IN RE: NON-BINDING ARBITRATION PURSUANT TO THE FINAL SETTLEMENT STIPULATION, *KANSAS v. NEBRASKA AND COLORADO*, NO. 126 ORIGINAL

BEFORE MARTHA O. PAGEL, ARBITRATOR

REBUTTAL EXPERT REPORT OF JAMES E. SLATTERY, P.E.

I, James E. Slattery, state the following:

(1) I understand that my role as an expert, both in preparing this report and in giving evidence, is to assist the arbitrator to understand the evidence or to determine facts in issue. The opinions expressed in my report are my own professional opinions.

(2) I have endeavored in my report and disclosures to be accurate and complete, and have addressed matters that I regard as being material to the opinions expressed, including the assumptions that I have made, the bases for my opinions, and the methods that I have employed in reaching those opinions.

(3) I have been advised by the attorney for my client of the disclosure requirements of the rules of the arbitration, and I have provided in my report the information required by those rules. I have not included anything in my report and disclosures that has been suggested by anyone, including the attorney for my client, without forming my own independent judgment on the matter.

(4) I will immediately notify, in writing, the attorney for the party for whom I am giving evidence if, for any reason, I consider that my existing report requires any correction or qualification; and, if the correction or qualification is significant, will prepare a supplementary report or disclosure to the extent permitted by the applicable rules of the arbitration.

(5) I have used my best efforts in my report and disclosures, and will use my best efforts in any evidence that I am called to give, to express opinions within those areas in which I have been offered or qualified as an expert by the arbitrator, and to state whether there are qualifications to my opinions.

(6) I have made the inquiries that I believe are appropriate and, to the best my knowledge, no matters of significance that I regard as relevant have been withheld from the arbitrator.

(7) I have disclosed any financial or pecuniary interest that I have in the results of this lawsuit or in any property or rights that are the subject of the lawsuit for which my report and disclosures are being submitted.

Dated this 2nd day of July, 2010.

James E. Slattery

James E. Slattery

Slattery & Hendrix Engineering LLC
Water Resources, Water Rights and Computer Modeling

Rebuttal Report on the

Colorado Compact Compliance Pipeline Project

Response to reports prepared on behalf of the State of Kansas, dated June 22, 2010

Prepared by
James E. Slattery
for the State of Colorado

July 2, 2010

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1.0 Introduction

David W. Barfield, the Kansas Chief Engineer, submitted a report responding to expert reports prepared and submitted on behalf of Colorado. In his report, Mr. Barfield states that Kansas has seven objections to Colorado's Compact Compliance Pipeline ("CCP") proposal ("Colorado's Proposal") (p. 14). He describes three of these objections as "longstanding and principal objections" to Colorado's Proposal and says that Colorado's expert reports and the depositions of its experts have revealed four additional problems with Colorado's Proposal (p. 14).

The three principal objections are: (1) the augmentation water to be delivered to the North Fork of the Republican River must be included in the RRCA ("Republican River Compact Administration") Groundwater Model (p. 9-10); (2) the Colorado Proposal does not address Colorado's failure to meet the sub-basin non-impairment requirement in the South Fork sub-basin (p. 10); and (3) the limitations set forth in the Colorado Resolution are insufficient to require augmentation deliveries on a reliable basis and leave those deliveries to Colorado's discretion (p. 11-12).

The four additional problems that Mr. Barfield says the Kansas experts have identified with Colorado's Proposal are: (1) the Colorado Proposal lacks "temporal limits" (p.12); (2) the States have not conducted a detailed review of Colorado's proposed changes to the RRCA Accounting Procedures (pp. 12-13); (3) Colorado's "catch-up" provisions are inadequate (p.13); and (4) Colorado has not explained the reasons for adding language to the Resolution that would allow future augmentation deliveries to increase to 25,000 acre-feet per year (p.13).

This report responds to the objections and problems identified by Mr. Barfield. To the extent necessary, this report will address the reports of the other Kansas experts.

