such as the WWSP. While the Compact disallows material depletions of usable stateline flows due to such development, it does not require affirmative proof of "no depletion" before the development can go forward. Rather, the Compact seems to permit beneficial development unless and until it becomes evident, either through the enforcement procedures of Paragraph VIII(H) or otherwise, that the activity causes depletions. The notable exceptions are the specific activities described in Paragraph V(H), for which preliminary confirmation of "no ... depletion or adverse effect" is a prerequisite to going forward. Otherwise, beneficial developments with no known or obvious adverse impacts seem to be permitted under the Compact unless shown to have caused disallowed depletions. If the Compact were otherwise, requiring an affirmative showing of "no depletion" before any activity could go forward, no matter how benign the activity, the Compact would have the effect of "impeding" new development, an effect the Compact specifically disavows in Paragraph IV(D).

There is ample reason to believe the WWSP is the sort of benign beneficial activity favored by Paragraph IV(D) of the Compact, despite the fact that a quantification of effects
appears to be beyond the capability of existing technology and information. Conceptually there is no basis for assuming the WWSP has an adverse impact on stateline flow since it involves simply a change of season of use of water, with no reasonable evidence that usage in either season will increase or decrease overall consumption. See, e.g. Reply Brief of the United States at 28-30. In addition, John Martin Reservoir is available to bridge seasonal reductions and enhancements. This view of the benign impact of the WWSP was supported by pre-implementation studies showing no adverse impact due to the WWSP and seemed to have been shared by Kansas' representatives to the Compact Administration who, as the evidence at trial confirmed, viewed the WWSP as uncontroversial and of no threat to Kansas. See, Def. Exhs. 538, 539; Tr. Vol. 85 at pp. 54-55, 58-70 (Thompson); Def. Exh. 532.

Furthermore, the WWSP appears to be exactly the type of activity for which Paragraph VIII(H) was adopted. That paragraph expresses the intentions of the parties that "enforcement" is to be a cooperative effort through the Compact Administration and, ultimately, through state officials. The very existence of the provision confirms that the Compact parties understood there would be ongoing factual questions about impacts to be resolved. There is no suggestion in the provision that activities are to be held up until impact determinations can be made. To the contrary, action is to be taken only after the Compact Administration has made its findings on impacts. By contrast, the specific activities described in Paragraph V(H) may not proceed without affirmative showing of no impact, suggesting by comparison, that the Compact parties intended other beneficial activities with apparently benign effects to go forward absent meaningful evidence of adverse impacts.

Finally, the conduct of the parties confirms that neither Kansas nor Colorado believed that the absence of depletions would have to be absolutely proven before beneficial development like the WWSP could go forward. The evidence at trial showed that the Kansas representatives to the Compact Administration, men experienced in water matters, considered the implementation of the WWSP to be noncontroversial and not prejudicial to Kansas. When Kansas did begin to object to the WWSP, it was not on the basis of any specific negative impact that Kansas could identify,

\[1\] As explained extensively in the Briefs of the United States, because of the biases and other problems in its conceptualization and simulation of the hydrologic regime, the HI Model is not a reasonable or reliable tool to be considered as evidence of adverse impacts from the operation of the WWSP.
but rather solely on the procedural argument that it should have the power to stop the Program by withholding its approval. Finally, Kansas enthusiastically entered into the 1980 Agreement, which specifically provides for benefits to Kansas resulting from a portion of the WWSP. One may conclude that Kansas' endorsement and continued acceptance of the 1980 Agreement and its benefits is prima facie evidence that Kansas does not actually believe the WWSP adversely affects Kansas stateline flows, but merely wants to shift the burden of showing no impacts to Colorado.

    In sum, we believe the WWSP fully complies with the Arkansas River Compact because it is beneficial development with no known or apparent adverse effects.

Sincerely,

[Signature]

Patricia L. Weiss
James J. Dubois
Attorneys
General Litigation Section
Environment and Natural Resources Division

cc: Mr. David Robbins, Esquire
    Mr. John Draper, Esquire
    The Honorable George G. Grover
August 24, 1993

BY TELECOPY AND MAIL

The Honorable Arthur L. Littleworth
Special Master
Best, Best & Krieger
3750 University Avenue
Riverside, California 92502

Re: Kansas v. Colorado, No. 105, Original (U.S. Supreme Court)

Dear Mr. Littleworth:

You addressed a number of questions to the parties by your letter of July 22, 1993. Thank you for the extension which you accorded us in responding to your letter. We are answering only the four questions addressed to Kansas. If we have any disagreement with the responses of the other parties, we will address that in our reply.

Question No. 1: Kansas states that this action is not a request for an equitable apportionment of the Arkansas River, but rather constitutes "an enforcement action under [the] Compact." (Kan. Opening Brief at 31) Do Colorado and the United States agree that this is a Compact enforcement action?

Answer No. 1: This question is directed to Colorado and the United States.

Question No. 2: Colorado argues that I should apply the "clear and convincing" burden of proof articulated by the Supreme Court in cases between States. The position of the United States appears to be close in result, but not necessarily based upon the same rationale. I would appreciate a sharper statement from the United States as to its view on the appropriate standard of proof in a case of this kind.
Answer No. 2: This question is directed to the United States.

Question No. 3: Colorado argues that Kansas should be barred from asserting any complaints arising from well development that occurred prior to 1965. Would Colorado please explain why the year 1965 was selected. That is, what is the significance of that year as opposed to any other?

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Answer No. 4: With respect to operation of Trinidad Reservoir, please see the following evidence in the record:

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(6) J. Ex. 19 (Esp. Minutes of 6/30/80 ARCA Meeting)
(7) Tr. vol. 17, at 97-103 (11/22/90) (Spronk)

With respect to wells, the Winter Water Program, Trinidad and shortages at the stateline, please see the following evidence in the record:

(1) D. Ex. 17, at 35-39, 68-71 (2/13/90 Deposition of Carl Bentrup)
(2) D. Ex. 21, at 121-23 (2/9/90 Deposition of Howard Corrigan)

Question No. 5: Colorado states that it does not dispute the fact that wells drilled east of the Buffalo Canal headgate after 1965 depleted stateline flows "to some extent during the 1970’s." (Colo. Closing Brief re Wells at 19) Is there evidence from which such depletion can be quantified, apart from the argument that such depletion should be offset by benefits accruing under the 1980 Plan?

Answer No. 5: This question is directed to Colorado.
Question No. 6: Mr. Helton testified that benefits under the 1980 Plan "largely" offset any post-Compact well development below John Martin. (RT Vol. 81 at 156; RT Vol. 133 at 70-74) Is there evidence by which benefits from the 1980 Plan can be quantified?

Answer No. 6: This question is directed to Colorado.

Question No. 7: Does Kansas agree that while the 1980 Operating Plan has been in effect, and so long as it remains in effect, Kansas may not claim releases from John Martin other than in accordance with the Plan? (See Colo. Closing Brief re Wells at 57)

Answer No. 7:

No, Kansas does not agree with the referenced statement by Colorado.

The Colorado statement referred to suggests that Kansas' only entitlement under the Compact consists of releases from John Martin Reservoir. This is not correct. Kansas is also entitled to maintenance of flows into the conservation pool at John Martin Reservoir, of return flows below John Martin Reservoir, and of flows through John Martin Reservoir which contributed to usable flows at the stateline under institutional conditions (viz., wells and reservoir operations) existing at the time of the Compact's adoption. None of these entitlements are addressed by the Colorado statement referred to.

With respect to future releases from John Martin, given the fact that the 1980 Operating Plan is inconsistent with the Compact, it is not enforceable, and Kansas, as a matter of law, is entitled to call for releases, if it should choose to do so, consistent with the Compact rather than the 1980 Operating Plan.

With respect to releases during the period from 1980 to the present, Kansas claims that it was entitled to the releases that would have been made to Kansas in accordance with the 1980 Operating Plan absent the depletions above John Martin Reservoir caused by post-Compact well pumping and the Winter Water Program in Colorado. One effect of post-Compact well pumping and the Winter Water Program above John Martin is to reduce inflows into conservation storage and thus allocations to the accounts, including the Kansas account.

The effect below John Martin Reservoir of post-compact well pumping and the WWSP is to decrease stateline flows that occur
independent of John Martin releases, which in turn affects the
need in Kansas to call for releases.

Kansas did not, by agreeing to the 1980 Operating Plan,
waive any rights guaranteed to Kansas by the Compact, including
those afforded by Article IV-D. The parties to the 1980
Operating Plan agreed to this principle in Article VI of the
Plan.

Question No. 8: Beyond the testimony of Mr. Helton, are
there any exhibits or testimony that relate to the history of the
negotiations leading to the 1980 Operating Plan, and to the
intent of the negotiators?

Answer No. 8: Beyond the testimony of Mr. Helton, there is
the testimony of Mr. Corrigan in D. Ex. 21, at 132-43, in which
the purpose of the 1980 Operating Plan is discussed.
Mr. Corrigan agrees that the purpose of the negotiations was to
"hammer out a better way to get water out of the reservoir to the
benefit of both states." Id., at 132. But the impact of well
pumping or the Winter Water Program was never mentioned as a
Compact violation which the 1980 Operating Plan was meant to
remedy. The first whereas clause of the 1980 Operating Plan
itself is in accord with this. See J. Ex. 21, Doc. 11, at 1.

Mr. Helton testified that the 1980 Operating Plan grew out
of a discussion of "ways which the water might be utilized with a
greater efficiency and achieve a greater beneficial use." Tr.
vol. 81, at 129, 93-95, 128-39 (5/21/91) (Helton). It should be
noted that no one, including Mr. Helton, testified that the
intent of the 1980 Operating Plan was to offset post-Compact well
depletions or Winter Water Program depletions in violation of the
Compact.

Question No. 9: Mr. Helton also testified that the impact
from pumping above John Martin Reservoir was "largely offset" by
return flows from transmountain imports, and reduced efficiency
resulting from the clear water effects. (RT Vol. 81 at 155, RT
Vol. 115 at 62) Is there evidence, first, by which the amount of
the impact can be quantified without offset, and secondly, by
which the amount of the offset can be quantified?

Answer No. 9: This question is directed to Colorado.

Question No. 10: The Kansas HI Model shows that depletions
to usable flow caused by post-compact pumping from 1950 to 1985
amounted to 620,000 acre feet, and that depletions due to the
WWSP were 40,000 acre feet. Yet the combined impact is only
489,000, that is, less than the depletions from wells alone.
Would Kansas please explain this apparent anomaly. I notice that the "switches" are different in the combined impact run. Also, is it possible on the basis of evidence in the record to apportion the 489,000 acre feet between wells and the WWSP?

**Answer No. 10:** As suggested in the question, the reduced figure of 489,000 is the result of a different switch setting for transmountain water. The reason that the combined effects (shown on P. Ex. 111***) are calculated to be less than the historical pumping effects is that the historical pumping effects of 620,000 acre feet of usable depletions is calculated independently of any transmountain return flow offset. The 620,000 acre foot figure is therefore the actual violation of the Compact by well pumping.

The question of any offset from transmountain return flows is arguably something that could be reserved to the remedies phase of this litigation. However, Kansas has provided the results obtained if one does offset the transmountain return flows against both the historical pumping and the winter water effects. This is done in the combined effects run by changing the transmountain switch from historical (H) to zero (0). Offsetting the return flows against both historical pumping and winter water together results in a net depletion of usable flows of 489,000 acre feet. Again, this is arguably something that could be reserved to the remedies phase, with the actual calculated violations due to pumping being 620,000 acre feet of usable depletions and the effects of the Winter Water Program being 40,000 acre feet of usable depletions. The transmountain deliveries are reported in P. Exs. 34, 34A. It is the return flows from these deliveries that are offset against the effects of historical pumping and the Winter Water Program to arrive at the reduced net effect of 489,000 acre feet.

There is no direct evidence of apportionment of the 489,000 acre feet combined impact between wells and the WWSP because there may not be a way to specifically apportion that combined impact. One may be able to indirectly approximate the apportionment of the effects by using P. Ex. 651. On that exhibit, the HHHH v. CHHO run (pumping with transmountain offset) shows usable flow depletions of 464,000 acre feet. The HHHH v. CCHO run (pumping and winter water with transmountain offset) shows usable flow depletions of 496,000 acre feet. Accordingly, the difference between 496,000 acre feet and 464,000 acre feet is 32,000 acre feet, which represents the best approximation in evidence of the incremental amount of depletions caused by the WWSP, using transmountain as an offset.

The important point to recognize in this context is that the actual violations of the Compact are specified separately and do
not include transmountain offsets. Those violations consist of 620,000 acre feet of usable flows for post-Compact well pumping and 40,000 acre feet for the WWSP.

**Question No. 11:** Colorado’s "What If 2" scenario showed depletions from well pumping for 1950-85 of 582,696 acre feet. It is my understanding that this figure relates to total depletions and not to depletions of usable flow, but that it does reflect any offset for return flows from transmountain imports. (RT Vol. 115 at 75). If this understanding is correct, is there evidence in the record upon which this amount of depletion could be modified to address only usable flows?

**Answer No. 11:** This question is directed to Colorado.

**Question No. 12:** Colorado states that if its analysis calculates higher depletions than the Kansas HI Model, the Colorado analysis nonetheless leads to very different conclusions. (Colo. Reply Brief at 35) Would Colorado please elaborate on this statement, and explain what the different conclusions are.

**Answer No. 12:** This question is directed to Colorado.

**Question No. 13:** Colorado Exhibit 135*, page 6.1 indicates an average "potential impact" under the "What If 2" scenario of 7755 acre feet annually over the 1950-85 period. This represents 40% of the change in conservation storage in John Martin, and all of the change in stateline flows during the irrigation season from April through October. Over the 1950-85 period, the total impact under this analysis would amount to 279,180 acre feet. In the Colorado view, is this "potential impact" the same as a material depletion of usable stateline flow? Is the change in April-October stateline flows the same as a change in usable flows?

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**Question No. 14:** As I recall, Mr. Binder and Mr. Finlayson testified for the United States that they were unable to determine whether or not the WWSP was operated in compliance with the Compact. Of course, this was apart from the major thrust of their testimony that the Kansas modeling results could not be relied upon to show a Compact violation. What is the position of the United States on the compliance of the WWSP with the Compact? Is it that the United States doesn’t know whether the program complies, or that it does comply? If the latter, could you please cite to the evidence on which the United States relies.
The Honorable Arthur L. Littleworth
August 24, 1993
Page 7

Answer No. 14: This question is directed to the United States.

Sincerely yours,

[Signature]

John B. Draper
Counsel of Record
for the State of Kansas

JBD:lg
10389-88-01
Copy to: David W. Robbins, Esq.
        Patricia L. Weiss, Esq.
        Andrew F. Walch, Esq./James J. DuBois, Esq.
TELECOPY MESSAGE

NAME: The Honorable Arthur L. Littleworth

ADDRESS: ____________________________________________________________

BUSINESS PHONE: ____________________ TELECOPY NO.: 909 - 686-3083

FROM: John B. Draper

TOTAL NUMBER OF PAGES TO FOLLOW: ________________________________

COMMENTS

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CLIENT NAME: Kansas

CLIENT NO.: 10389-98-01
The Honorable Arthur L. Littleworth  
Special Master  
Beat, Beat & Krieger  
3750 University Avenue  
Riverside, California 92502  

Re: Kansas v. Colorado, No. 105, Original (U.S. Supreme Court)

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The Honorable Arthur L. Littleworth
August 24, 1993
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The Honorable Arthur L. Littleworth  
August 24, 1993  
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The Honorable Arthur L. Littleworth  
August 24, 1993  
Page 4

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The Honorable Arthur L. Littleworth  
August 24, 1993  
Page 5

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The important point to recognize in this context is that the actual violations of the Compact are specified separately and do
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The Honorable Arthur L. Littleworth  
August 24, 1993  
Page 7

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Sincerely yours,

John B. Draper  
Counsel of Record  
for the State of Kansas

JBD:1g  
10389-88-01  
Copy to:  David W. Robbins, Esq.  
Patricia L. Weiss, Esq.  
Andrew F. Walch, Esq./James J. DuBois, Esq.
DATE: August 24, 1993

DELIVER TO:
Arthur L. Littleworth
John B. Draper
Patricia L. Weiss
James J. DuBois

RE: Kansas v. Colorado, No. 105, Original (U.S. Supreme Court)

FROM: David Robbins

TOTAL NUMBER OF PAGES INCLUDING COVER SHEET: 19

COMMENTS: Letter response of 8/24/93 to Special Master's 14 questions.

IF YOU DO NOT RECEIVE ANY OF THE PAGES, PLEASE CALL OUR OFFICE IN DENVER, COLORADO, AT 303-296-8100

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August 24, 1993

Hon. Arthur L. Littleworth
Special Master, U.S. Supreme Court
400 Mission Square
3750 University Avenue
P. O. Box 1028
Riverside, CA 92502

Re: Kansas v. Colorado, No. 105,
Original (U.S. Supreme Court)

Dear Mr. Littleworth:

Colorado's responses to the questions posed in your July 22, 1993 letter are as follows:

1. Kansas states that this action is not a request for an equitable apportionment of the Arkansas River, but rather constitutes "an enforcement action under [the] Compact." (Kan. Opening Brief at 31) Do Colorado and the United States agree that this is a Compact enforcement action?

Response: Colorado agrees that Kansas did not request an equitable apportionment of the Arkansas River in its complaint, which alleged that Colorado and its water users have violated the Arkansas River Compact. However, to describe this "as an enforcement action under [the] Compact" suggests that Kansas is seeking an order to enforce the Compact's provisions; whereas, the specific relief Kansas sought in its complaint is damages. Therefore, it would be more accurate to describe this as an action for violation or breach of the Arkansas River Compact rather than
August 24, 1993
Page 2

an enforcement action under the Compact. In any event, however, Colorado does not believe that characterization of this case as "an enforcement action under [the] Compact" should be determinative of the burden of proof that should be applied. See Colorado's Reply Brief at 13-15 (May 17, 1993).

2. Colorado argues that I should apply the "clear and convincing" burden of proof articulated by the Supreme Court in cases between States. The position of the United States appears to be close in result, but not necessarily based upon the same rationale. I would appreciate a sharper statement from the United States as to its view on the appropriate standard of proof in a case of this kind.

Response: No comment.

3. Colorado argues that Kansas should be barred from asserting any complaints arising from well development that occurred prior to 1965. Would Colorado please explain why the year 1965 was selected. That is, what is the significance of that year as opposed to any other?

Response: Colorado should have stated that Kansas should be barred from asserting any complaints arising from well development that occurred prior to 1966 rather than 1965. The year 1965 was selected for practical reasons. In 1965 legislation was enacted giving the Colorado State Engineer authority to deny the issuance of new well permits if the vested rights of others would be materially injured. See generally RT Vol. 15 at 107-08 (Spronk) (describing statutory changes in the administration of ground water
in Colorado). After 1965, the State Engineer essentially stopped issuing new well permits in the Arkansas River Valley except for those east of the Buffalo Canal headgate. RT Vol. 130 at 28-29 (Simpson). Although the existence of well development which had occurred in Colorado up through and including 1965 was clearly known to Kansas officials, e.g., Def. Exh. 21 at 165-66, 167-68 (Corrigan), and the potential effect of such development would have been clear at that time, Kansas made no complaint about such


2/ Colorado's tabulation of high-capacity irrigation wells shows that 1,950 wells out of a total of 2,062 wells have appropriation dates of 1965 or earlier. Def. Exh. 165*, Table A.1. Additional investigation by Mr. Simpson, the Colorado State Engineer, indicated that of the 112 wells with appropriation dates after 1965, 76 were east of the Buffalo Canal headgate. RT Vol. 130 at 29-32. Of the remainder, some were constructed into bedrock aquifers and some were permitted in 1965 or earlier, but were decreed appropriation dates after 1965. Id. Only eleven well permits were issued by the State Engineer to construct wells in the Valley Fill Aquifer west of the Buffalo Canal headgate after 1965. Id.