2.0 Responses to Kansas' Objections

2.1 Kansas' Objection Number 1: The Colorado Proposal Does Not Include the Augmentation Water in the RRCA Groundwater Model

Kansas' first objection to Colorado's Proposal is that the augmentation water to be delivered to the North Fork of the Republican River is not included in the RRCA Groundwater Model (pp. 9-10).

I disagree with Kansas' position on this issue for the reasons stated in Dr. Willem Schreüder's expert report. The States are in agreement, however, that the pumping from the Compact Compliance Wells will be included in the RRCA Groundwater Model to determine the net depletions from these wells, which is a component of the augmentation credit. This is

consistent with Subsection III.B.1.k of the Final Settlement Stipulation (FSS). It states: "The determination of net depletions from these wells [i.e., wells acquired or constructed by a State for the sole purpose of offsetting stream depletions in order to comply with its Compact Allocations] will be computed by the RRCA Groundwater Model and included in the State's Computed Beneficial Consumptive Use." Paragraph 1 of the Colorado Resolution states that "Net depletion from the Colorado Compact Compliance Wells shall be computed by the RRCA Groundwater Model and included in Colorado's Computed Beneficial Consumptive Use of groundwater pursuant to paragraph III.D.1 of the revised RRCA Accounting Procedures." (Colorado's August 12, 2009 Resolution, ¶ 1). Mr. Book stated in his deposition that he had no disagreement with this paragraph of the Colorado Resolution.

While there are circumstances where it would be appropriate to use the RRCA Groundwater Model to calculate the augmentation credit for the water delivered, it is not appropriate to use the model to determine the augmentation credit for the CCP. The circumstances in which it would be appropriate to use the RRCA Groundwater Model to calculate the augmentation credit are those similar to Nebraska's Imported Water Supply Credit.

The water imported into the Republican River Basin by Nebraska is not delivered directly to a surface stream in the Basin. Instead, the water imported by Nebraska recharges the groundwater system in the Basin as a result of seepage from canals that divert water from the Platte River in Nebraska or return flows from lands irrigated with water imported from the Platte River. Not all of the seepage and return flows from the imported water recharges the groundwater system in the Basin -- some of the seepage and return flows return to the Platte River drainage basin. To calculate the credit Nebraska is entitled to the recharge from the imported water, the RRCA Groundwater Model is used. This is an appropriate use of the RRCA Groundwater Model, and the experts from all three States agreed that it was appropriate to use the RRCA Groundwater Model to calculate Nebraska's Imported Water Supply Credit.

However, if the water imported from the Platte River had been discharged directly into the Republican River or a tributary of the Republican River, it would not be appropriate to use the RRCA Groundwater Model to calculate the Imported Water Supply Credit for the reasons stated by Dr. Schreüder. Once water becomes part of a surface stream in the Basin, including groundwater discharged into the North Fork from the Colorado Compact Compliance Wells, it is considered surface water and is accounted for using the RRCA Accounting Procedures for surface water. This is the accepted practice and should also apply to pipeline discharged to the North Fork under Colorado's Proposal.

In the RRCA Accounting Procedures, water released from a reservoir is not included in the RRCA Groundwater Model to determine the fate of that water, even though some of the water stored in the reservoir may be base flow, nor is streamflow generated from runoff from precipitation included in the RRCA Groundwater Model to determine the fate of that water. The

fate of these components of the streamflow are reflected in the gaged streamflow records, reservoir storage content records, and records of surface diversions, just as the discharge from the CCP will be reflected in these records.

In the RRCA Accounting Procedures, the RRCA Groundwater Model is only used to calculate the change in gain and losses to streamflows that would result if there was no groundwater pumping in one of the States and to calculate Nebraska's credit for imported water. The RRCA Groundwater Model has never been used to simulate surface water flow that can be measured or to determine the fate of surface flow. The RRCA Groundwater Model is only used to estimate components that cannot be measured such as the amount of additional flow that would have been in the river in the absence of well pumping or the amount of streamflow that is due to Nebraska's imported water. Colorado's Proposal is consistent with the way surface water and the computed beneficial consumptive use of surface water is computed in the RRCA Accounting Procedures. See Subsection III.D.1 of the RRCA Accounting Procedures.