As Dr. Danielson testified, the Colorado State Engineer continued to issue well permits east of the Buffalo Canal headgate for several years after 1965 based on the fact that sizeable amounts of water were passing Garden City unused and that Kansas was allowing unrestricted construction of wells in Kansas right up to the Stateline. RT Vol. 76 at 112-15 ("KANSAS HAD NO RESTRICTIONS WHATSOEVER ON PERMITS. IT WAS SIMPLY 'GO DRILL YOUR WELL.'"); see also RT Vol. 115 at 63-64 (Helton). While Kansas also delayed in complaining about these wells, many of them were not permitted until the early 1970s. See Def. Exh. 165*, Table A.1 (Reach 4). Furthermore, the substitute supply plan of the Lower Arkansas Water Management Association (LAWMA), which relied upon wells as alternate points of diversion to the Buffalo Canal water right, did not become operational until approximately 1976, see Def. Exh. 135*, page 1.3 (column headed "Buffalo"), and shortly afterwards the 1980 Operating Plan was adopted to address complaints about transit losses on Kansas releases from John Martin Reservoir. Thus, while Kansas also delayed in complaining about wells drilled east of the Buffalo Canal headgate after 1965, Colorado did not want to weaken the force of its arguments based on Kansas' delay by
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trying to stretch them to include wells which were permitted after 1965. While the wisdom of issuing well permits east of the Buffalo Canal headgate after 1965 may seem questionable today, the effects of those wells were addressed through the 1980 Operating Plan.

4. Kansas states that it retained a consulting firm in 1983 "after several years of fruitless efforts to resolve the problem of postcompact depletions." (Kan. Opening Brief at 41) Would Kansas please refer me to the evidence that supports this assertion.

Response: Although this question was directed to Kansas, the statement in Kansas' opening brief is disputed by Colorado insofar as it implies that Kansas complained about post-compact well development in Colorado prior to the request for an investigation by the Compact Administration in 1985.

5. Colorado states that it does not dispute the fact that wells drilled east of the Buffalo Canal headgate after 1965 depleted stateline flows "to some extent during the 1970's." (Colo. Closing Brief re Wells at 19) Is there evidence from which such depletion can be quantified, apart from the argument that such depletion should be offset by benefits accruing under the 1980 Plan?

Response: Yes. Mr. Schroeder quantified depletions and accretions to Stateline flows by wells drilled east of the Buffalo Canal headgate after 1965 using his modified version of the H-I

\[3/\] But see RT Vol. 76 at 112-15 (Danielson). Kansas' failure to restrict well development in southwestern Kansas in the late 1960s and 1970s, despite warnings from federal agencies about the impacts of over-development on aquifer water levels, Jt. Exh. 105 at 29, 40, 130, seems even more subject to reproach.
Model. See RT Vol. 139 at 25. The results are shown on Def. Exh. 1011, Comparison 11, as follows:

<table>
<thead>
<tr>
<th>Total Depletions</th>
<th>Depletions &amp; Accretions</th>
</tr>
</thead>
<tbody>
<tr>
<td>57,595</td>
<td>57,051</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HCl's Usable (Helton's Coeff.) Depletions</th>
<th>Depletions &amp; Accretions</th>
</tr>
</thead>
<tbody>
<tr>
<td>31,150</td>
<td>29,749</td>
</tr>
</tbody>
</table>

During his testimony, Mr. Helton described how the impacts of wells drilled east of the Buffalo Canal headgate after 1965 were quantified by Mr. Schroeder. See RT Vol. 133 at 58-68. Although both Mr. Helton and Mr. Schroeder had substantial criticisms of the H-I Model, even as modified by Mr. Schroeder, Mr. Helton testified that he used the H-I Model for this purpose because it was relatively convenient to use and because he wanted to be able to compare the depletions from the wells drilled east of the Buffalo Canal headgate after 1965 with the benefits of the 1980 Operating Plan. RT Vol. 133 at 60-61. He pointed out that the wells drilled east of the Buffalo Canal after 1965 were downstream from any Colorado water user. Id. at 65. Therefore, the elimination of pumping by those wells would not affect diversions predicted by the model. Id. While Mr. Helton was unwilling to agree that the results of this comparison were accurate, he did feel they were reasonable. Id. at 66.

The results are also shown on Def. Exh. 1013, which Mr. Schroeder prepared to summarize the most important comparisons shown on Def. Exh. 1011. RT Vol. 139 at 35. The results shown on Def. Exh. 1013 do not include the results of applying the Spronk usable flow analysis because Mr. Schroeder did not consider that analysis appropriate. Id. Therefore, the results of the Spronk usable flow analysis are not shown in these responses.
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6. Mr. Helton testified that benefits under the 1980 Plan "largely" offset any impact of post-Compact well development below John Martin. (RT Vol. 81 at 156; RT Vol. 133 at 70-74) Is there evidence by which benefits from the 1980 Plan can be quantified?

Response: Yes. Mr. Schroeder quantified the depletions and accretions resulting from the 1980 Operating Plan using his modified version of the H-I Model. See RT Vol. 139 at 24-25. The results are shown on Def. Exh. 1011, Comparison 9, as follows:

<table>
<thead>
<tr>
<th>Total Depletions &amp; Accretions</th>
<th>HCI's Usable (Helton's Coeff.) Depletions &amp; Accretions</th>
</tr>
</thead>
<tbody>
<tr>
<td>101,444</td>
<td>79,456</td>
</tr>
<tr>
<td>-125,591</td>
<td>-30,000</td>
</tr>
</tbody>
</table>

Mr. Helton relied on Comparisons 9 and 11 on Def. Exh. 1011 as part of the basis for his opinion that the 1980 Operating Plan had effectively offset the depletions caused by wells drilled east of the Buffalo Canal headgate after 1965. RT Vol. 133 at 68-70.5/

In addition, Mr. Helton quantified certain benefits from the 1980 Operating Plan that he could easily quantify, including the increase in conservation storage by eliminating Colorado demands for releases of up to 100 cfs of river flow during the winter storage season, the reduced evaporation losses on conservation storage, and the amounts stored in the Kansas transit loss account. Def. Exh. 290**; RT Vol. 84 at 94-110. See also RT Vol. 133 at 70-74. These benefits alone averaged 18,710 acre-feet per year, Def. Exh. 290**, but did not include the benefits to Kansas from guaran-

5/ Mr. Helton also relied in part on his own analysis of the benefits of the 1980 Operating Plan. RT Vol. 133 at 70-74.
teeing Kansas 40 percent of the water stored in conservation storage in John Martin Reservoir or the change in timing of releases allowing Kansas to call for water when it is most beneficial. See RT Vol. 84 at 106-110. Mr. Helton assumed that Kansas received 40 percent of the benefits which he was able to quantify. RT Vol. 133 at 72. For the years 1979-85, Mr. Helton calculated that these direct benefits to Kansas were 49,111 acre-feet. Id.

7. Does Kansas agree that while the 1980 Operating Plan has been in effect, and so long as it remains in effect, Kansas may not claim releases from John Martin other than in accordance with the Plan? (See Colo. Closing Brief re Wells at 57)

Response: No comment.

8. Beyond the testimony of Mr. Helton, are there any exhibits or testimony that relate to the history of the negotiations leading to the 1980 Operating Plan, and to the intent of the negotiators?

Response: Yes. Mr. Bentrup, Mr. Corrigan, and Mr. Hilmes discussed the history of the negotiations leading to the 1980 Operating Plan and the intent of the negotiators to a limited extent in their depositions. See Def. Exh. 17 at 80-98; Def. Exh. 21 at 132-45; and Def. Exh. 31 at 34-47. Mr. Gibson, the former Kansas Chief Engineer, also briefly discussed the negotiations leading to the 1980 Operating Plan in his deposition. Def. Exh. 27 at 77-79. Their testimony is generally consistent with the testimony of Mr. Helton. It should be noted that although Kansas identified several non-expert witnesses who were expected to
testify concerning the 1980 Operating Plan, Kansas did not call any of those witnesses for that purpose.

9. Mr. Helton also testified that the impact from pumping above John Martin Reservoir was "largely offset" by return flows from transmountain imports, and reduced efficiency resulting from the clear water effects. (RT Vol. 81 at 155, RT Vol. 115 at 62) Is there evidence, first, by which the amount of the impact can be quantified without offset, and secondly, by which the amount of the offset can be quantified?

Response: No. Colorado's "What If 2" scenario (Def. Exh. 135*) did not separately quantify the amount of the impact without offset or the amount of the offset. What Colorado did was to quantify the net change in river flow and conservation storage over the period 1950-85, assuming there had been no post-compact well pumping, no transmountain return flows, and no clear water effects from Pueblo Reservoir. RT Vol. 84 at 40-43 (Helton). The net change in river flow above John Martin Dam averaged 1,294 acre-feet per year and the net change in conservation storage averaged 841 acre-feet per year. Def. Exh. 135*, page 6.1, Cols. (9) and (13); RT Vol. 84 at 41-44, 51-52, 56-63 (Helton). For the purpose of determining the potential impact on Kansas, Mr. Helton assumed that Kansas would be entitled to 40 percent of the changes in conservation storage. Def. Exh. 135*, page 6.1, note (c); RT Vol. 84 at 43.6

6/ In addition, in response to a question by the Special

6/ By assuming that Kansas would be entitled to 40 percent of the changes in conservation storage, Mr. Helton over-estimated the potential impact on Kansas. RT Vol. 134 at 32-34. His reasoning was that the actual impact on Kansas could not exceed this amount. See RT Vol. 115 at 78.
Master, RT Vol. 134 at 19, Mr. Helton prepared an exhibit to compare the pre- and post-Pueblo Reservoir canal and lateral losses to demonstrate that the clear water effects of Pueblo Reservoir were relatively small. Def. Exh. 1017; see RT Vol. 139 at 68-78, for Mr. Helton's testimony concerning this exhibit. See also RT Vol. 84 at 61 (clear water effect is a relatively small increment).

10. The Kansas HI Model shows that depletions to usable flow caused by post-Compact pumping from 1950 to 1985 amounted 620,000 acre-feet, and that depletions due to the WWSP were 40,000 acre-feet. Yet the combined impact is only 489,000, that is, less than the depletions from wells alone. Would Kansas please explain this apparent anomaly. I notice that the "switches" are different in the combined impact run. Also, is it possible on the basis of evidence in the record to apportion the 489,000 acre-feet between wells and the WWSP?

Response: The Special Master asked Mr. Durbin, the developer of the HI Model, if he had apportioned his "combined effects" comparison between wells and the WWSP. See RT Vol. 44 at 128. Mr. Durbin responded by saying that he had prepared other comparisons showing the isolated effects of wells and the WWSP. Id. at 128-29. However, he later testified that it was not possible to take comparisons of the individual impacts of wells and the WWSP and add them together to get the combined impacts, RT Vol. 45 at 48-50, and never explained how he would apportion the combined effects between wells and the WWSP. The Kansas replacement experts did not apportion the 489,000 acre-feet between wells and the WWSP and did not offer any testimony on how such an apportionment might be made.
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11. Colorado's "What If 2" scenario showed depletions from well pumping for 1950-85 of 582,696 acre-feet. It is my understanding that this figure relates to total depletions and not to depletions of usable flow, but that it does reflect any offset for return flows from trans-mountain imports. (RT Vol. 115 at 75). If this understanding is correct, is there evidence in the record upon which this amount of depletion could be modified to address only usable flows?

Response: The Special Master's understanding concerning Colorado's "What If 2" scenario is correct. With regard to evidence of the amount of depletion to usable flows, Mr. Helton calculated the impact on usable flow for the period 1950 through 1969. This is shown on page 7.3 (substitute page) of Def. Exh. 135*. For the period 1950-69, the annual depletion to usable flow averaged 1,683 acre-feet per year or 33,660 acre-feet for the 20-year period. Id. See RT Vol. 86 at 89.

Mr. Helton calculated the impact on usable flow from the potential impact on Kansas, which he based on the change in Stateline flow during the months April through October and 40 percent of the change in conservation storage. RT Vol. 84 at 43, 46, 64-66. The potential impact on Kansas for the years 1950-69 is shown on page 7.1 of Def. Exh. 135*. Next, Mr. Helton determined on a monthly basis the Stateline flow which was not diverted in

7/ Mr. Helton did not consider depletions to Stateline flow during the months of November through March to be a potential impact on usable flow because Kansas diversions during these months were small in comparison to the unused flow passing the Farmers diversion. See RT Vol. 83 at 64; Vol. 115 at 77-78; Vol. 134 at 27-30. See also RT Vol. 53 at 121-51; Vol. 54 at 22-31 (cross-examination of Durbin on the fact that Kansas diversions in the winter were only a small fraction of Stateline flows).
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Kansas and which flowed unused past the headgate of the Farmers Ditch in Kansas. RT Vol. 86 at 41-61. The monthly amounts of Stateline flow not diverted in Kansas for the years 1950 through 1969 are shown on page 7.2 (substitute page) of Def. Exh. 135*. Finally, Mr. Helton compared the monthly potential impact to the monthly Stateline flow not diverted in Kansas. RT Vol. 86 at 82. If the potential impact was greater than the Stateline flow not diverted in Kansas, he treated the difference as an impact on usable flow.8/ Id. at 82, 84. The impact of post-compact well development in Colorado on usable flow for the years 1950-69 is shown on page 7.3 (substitute page) of Def. Exh. 135*. See RT Vol. 86 at 80-81, 92-93.

Mr. Helton was not able to do an analysis of the impact on usable flow for the years 1970-85 because the streamflow gage at Garden City had been removed, RT Vol. 86 at 44-46; Vol. 134 at 14-15; thus, he was not able to calculate the Stateline flow which was not diverted in Kansas and which flowed unused past the Farmers diversion. However, Mr. Helton testified that the impact on usable flow for the years 1970-85 would be less than the potential impact he had calculated. RT Vol. 86 at 93.

12. Colorado states that if its analysis calculates higher depletions than the Kansas HI Model, the Colorado analysis nonetheless leads to very different conclusions. (Colo. Reply Brief at 35) Would Colorado please elabo-

8/ Mr. Helton did not use the term "usable Stateline flow" because the potential impact on Kansas includes 40 percent of the change in John Martin Reservoir conservation storage.
rate on this statement, and explain what the different conclusions are.

Response: Colorado's "What If 2" scenario showed changes in Stateline flow for the period 1950 through 1985 of 582,696 acre-feet. The results of this scenario cannot be compared directly to any of the comparisons shown on Pl. Exh. 111*** because the Colorado analysis uses different estimates of pre- and post-compact pumping, different institutional conditions, and does not reoperate John Martin Reservoir based on changes in conservation storage, which would affect diversions in Water District 67 and releases for Kansas. Mr. Larson prepared a comparison (Pl. Exh. 642), using the H-I Model as revised by the Kansas replacement experts, for the same amount of change in post-compact pumping as used in Colorado's "What If 2" scenario. This comparison showed depletions to Stateline flows of 395,000 acre-feet. That was the basis for Colorado's statement that its analysis may calculate higher depletions than the Kansas H-I Model.

The Colorado analysis leads to very different conclusions because Colorado did its analysis by reaches, which allowed Mr. Helton to determine changes in conservation storage in John Martin Reservoir as well as changes in Stateline flow. The Colorado analysis also considered the quantities of water that were unused in Kansas and the effects of post-compact well development in Kansas. Based on the Colorado analysis, Mr. Helton concluded that the impacts of post-compact well pumping in Colorado above John Martin Reservoir had been largely offset by transmountain return
flows and the clear water effects of Pueblo Reservoir. RT Vol. 81 at 155-56; Vol. 84 at 51. **See** response to Question 9 above.

Second, Mr. Helton concluded that impacts of pumping above the Buffalo Canal headgate were largely absorbed by Colorado ditches and the main impact on Stateline flow occurred as a result of pumping in the reach below the Buffalo Canal headgate. RT Vol. 84 at 52. Third, Mr. Helton concluded that post-compact well development in Colorado had a small impact on usable flow to Kansas through 1969 (1,683 acre-feet per year average for 1950 through 1969). RT Vol. 86 at 89. **See** response to Question 11 above. However, he concluded that there was a much larger amount of Stateline flow passing the Farmers diversion unused (72,640 acre-feet per year average for 1950 through 1969, excluding 1965). Def. Exh. 244*; RT Vol. 86 at 77.**

As Mr. Helton testified, this was water which was surplus to the needs of water users in Colorado and Kansas and was available for development by both States under the Compact. RT Vol. 86 at 78. While both States undoubtedly knew

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9/ The average shown on Def. Exh. 244* for the years 1950 through 1969, excluding 1965, is based on the annual Stateline flow past the Farmers diversion unused, corrected for diversions in excess of the vested rights of the Kansas ditches. RT Vol. 86 at 72-75. On page 7.2 of Def. Exh. 135*, Mr. Helton showed the Stateline flow past the Farmers diversion unused for the months of April through October. The monthly values shown on page 7.2, which were used to calculate the impact on usable flow to Kansas shown on page 7.3, were taken from Def. Exh. 238* and were not corrected for diversions in excess of the vested rights of the Kansas ditches. **See** RT Vol. 86 at 41-59. The average Stateline flow past the Farmers diversion unused during the months of April through October for the years 1950 through 1969 (including 1965) was 60,323 acre-feet per year. Def. Exh. 135*, page 7.2 (substitute page).
that post-compact well development in both States might deplete usable flows to some extent, they also came to realize that additional well development was the only feasible method to develop the substantial amounts of unused flow, and both States allowed it. Id. at 78-79. To the extent diversions in Kansas were reduced by post-compact well development in both States, Kansas allowed farmers with surface rights to drill wells to supplement their surface supplies. Moreover, to the extent well development in Colorado depleted return flows at the Stateline, Kansas could demand additional releases of better quality water from John Martin Reservoir.

Thus, while the Colorado analysis may calculate higher depletions to Stateline flows for a similar change in post-compact pumping, the Colorado analysis allowed Mr. Helton to identify the cause of the depletions to Stateline flows. As Mr. Helton showed, the depletions to Stateline flow were not due to post-compact well pumping in Colorado generally, but were due primarily to wells which had been constructed east of the Buffalo Canal headgate after 1965. Finally, Mr. Helton concluded that the 1980 Operating Plan had been beneficial to the water users in both Colorado and Kansas by allowing water stored in John Martin Reservoir to be used more efficiently and by increasing the water supply that accrued to conservation storage, RT Vol. 84 at 106-10, and that the 1980 Operating Plan had effectively offset the depletions caused by
well constructed east of the Buffalo Canal headgate after 1965. RT Vol. 133 at 68-70.

With regard to the wells constructed east of the Buffalo Canal headgate after 1965, Mr. Helton was not able to quantify the impact on usable flow from those wells or the benefits of the 1980 Operating Plan with the Colorado analysis; however, using the modified H-I Model, Mr. Schroeder calculated the depletions from those wells and the benefits from the 1980 Operating Plan. The benefits from the 1980 Operating Plan were considerably larger than the depletions caused by wells drilled after 1965 east of the Buffalo Canal headgate. RT Vol. 133 at 58-70. See response to Question 6 above.