If water from the Colorado Compact Compliance Wells were to be delivered to recharge sites located at some distance from a surface stream in the Basin to recharge the groundwater system, I would agree that it would be appropriate to use the RRCA Groundwater Model to determine the credit from such recharge, for the same reason the RRCA Groundwater Model is used to determine the credit from Nebraska's import water supply into the basin. However, where the augmentation water from the Colorado Compact Compliance Wells will be measured as it is delivered directly the stream and will be measured again at the Compact accounting gages as in Colorado's Proposal, it is not appropriate to use the RRCA Groundwater Model to determine the augmentation credit.

The net effect of Kansas's proposal to include the Compact Compliance Pipeline water in the RRCA Groundwater Model would be to charge Colorado with the transit loss to move the Pipeline water from the North Fork of the Republican River at the Colorado-Nebraska state line to a point 50 miles downstream at Swanson Reservoir. Colorado has no allocation from the main stem, which includes the North Fork of the Republican River in Nebraska and the main stem between the junction of the North Fork and the Arikaree River and the lowest crossing point of the river at the Nebraska-Kansas state line (see RRCA Accounting Procedures, Section II (definition of Main Stem). Colorado has no control over the use or administration of the water in Nebraska. Therefore, I do not agree that the Pipeline water to be delivered to the North Fork of the Republican River in Colorado should be included in the RRCA Groundwater Model to determine the augmentation credit.

In the Republican River Compact, Colorado received an allocation of water for beneficial consumptive use from the computed virgin water supply originating in the North Fork of the Republican River drainage basin in Colorado. See Republican River Compact, Articles III and IV. The virgin water supply of the North Fork of the Republican River drainage basin in

Colorado is calculated based on the annual stream flow measured at USGS gaging station No. 0682300 located on the North Fork at the Colorado-Nebraska state line (North Fork gaging station). See RRCA Accounting Procedures, Subsection II (definition of sub-basin), Subsection III.A.1 (sub-basin calculation of the annual virgin water supply), and Section IV.B.1 (specific formula for calculation of the virgin water supply (VWS) for the North Fork of the Republican River in Colorado).

Colorado's Proposal is to measure the deliveries from the CCP where the pipeline discharges water into the North Fork a short distance upstream of the North Fork gaging station. As the water flows downstream, the discharge will be measured at the North Fork gaging station and other mainstem gaging stations. The CCP deliveries will be used to offset stream depletions occurring to the North Fork sub-basin upstream of the North Fork gaging station as calculated by the RRCA Groundwater Model. The CCP deliveries will allow Colorado to replace stream depletions upstream of the North Fork gaging station at the same location where the stream depletions are determined. Colorado should have no obligation for transit losses in delivering this water through the reach between the North Fork gaging station and Swanson Reservoir, which is located 50 miles downstream in Nebraska.

2.2 Kansas' Objection Number 2: The North Fork Credits Should be Limited to Protect Kansas' Allocation in the South Fork Sub-basin

Kansas' second objection to Colorado's Proposal is that it "allows Colorado to replace its South Fork overuse on the North Fork" (p. 10). Mr. Wolfe stated in his expert report and both of us stated in our depositions that augmentation deliveries to the North Fork from the Pipeline would not be "credited" against stream depletions in the South Fork of the Republican River in Table 4A of the RRCA Accounting Procedures. Table 4A is used to determine Colorado's compliance with the sub-basin non-impairment requirement. See RRCA Accounting Procedures, Subsection III.F & Table 4A. Mr. Barfield still states in his report that: "There must be an express condition to this effect in Colorado's Proposal." I have no objection to making this an express condition of Colorado's Proposal.