13. Colorado Exhibit 135*, page 6.1 indicates an average "potential impact" under the "What If 2" scenario of 7755 acre-feet annually over the 1950-85 period. This represents 40% of the change in conservation storage in John Martin, and all of the change in stateline flows during the irrigation season from April through October. Over the 1950-85 period, the total impact under this analysis would amount to 279,180 acre-feet. In the

10/ The depletions and accretions to Stateline flows due to wells drilled after 1965 east of the Buffalo Canal headgate were a net depletion of 57,051 acre-feet. Def. Exh. 1011, Comparison 11. The depletions and accretions to Stateline flows from the 1980 Operating Plan were a net accretion of 125,591 acre-feet. Def. Exh. 1011, Comparison 9. In the case of the 1980 Operating Plan, it is more appropriate to compare the total depletions and accretions to Stateline flow rather than the total depletions and accretions to usable Stateline flows because the benefits of the 1980 Operating Plan to Kansas were in fact almost entirely usable. RT Vol. 133 at 74-75. The H-I Model calculates a smaller increase in usable Stateline flows because of the inaccuracies in modeling John Martin Reservoir, which holds water in storage, causing excessive spills. See id. at 75.
Colorado view, is this "potential impact" the same as a material depletion of usable Stateline flow? Is the change in April-October stateline flows the same as a change in usable flows?

Response: The answer to both questions is "no." The potential impact on Kansas shown in Column (17) on page 6.1 of Def. Exh. 135* is only that -- a potential impact on Kansas. See RT Vol. 84 at 52; Vol. 115 at 73; Vol. 134 at 22-23.

Pages 7.1, 7.2 (substitute page), and 7.3 (substitute page) of Def. Exh. 135* show Mr. Helton's analysis of the impact on usable flow for the years 1950 through 1969. The potential impact on Kansas for the years 1950-69 averaged 4,405 acre-feet per year (page 7.1, Col. (11)); however, Mr. Helton concluded that the impact on usable flow was only 1,683 acre-feet per year (page 7.3 (substitute page)). RT Vol. 86 at 89. Thus, the "potential impact" on Kansas is not the same as a material depletion of usable Stateline flow. See RT Vol. 83 at 64 (discussion by Mr. Helton of the difference between potential impact on Kansas and impact on usable flow).

14. As I recall, Mr. Binder and Mr. Finlayson testified for the United States that they were unable to determine whether or not the WWSP was operated in compliance with the Compact. Of course, this was apart from the major thrust of their testimony that the Kansas modeling results could not be relied upon to show a Compact violation. What is the position of the United States on the compliance of the WWSP with the Compact? Is it that the United States doesn't know whether the program complies, or that it does comply? If the latter, could
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you please cite to the evidence on which the United States relies.

Response: No comment.

Very truly yours,

David W. Robbins

DWR: ncr
cc: Judge George Grover
    John B. Draper, Esq.
    Patricia L. Weiss, Esq.
    James J. DuBois, Esq.
    Wendy C. Weiss, Esq.

(287)
August 23, 1993

The Honorable Arthur L. Littleworth
Best, Best & Krieger
400 Mission Square
3750 University Avenue
P. O. Box 1028
Riverside, CA 82502

Re: Kansas v. Colorado, No. 105,
Original (U.S. Supreme Court)

Dear Mr. Littleworth:

As we complete the responses to your questions, it has occurred to me that I should apprise you, Patricia, and John of a scheduling matter which arises at the end of September. I will be unavailable from September 24 until October 10, 1993, and I wanted to be sure that you are aware of this fact as you complete your draft report and contemplate scheduling an oral argument. Any consideration you could give me during that period of time would be appreciated.

Very truly yours,

David W. Robbins

DWR: ncr
cc: John B. Draper, Esq. )
    Patricia Weiss, Esq. )
    Jim DuBois, Esq. )
The Honorable Arthur L. Littleworth  
Special Master  
United States Supreme Court  
Best, Best & Krieger  
3750 University Avenue  
Riverside, California 92502

Re: State of Kansas v. State of Colorado,  
No. 105 Original

Dear Mr. Littleworth:

Enclosed is a copy of the Supreme Court’s recent decision in Daubert et al. v. Merrell Dow Pharmaceuticals. As you may recall, we cited the Ninth Circuit’s Daubert opinion in the Response Brief of the United States on Kansas’ Winter Water Storage Program Claim, as part of our argument that expert testimony must satisfy threshold standards of reliability. In the opinion, the Supreme Court rejects the Ninth Circuit’s narrow view that “general acceptance” in the scientific community is the exclusive test for the admissibility of expert scientific evidence. Slip Op. at 8. However, the Court confirms that the Federal Rules do impose a standard of reliability for expert testimony, Slip Op. at 9, and discusses some of the tests which may be used to assess the reliability of such testimony. Id. at 12-15.

We are planning to discuss this case at oral argument. However, if you wish, we would also be pleased to prepare a supplemental brief.

Sincerely,

[Signature]
Patricia L. Weiss  
James J. Dubois  
Attorneys  
General Litigation Section  
Environment and Natural Resources Division

cc: Mr. David Robbins, Esquire  
Mr. John Draper, Esquire  
The Honorable George G. Grover
SUPREME COURT OF THE UNITED STATES

Syllabus

DAUBERT ET UX., INDIVIDUALLY AND AS GUARDIANS AD LITEM FOR DAUBERT, ET AL. v. MERRELL DOW PHARMACEUTICALS, INC.

CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE NINTH CIRCUIT


Petitioners, two minor children and their parents, alleged in their suit against respondent that the children's serious birth defects had been caused by the mothers' prenatal ingestion of Bendectin, a prescription drug marketed by respondent. The District Court granted respondent summary judgment based on a well-credentialed expert's affidavit concluding, upon reviewing the extensive published scientific literature on the subject, that maternal use of Bendectin has not been shown to be a risk factor for human birth defects. Although petitioners had responded with the testimony of eight other well-credentialed experts, who based their conclusion that Bendectin can cause birth defects on animal studies, chemical structure analyses, and the unpublished "reanalysis" of previously published human statistical studies, the court determined that this evidence did not meet the applicable "general acceptance" standard for the admission of expert testimony. The Court of Appeals agreed and affirmed, citing Frye v. United States, 54 App. D. C. 46, 47, 293 F. 1013, 1014, for the rule that expert opinion based on a scientific technique is inadmissible unless the technique is "generally accepted" as reliable in the relevant scientific community.


(a) Frye's "general acceptance" test was superseded by the Rules' adoption. The Rules occupy the field, United States v. Abel, 469 U. S. 45, 49, and, although the common law of evidence may serve as an aid to their application, id., at 51-52, respondent's assertion that they somehow assimilated Frye is unconvincing. Nothing in the
DAUBERT v. MERRELL DOW PHARMACEUTICALS

Syllabus

Rules as a whole or in the text and drafting history of Rule 702, which specifically governs expert testimony, gives any indication that "general acceptance" is a necessary precondition to the admissibility of scientific evidence. Moreover, such a rigid standard would be at odds with the Rules' liberal thrust and their general approach of relaxing the traditional barriers to "opinion" testimony. Pp. 4-8.

(b) The Rules—especially Rule 702—place appropriate limits on the admissibility of purportedly scientific evidence by assigning to the trial judge the task of ensuring that an expert's testimony both rests on a reliable foundation and is relevant to the task at hand. The reliability standard is established by Rule 702's requirement that an expert's testimony pertain to "scientific ... knowledge," since the adjective "scientific" implies a grounding in science's methods and procedures, while the word "knowledge" connotes a body of known facts or of ideas inferred from such facts or accepted as true on good grounds. The Rule's requirement that the testimony "assist the trier of fact to understand the evidence or to determine a fact in issue" goes primarily to relevance by demanding a valid scientific connection to the pertinent inquiry as a precondition to admissibility. Pp. 9-12.

(c) Faced with a proffer of expert scientific testimony under Rule 702, the trial judge, pursuant to Rule 104(a), must make a preliminary assessment of whether the testimony's underlying reasoning or methodology is scientifically valid and properly can be applied to the facts at issue. Many considerations will bear on the inquiry, including whether the theory or technique in question can be (and has been) tested, whether it has been subjected to peer review and publication, its known or potential error rate, and the existence and maintenance of standards controlling its operation, and whether it has attracted widespread acceptance within a relevant scientific community. The inquiry is a flexible one, and its focus must be solely on principles and methodology, not on the conclusions that they generate. Throughout, the judge should also be mindful of other applicable Rules. Pp. 12-15.

(d) Cross-examination, presentation of contrary evidence, and careful instruction on the burden of proof, rather than wholesale exclusion under an uncompromising "general acceptance" standard, is the appropriate means by which evidence based on valid principles may be challenged. That even limited screening by the trial judge, on occasion, will prevent the jury from hearing of authentic scientific breakthroughs is simply a consequence of the fact that the Rules are not designed to seek cosmic understanding but, rather, to resolve legal disputes. Pp. 15-17.

951 F. 2d 1128, vacated and remanded.
DAUBERT v. MERRELL DOW PHARMACEUTICALS

Syllabus

BLACKMUN, J., delivered the opinion for a unanimous Court with respect to Parts I and II-A, and the opinion of the Court with respect to Parts II-B, II-C, III, and IV, in which WHITE, O'CONNOR, SCALIA, KENNEDY, SOUTER, and THOMAS, JJ., joined. REHNQUIST, C. J., filed an opinion concurring in part and dissenting in part, in which STEVENS, J., joined.
In this case we are called upon to determine the standard for admitting expert scientific testimony in a federal trial.

I

Petitioners Jason Daubert and Eric Schuller are minor children born with serious birth defects. They and their parents sued respondent in California state court, alleging that the birth defects had been caused by the mothers' ingestion of Bendectin, a prescription anti-nausea drug marketed by respondent. Respondent removed the suits to federal court on diversity grounds.

After extensive discovery, respondent moved for summary judgment, contending that Bendectin does not cause birth defects in humans and that petitioners would be unable to come forward with any admissible evidence that it does. In support of its motion, respondent submitted an affidavit of Steven H. Lamm, physician and epidemiologist, who is a well-credentialed expert on the risks from exposure to various chemical substances.\(^1\) Doctor Lamm

\(^1\)Doctor Lamm received his master's and doctor of medicine degrees from the University of Southern California. He has served as a consul-
stated that he had reviewed all the literature on Bendectin and human birth defects—more than 30 published studies involving over 130,000 patients. No study had found Bendectin to be a human teratogen (i.e., a substance capable of causing malformations in fetuses). On the basis of this review, Doctor Lamm concluded that maternal use of Bendectin during the first trimester of pregnancy has not been shown to be a risk factor for human birth defects.

Petitioners did not (and do not) contest this characterization of the published record regarding Bendectin. Instead, they responded to respondent's motion with the testimony of eight experts of their own, each of whom also possessed impressive credentials. These experts had concluded that Bendectin can cause birth defects. Their conclusions were based upon "in vitro" (test tube) and "in vivo" (live) animal studies that found a link between Bendectin and malformations; pharmacological studies of the chemical structure of Bendectin that purported to show similarities between the structure of the drug and that of other substances known to cause birth defects; and

tant in birth-defect epidemiology for the National Center for Health Statistics and has published numerous articles on the magnitude of risk from exposure to various chemical and biological substances. App. 34–44.

For example, Shanna Helen Swan, who received a master's degree in biostatics from Columbia University and a doctorate in statistics from the University of California at Berkeley, is chief of the section of the California Department of Health and Services that determines causes of birth defects, and has served as a consultant to the World Health Organization, the Food and Drug Administration, and the National Institutes of Health. App. 113–114, 131–132. Stewart A. Newman, who received his master's and a doctorate in chemistry from Columbia University and the University of Chicago, respectively, is a professor at New York Medical College and has spent over a decade studying the effect of chemicals on limb development. App. 54–56. The credentials of the others are similarly impressive. See App. 61–66, 73–80, 148–153, 187–192, and Attachment to Petitioners' Opposition to Summary Judgment, Tabs 12, 20, 21, 26, 31, 32.
the "reanalysis" of previously published epidemiological (human statistical) studies.

The District Court granted respondent's motion for summary judgment. The court stated that scientific evidence is admissible only if the principle upon which it is based is "'sufficiently established to have general acceptance in the field to which it belongs.'" 727 F. Supp. 570, 572 (SD Cal. 1989), quoting United States v. Kilgus, 571 F. 2d 508, 510 (CA9 1978). The court concluded that petitioners' evidence did not meet this standard. Given the vast body of epidemiological data concerning Bendectin, the court held, expert opinion which is not based on epidemiological evidence is not admissible to establish causation. 727 F. Supp., at 575. Thus, the animal-cell studies, live-animal studies, and chemical-structure analyses on which petitioners had relied could not raise by themselves a reasonably disputable jury issue regarding causation. Ibid. Petitioners' epidemiological analyses, based as they were on recalculations of data in previously published studies that had found no causal link between the drug and birth defects, were ruled to be inadmissible because they had not been published or subjected to peer review. Ibid.

The United States Court of Appeals for the Ninth Circuit affirmed. 951 F.2d 1128 (1991). Citing Frye v. United States, 54 App. D.C. 46, 47, 293 F. 1013, 1014 (1923), the court stated that expert opinion based on a scientific technique is inadmissible unless the technique is "generally accepted" as reliable in the relevant scientific community. 951 F. 2d, at 1129–1130. The court declared that expert opinion based on a methodology that diverges "significantly from the procedures accepted by recognized authorities in the field . . . cannot be shown to be 'generally accepted as a reliable technique.'" Id., at 1130, quoting United States v. Solomon, 753 F. 2d 1522, 1526 (CA9 1985).

The court emphasized that other Courts of Appeals
considering the risks of Bendectin had refused to admit reanalyses of epidemiological studies that had been neither published nor subjected to peer review. 951 F. 2d, at 1130–1131. Those courts had found unpublished reanalyses “particularly problematic in light of the massive weight of the original published studies supporting [respondent's] position, all of which had undergone full scrutiny from the scientific community.” Id., at 1130. Contending that reanalysis is generally accepted by the scientific community only when it is subjected to verification and scrutiny by others in the field, the Court of Appeals rejected petitioners' reanalyses as “unpublished, not subjected to the normal peer review process and generated solely for use in litigation.” Id., at 1131. The court concluded that petitioners' evidence provided an insufficient foundation to allow admission of expert testimony that Bendectin caused their injuries and, accordingly, that petitioners could not satisfy their burden of proving causation at trial.


II

A

In the 70 years since its formulation in the Frye case, the “general acceptance” test has been the dominant standard for determining the admissibility of novel scientific evidence at trial. See E. Green & C. Nesson, Problems, Cases, and Materials on Evidence 649 (1983).
Although under increasing attack of late, the rule continues to be followed by a majority of courts, including the Ninth Circuit.3

The Frye test has its origin in a short and citation-free 1923 decision concerning the admissibility of evidence derived from a systolic blood pressure deception test, a crude precursor to the polygraph machine. In what has become a famous (perhaps infamous) passage, the then Court of Appeals for the District of Columbia described the device and its operation and declared:

"Just when a scientific principle or discovery crosses the line between the experimental and demonstrable stages is difficult to define. Somewhere in this twilight zone the evidential force of the principle must be recognized, and while courts will go a long way in admitting expert testimony deduced from a well-recognized scientific principle or discovery, the thing from which the deduction is made must be sufficiently established to have gained general acceptance in the particular field in which it belongs." 54 App. D.C., at 47, 293 F., at 1014 (emphasis added).

Because the deception test had "not yet gained such standing and scientific recognition among physiological and psychological authorities as would justify the courts in admitting expert testimony deduced from the discovery, development, and experiments thus far made," evidence of its results was ruled inadmissible. Ibid.

The merits of the Frye test have been much debated, and scholarship on its proper scope and application is legion.4 Petitioners' primary attack, however, is not on

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4 See, e.g., Green, Expert Witnesses and Sufficiency of Evidence in Toxic Substances Litigation: The Legacy of Agent Orange and Bendectin
the content but on the continuing authority of the rule. They contend that the Frye test was superseded by the adoption of the Federal Rules of Evidence.5 We agree. We interpret the legislatively-enacted Federal Rules of Evidence as we would any statute. Beech Aircraft Corp. v. Rainey, 488 U.S. 153, 163 (1988). Rule 402 provides the baseline:

“All relevant evidence is admissible, except as


Indeed, the debates over Frye are such a well-established part of the academic landscape that a distinct term—“Frye-ologist”—has been advanced to describe those who take part. See Behringer, Introduction, Proposals for a Model Rule on the Admissibility of Scientific Evidence, 26 Jurimetrics J., at 239, quoting Lacey, Scientific Evidence, 24 Jurimetrics J. 254, 264 (1984).

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otherwise provided by the Constitution of the United States, by Act of Congress, by these rules, or by other rules prescribed by the Supreme Court pursuant to statutory authority. Evidence which is not relevant is not admissible."

"Relevant evidence" is defined as that which has "any tendency to make the existence of any fact that is of consequence to the determination of the action more probable or less probable than it would be without the evidence." Rule 401. The Rule's basic standard of relevance thus is a liberal one.

Frye, of course, predated the Rules by half a century. In United States v. Abel, 469 U. S. 45 (1984), we considered the pertinence of background common law in interpreting the Rules of Evidence. We noted that the Rules occupy the field, id., at 49, but, quoting Professor Cleary, the Reporter, explained that the common law nevertheless could serve as an aid to their application:

"In principle, under the Federal Rules no common law of evidence remains. 'All relevant evidence is admissible, except as otherwise provided . . . .' In reality, of course, the body of common law knowledge continues to exist, though in the somewhat altered form of a source of guidance in the exercise of delegated powers." Id., at 51-52.

We found the common-law precept at issue in the Abel case entirely consistent with Rule 402's general requirement of admissibility, and considered it unlikely that the drafters had intended to change the rule. Id., at 50-51. In Bourjaily v. United States, 483 U. S. 171 (1987), on the other hand, the Court was unable to find a particular common-law doctrine in the Rules, and so held it superseded.

Here there is a specific Rule that speaks to the contested issue. Rule 702, governing expert testimony,
provides:

"If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise."

Nothing in the text of this Rule establishes "general acceptance" as an absolute prerequisite to admissibility. Nor does respondent present any clear indication that Rule 702 or the Rules as a whole were intended to incorporate a "general acceptance" standard. The drafting history makes no mention of Frye, and a rigid "general acceptance" requirement would be at odds with the "liberal thrust" of the Federal Rules and their "general approach of relaxing the traditional barriers to 'opinion' testimony." Beech Aircraft Corp. v. Rainey, 488 U. S., at 169 (citing Rules 701 to 705). See also Weinstein, Rule 702 of the Federal Rules of Evidence is Sound; It Should Not Be Amended, 138 F.R.D. 631, 631 (1991) ("The Rules were designed to depend primarily upon lawyer-adversaries and sensible triers of fact to evaluate conflicts").

Given the Rules' permissive backdrop and their inclusion of a specific rule on expert testimony that does not mention "general acceptance," the assertion that the Rules somehow assimilated Frye is unconvincing. Frye made 'general acceptance' the exclusive test for admitting expert scientific testimony. That austere standard, absent from and incompatible with the Federal Rules of Evidence, should not be applied in federal trials. 6

6Because we hold that Frye has been superseded and base the discussion that follows on the content of the congressionally-enacted Federal Rules of Evidence, we do not address petitioners' argument that application of the Frye rule in this diversity case, as the application of a judge-made rule affecting substantive rights, would violate the doctrine of Erie
That the Frye test was displaced by the Rules of Evidence does not mean, however, that the Rules themselves place no limits on the admissibility of purportedly scientific evidence. Nor is the trial judge disabled from screening such evidence. To the contrary, under the Rules the trial judge must ensure that any and all scientific testimony or evidence admitted is not only relevant, but reliable.

The primary locus of this obligation is Rule 702, which clearly contemplates some degree of regulation of the subjects and theories about which an expert may testify. "If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue" an expert "may testify thereto." The subject of an expert's testimony must be "scientific . . . knowledge." The adjective "scientific" implies a grounding in the methods and procedures of science. Similarly, the word "knowledge" connotes more than subjective belief or unsupported speculation. The term "applies to any body of known facts or to any body of ideas inferred from such facts or accepted as truths on good grounds." Webster's Third New International Dictionary 1252 (1986). Of course, it would be unreasonable to conclude that the subject of scientific testimony must be "known" to a certainty; arguably, there are no certainties in science. See, e.g., Brief for Nicolaas Bloembergen et al. as Amici Curiae 9 ("Indeed, scientists do not assert

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R. Co. v. Tompkins, 304 U. S. 64 (1938).

7 The Chief Justice "does not doubt that Rule 702 confides to the judge some gatekeeping responsibility," post, at 4, but would neither say how it does so, nor explain what that role entails. We believe the better course is to note the nature and source of the duty.

8 Rule 702 also applies to "technical, or other specialized knowledge." Our discussion is limited to the scientific context because that is the nature of the expertise offered here.
that they know what is immutably 'true'—they are committed to searching for new, temporary theories to explain, as best they can, phenomena"; Brief for American Association for the Advancement of Science and the National Academy of Sciences as Amici Curiae 7–8 ("Science is not an encyclopedic body of knowledge about the universe. Instead, it represents a process for proposing and refining theoretical explanations about the world that are subject to further testing and refinement") (emphasis in original). But, in order to qualify as "scientific knowledge," an inference or assertion must be derived by the scientific method. Proposed testimony must be supported by appropriate validation—i.e., "good grounds," based on what is known. In short, the requirement that an expert's testimony pertain to "scientific knowledge" establishes a standard of evidentiary reliability.

Rule 702 further requires that the evidence or testimony "assist the trier of fact to understand the evidence or to determine a fact in issue." This condition goes primarily

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9 We note that scientists typically distinguish between "validity" (does the principle support what it purports to show?) and "reliability" (does application of the principle produce consistent results?). See Black, A Unified Theory of Scientific Evidence, 56 Ford. L. Rev. 595, 599 (1988). Although "the difference between accuracy, validity, and reliability may be such that each is distinct from the other by no more than a hen's kick," Starrs, Frye v. United States Restructured and Revitalized: A Proposal to Amend Federal Evidence Rule 702, 26 Jurimetrics J. 249, 256 (1986), our reference here is to evidentiary reliability—that is, trustworthiness. Cf., e.g., Advisory Committee's Notes on Fed. Rule Evid. 602 ("[T]he rule requiring that a witness who testifies to a fact which can be perceived by the senses must have had an opportunity to observe, and must have actually observed the fact' is a 'most pervasive manifestation' of the common law insistence upon 'the most reliable sources of information.'") (citation omitted); Advisory Committee's Notes on Art. VIII of the Rules of Evidence (hearsay exceptions will be recognized only "under circumstances supposed to furnish guarantees of trustworthiness"). In a case involving scientific evidence, evidentiary reliability will be based upon scientific validity.
to relevance. "Expert testimony which does not relate to any issue in the case is not relevant and, ergo, non-helpful." 3 Weinstein & Berger ¶702[02], p. 702-18. See also United States v. Downing, 753 F. 2d 1224, 1242 (CA3 1985) ("An additional consideration under Rule 702—and another aspect of relevancy—is whether expert testimony proffered in the case is sufficiently tied to the facts of the case that it will aid the jury in resolving a factual dispute"). The consideration has been aptly described by Judge Becker as one of "fit." Ibid. "Fit" is not always obvious, and scientific validity for one purpose is not necessarily scientific validity for other, unrelated purposes. See Starrs, Frye v. United States Restructured and Re revitalized: A Proposal to Amend Federal Evidence Rule 702, and 26 Jurimetrics J. 249, 258 (1986). The study of the phases of the moon, for example, may provide valid scientific "knowledge" about whether a certain night was dark, and if darkness is a fact in issue, the knowledge will assist the trier of fact. However (absent creditable grounds supporting such a link), evidence that the moon was full on a certain night will not assist the trier of fact in determining whether an individual was unusually likely to have behaved irrationally on that night. Rule 702's "helpfulness" standard requires a valid scientific connection to the pertinent inquiry as a precondition to admissibility.

That these requirements are embodied in Rule 702 is not surprising. Unlike an ordinary witness, see Rule 701, an expert is permitted wide latitude to offer opinions, including those that are not based on first-hand knowledge or observation. See Rules 702 and 703. Presumably, this relaxation of the usual requirement of first-hand knowledge—a rule which represents "a 'most pervasive manifestation' of the common law insistence upon 'the most reliable sources of information,'" Advisory Committee's Notes on Fed. Rule Evid. 602 (citation omitted)—is premised on an assumption that the expert's
opinion will have a reliable basis in the knowledge and experience of his discipline.

C

Faced with a proffer of expert scientific testimony, then, the trial judge must determine at the outset, pursuant to Rule 104(a), whether the expert is proposing to testify to (1) scientific knowledge that (2) will assist the trier of fact to understand or determine a fact in issue. This entails a preliminary assessment of whether the reasoning or methodology underlying the testimony is scientifically valid and of whether that reasoning or methodology properly can be applied to the facts in issue. We are confident that federal judges possess the capacity to undertake this review. Many factors will bear on the inquiry, and we do not presume to set out a definitive checklist or test. But some general observations are appropriate.

Ordinarily, a key question to be answered in determining whether a theory or technique is scientific knowledge that will assist the trier of fact will be whether it can be

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12 Rule 104(a) provides:

"Preliminary questions concerning the qualification of a person to be a witness, the existence of a privilege, or the admissibility of evidence shall be determined by the court, subject to the provisions of subdivision (b) [pertaining to conditional admissions]. In making its determination it is not bound by the rules of evidence except those with respect to privileges." These matters should be established by a preponderance of proof. See Bourjaily v. United States, 483 U.S. 171, 175-176 (1987).

11 Although the Frye decision itself focused exclusively on "novel" scientific techniques, we do not read the requirements of Rule 702 to apply specially or exclusively to unconventional evidence. Of course, well-established propositions are less likely to be challenged than those that are novel, and they are more handily defended. Indeed, theories that are so firmly established as to have attained the status of scientific law, such as the laws of thermodynamics, properly are subject to judicial notice under Fed. Rule Evid. 201.
(and has been) tested. "Scientific methodology today is based on generating hypotheses and testing them to see if they can be falsified; indeed, this methodology is what distinguishes science from other fields of human inquiry." Green, at 645. See also C. Hempel, Philosophy of Natural Science 49 (1966) ("[T]he statements constituting a scientific explanation must be capable of empirical test"); K. Popper, Conjectures and Refutations: The Growth of Scientific Knowledge 37 (5th ed. 1989) ("[T]he criterion of the scientific status of a theory is its falsifiability, or refutability, or testability").

Another pertinent consideration is whether the theory or technique has been subjected to peer review and publication. Publication (which is but one element of peer review) is not a sine qua non of admissibility; it does not necessarily correlate with reliability, see S. Jasanoff, The Fifth Branch: Science Advisors as Policymakers 61-76 (1990), and in some instances well-grounded but innovative theories will not have been published, see Horrobin, The Philosophical Basis of Peer Review and the Suppression of Innovation, 263 J. Am. Med. Assn. 1438 (1990). Some propositions, moreover, are too particular, too new, or of too limited interest to be published. But submission to the scrutiny of the scientific community is a component of "good science," in part because it increases the likelihood that substantive flaws in methodology will be detected. See J. Ziman, Reliable Knowledge: An Exploration of the Grounds for Belief in Science 130-133 (1978); Relman and Angell, How Good Is Peer Review?, 321 New Eng. J. Med. 827 (1989). The fact of publication (or lack thereof) in a peer-reviewed journal thus will be a relevant, though not dispositive, consideration in assessing the scientific validity of a particular technique or methodology on which an opinion is premised.

Additionally, in the case of a particular scientific technique, the court ordinarily should consider the known or potential rate of error, see, e.g., United States v. Smith,
869 F. 2d 348, 353–354 (CA7 1989) (surveying studies of the error rate of spectrographic voice identification technique), and the existence and maintenance of standards controlling the technique’s operation. See United States v. Williams, 583 F. 2d 1194, 1198 (CA2 1978) (noting professional organization’s standard governing spectrographic analysis), cert. denied, 439 U. S. 1117 (1979).

Finally, “general acceptance” can yet have a bearing on the inquiry. A “reliability assessment does not require, although it does permit, explicit identification of a relevant scientific community and an express determination of a particular degree of acceptance within that community.” United States v. Downing, 753 F. 2d, at 1238. See also 3 Weinstein & Berger ¶ 702[03], pp. 702–41 to 702–42. Widespread acceptance can be an important factor in ruling particular evidence admissible, and “a known technique that has been able to attract only minimal support within the community,” Downing, supra, at 1238, may properly be viewed with skepticism.

The inquiry envisioned by Rule 702 is, we emphasize, a flexible one.12 Its overarching subject is the scientific validity—and thus the evidentiary relevance and reliability—of the principles that underlie a proposed submission. The focus, of course, must be solely on principles and methodology, not on the conclusions that they generate.

Throughout, a judge assessing a proffer of expert scien-

12A number of authorities have presented variations on the reliability approach, each with its own slightly different set of factors. See, e.g., Downing, 753 F. 2d 1238–1239 (on which our discussion draws in part); 3 Weinstein & Berger ¶ 702[03], pp. 702–41 to 702–42 (on which the Downing court in turn partially relied); McCormick, Scientific Evidence: Defining a New Approach to Admissibility, 57 Iowa L. Rev. 879, 911–912 (1982); and Symposium on Science and the Rules of Evidence, 99 F.R.D. 187, 231 (1983) (statement by Margaret Berger). To the extent that they focus on the reliability of evidence as ensured by the scientific validity of its underlying principles, all these versions may well have merit, although we express no opinion regarding any of their particular details.
scientific testimony under Rule 702 should also be mindful of other applicable rules. Rule 703 provides that expert opinions based on otherwise inadmissible hearsay are to be admitted only if the facts or data are "of a type reasonably relied upon by experts in the particular field in forming opinions or inferences upon the subject." Rule 706 allows the court at its discretion to procure the assistance of an expert of its own choosing. Finally, Rule 403 permits the exclusion of relevant evidence "if its probative value is substantially outweighed by the danger of unfair prejudice, confusion of the issues, or misleading the jury . . . ." Judge Weinstein has explained: "Expert evidence can be both powerful and quite misleading because of the difficulty in evaluating it. Because of this risk, the judge in weighing possible prejudice against probative force under Rule 403 of the present rules exercises more control over experts than over lay witnesses." Weinstein, 138 F.R.D., at 632.

III

We conclude by briefly addressing what appear to be two underlying concerns of the parties and amici in this case. Respondent expresses apprehension that abandonment of "general acceptance" as the exclusive requirement for admission will result in a "free-for-all" in which befuddled juries are confounded by absurd and irrational pseudoscientific assertions. In this regard respondent seems to us to be overly pessimistic about the capabilities of the jury, and of the adversary system generally. Vigorous cross-examination, presentation of contrary evidence, and careful instruction on the burden of proof are the traditional and appropriate means of attacking shaky but admissible evidence. See Rock v. Arkansas, 483 U. S. 44, 61 (1987). Additionally, in the event the trial court concludes that the scintilla of evidence presented supporting a position is insufficient to allow a reasonable juror to conclude that the position more likely than not
is true, the court remains free to direct a judgment, Fed. Rule Civ. Proc. 50 (a), and likewise to grant summary judgment, Fed. Rule Civ. Proc. 56. Cf., e.g., Turpin v. Merrell Dow Pharmaceuticals, Inc., 959 F. 2d 1349 (CA6) (holding that scientific evidence that provided foundation for expert testimony, viewed in the light most favorable to plaintiffs, was not sufficient to allow a jury to find it more probable than not that defendant caused plaintiff's injury), cert. denied, 506 U. S. ___ (1992); Brock v. Merrell Dow Pharmaceuticals, Inc., 874 F. 2d 307 (CA5 1989) (reversing judgment entered on jury verdict for plaintiffs because evidence regarding causation was insufficient), modified, 884 F. 2d 166 (CA5 1989), cert. denied, 494 U. S. 1046 (1990); Green 680-681. These conventional devices, rather than wholesale exclusion under an uncompromising "general acceptance" test, are the appropriate safeguards where the basis of scientific testimony meets the standards of Rule 702.

Petitioners and, to a greater extent, their amici exhibit a different concern. They suggest that recognition of a screening role for the judge that allows for the exclusion of "invalid" evidence will sanction a stifling and repressive scientific orthodoxy and will be inimical to the search for truth. See, e.g., Brief for Ronald Bayer et al. as Amici Curiae. It is true that open debate is an essential part of both legal and scientific analyses. Yet there are important differences between the quest for truth in the courtroom and the quest for truth in the laboratory. Scientific conclusions are subject to perpetual revision. Law, on the other hand, must resolve disputes finally and quickly. The scientific project is advanced by broad and wide-ranging consideration of a multitude of hypotheses, for those that are incorrect will eventually be shown to be so, and that in itself is an advance. Conjectures that are probably wrong are of little use, however, in the project of reaching a quick, final, and binding legal judgment—often of great consequence—about a particular set
of events in the past. We recognize that in practice, a gatekeeping role for the judge, no matter how flexible, inevitably on occasion will prevent the jury from learning of authentic insights and innovations. That, nevertheless, is the balance that is struck by Rules of Evidence designed not for the exhaustive search for cosmic understanding but for the particularized resolution of legal disputes.\(^\text{13}\)

IV

To summarize: “general acceptance” is not a necessary precondition to the admissibility of scientific evidence under the Federal Rules of Evidence, but the Rules of Evidence—especially Rule 702—do assign to the trial judge the task of ensuring that an expert’s testimony both rests on a reliable foundation and is relevant to the task at hand. Pertinent evidence based on scientifically valid principles will satisfy those demands.

The inquiries of the District Court and the Court of Appeals focused almost exclusively on “general acceptance,” as gauged by publication and the decisions of other courts. Accordingly, the judgment of the Court of Appeals is vacated and the case is remanded for further proceedings consistent with this opinion.

*It is so ordered.*

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\(^{13}\)This is not to say that judicial interpretation, as opposed to adjudicative factfinding, does not share basic characteristics of the scientific endeavor: “The work of a judge is in one sense enduring and in another ephemeral. . . . In the endless process of testing and retesting, there is a constant rejection of the dross and a constant retention of whatever is pure and sound and fine.” B. Cardozo, The Nature of the Judicial Process 178, 179 (1921).
SUPREME COURT OF THE UNITED STATES

No. 92-102

WILLIAM DAUBERT, ET UX., ETC., ET AL., PETITIONERS v. MERRELL DOW PHARMACEUTICALS, INC.

ON WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE NINTH CIRCUIT

[June 28, 1993]

CHIEF JUSTICE REHNQUIST, with whom JUSTICE STEVENS joins, concurring in part and dissenting in part.

The petition for certiorari in this case presents two questions: first, whether the rule of Frye v. United States, 54 App. D. C. 46, 293 F. 1013 (1923), remains good law after the enactment of the Federal Rules of Evidence; and second, if Frye remains valid, whether it requires expert scientific testimony to have been subjected to a peer-review process in order to be admissible. The Court concludes, correctly in my view, that the Frye rule did not survive the enactment of the Federal Rules of Evidence, and I therefore join Parts I and II-A of its opinion. The second question presented in the petition for certiorari necessarily is mooted by this holding, but the Court nonetheless proceeds to construe Rules 702 and 703 very much in the abstract, and then offers some "general observations." *Ante*, at 12.

"General observations" by this Court customarily carry great weight with lower federal courts, but the ones offered here suffer from the flaw common to most such observations—they are not applied to deciding whether or not particular testimony was or was not admissible, and therefore they tend to be not only general, but vague and abstract. This is particularly unfortunate in a case such as this, where the ultimate legal question depends on an
appreciation of one or more bodies of knowledge not judicially noticeable, and subject to different interpretations in the briefs of the parties and their *amicus*. Twenty-two *amicus* briefs have been filed in the case, and indeed the Court's opinion contains no less than 37 citations to *amicus* briefs and other secondary sources.

The various briefs filed in this case are markedly different from typical briefs, in that large parts of them do not deal with decided cases or statutory language—the sort of material we customarily interpret. Instead, they deal with definitions of scientific knowledge, scientific method, scientific validity, and peer review—in short, matters far afield from the expertise of judges. This is not to say that such materials are not useful or even necessary in deciding how Rule 703 should be applied; but it is to say that the unusual subject matter should cause us to proceed with great caution in deciding more than we have to, because our reach can so easily exceed our grasp.

But even if it were desirable to make "general observations" not necessary to decide the questions presented, I cannot subscribe to some of the observations made by the Court. In Part II–B, the Court concludes that reliability and relevancy are the touchstones of the admissibility of expert testimony. *Ante*, at 9. Federal Rule of Evidence 402 provides, as the Court points out, that "[e]vidence which is not relevant is not admissible." But there is no similar reference in the Rule to "reliability." The Court constructs its argument by parsing the language "[i]f scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue . . . an expert . . . may testify thereto . . . ", Fed. Rule Evid. 702. It stresses that the subject of the expert's testimony must be "scientific . . . knowledge," and points out that "scientific" "implies a grounding in the methods and procedures of science," and that the word "knowledge" "connotes more than subjective belief or unsupported speculation." *Ante*, at 9.
From this it concludes that "scientific knowledge" must be "derived by the scientific method." Ante, at 10. Proposed testimony, we are told, must be supported by "appropriate validation." Ante, at 10. Indeed, in footnote 9, the Court decides that "[i]n a case involving scientific evidence, evidentiary reliability will be based upon scientific validity." Ante, at 10, n. 9 (emphasis in original).

Questions arise simply from reading this part of the Court's opinion, and countless more questions will surely arise when hundreds of district judges try to apply its teaching to particular offers of expert testimony. Does all of this dicta apply to an expert seeking to testify on the basis of "technical or other specialized knowledge"—the other types of expert knowledge to which Rule 702 applies—or are the "general observations" limited only to "scientific knowledge"? What is the difference between scientific knowledge and technical knowledge; does Rule 702 actually contemplate that the phrase "scientific, technical, or other specialized knowledge" be broken down into numerous subspecies of expertise, or did its authors simply pick general descriptive language covering the sort of expert testimony which courts have customarily received? The Court speaks of its confidence that federal judges can make a "preliminary assessment of whether the reasoning or methodology underlying the testimony is scientifically valid and of whether that reasoning or methodology properly can be applied to the facts in issue." Ante, at 12. The Court then states that a "key question" to be answered in deciding whether something is "scientific knowledge" "will be whether it can be (and has been) tested." Ante, at 12. Following this sentence are three quotations from treatises, which speak not only of empirical testing, but one of which states that "the criterion of the scientific status of a theory is its falsifiability, or refutability, or testability," ante, pp. 12-13.

I defer to no one in my confidence in federal judges; but I am at a loss to know what is meant when it is said
that the scientific status of a theory depends on its "falsifiability," and I suspect some of them will be, too.

I do not doubt that Rule 702 confides to the judge some gatekeeping responsibility in deciding questions of the admissibility of proffered expert testimony. But I do not think it imposes on them either the obligation or the authority to become amateur scientists in order to perform that role. I think the Court would be far better advised in this case to decide only the questions presented, and to leave the further development of this important area of the law to future cases.