However, Colorado objects to Kansas using the sub-basin non-impairment requirement as a basis for refusing to approve the Compact Compliance Pipeline (CCP) project, which is intended to assist Colorado in complying with the statewide test for determining Compact compliance. The statewide test and the sub-basin non-impairment requirement are separate requirements under the FSS and the RRCA Accounting Procedures. The CCP deliveries will be used to offset stream depletions to the North Fork of the Republican River in Colorado sub-basin and the CCP deliveries will be significantly less than the North Fork stream depletions as shown in Figure 5 of my report. Therefore, the CCP deliveries will not be used to replace Colorado's overuse of South Fork water under the sub-basin non-impairment test.

2.3 Kansas' Objection Number 3: The Operational Limits in Colorado's Proposal Are Insufficient

Kansas' third objection to Colorado's Proposal is that the limitations set forth in the Colorado Resolution are insufficient to require such deliveries on a reliable basis and instead leave those deliveries to Colorado's discretion (p.11). Mr. Barfield concedes that in my deposition I described a methodology in which Colorado would develop a "projected delivery" similar to what Mr. Barfield says are Kansas' suggestions, but he states that this "projected delivery" approach differs fundamentally from what is contained in Colorado's Resolution (p.12). He refers to Mr. Book's expert report for more detail (p.12).

There appears to be little or no disagreement between Mr. Book and myself on the basic procedure that would be used to estimate the projected Pipeline deliveries each year. The status of Colorado's compliance with its allocations in the prior four years would be considered and a projection would be made of the amount of the deliveries required for the current year. The status of Colorado's compliance over the prior four years will vary, although the status of Colorado's compliance over the prior four years will be more or less known at the beginning of the current year. But, the more difficult problem for making a projection of the deliveries required for the current year is that the amount of such deliveries can vary widely and no one will know at the beginning of the year what that amount will be because the amount of Colorado's allocations are determined by the hydrology during the year.

Table 1 of Mr. Book's report shows the difference between Colorado's Allocations and Colorado's Consumptive Beneficial Consumptive Use (CBCU) for the years 2003 through 2008. The difference varied from 5,060 acre-feet in 2008 to 12,130 acre-feet in 2004, which Mr. Book agreed in his deposition was a wide range. At the beginning of the year, Colorado and the Republican River Water Conservation District Water Activity Enterprise ("RRWCD WAE") will have to be prepared to deliver water from the CCP project based on a "worst case" scenario, and then will adjust deliveries during the year based on hydrologic and climatic conditions during the year.

Because Kansas had initially raised a concern that Colorado would deliver a large amount of augmentation water in one year and little or no augmentation water in the succeeding four years used in the five-year running average to determine Compact compliance for the statewide test, Colorado proposed a minimum annual delivery of 4,000 acre-feet. In his deposition, Mr. Book agreed that a minimum annual delivery 4,000 acre-feet appeared to be reasonable based on the RRCA accounting for the years 2003-2008.

Colorado also proposed a limit on the augmentation water supply credit based on a "Projected Delivery." From Mr. Barfield's report, it is clear that the term "Projected Delivery" in the Colorado Resolution has caused confusion. As Mr. Book correctly noted in his report, the

"Projected Delivery" is an intermediate step to establish a limit on the augmentation water supply credit. Book Report at page 9.

The "Projected Delivery" as used in the Colorado Resolution is the largest annual deficit or difference between Colorado's total annual Allocation and Colorado's CBCU during the 10 accounting years immediately preceding the subject (current) accounting year. The largest deficit or difference is used to estimate the maximum amount of Pipeline deliveries that would be required at the beginning of the current accounting year, although there is always the potential that a drought year worse than what may have occurred during the preceding 10 accounting years might result in the need for larger augmentation deliveries.

Because the Compact accounting is not completed until several months after the end of the current year, Colorado cannot know the exact amount of its total annual Allocation or CBCU during the current year and could under-deliver the amount of augmentation water needed during the year and need to make up that deficit, or "catch up," in the following year. That was why Colorado proposed that the limit on the Augmentation Water Supply Credit would be 140% of the Projected Delivery or the Projected Delivery plus 4,000 acre-feet, whichever is greater. 140% of the Projected Delivery would allow additional deliveries if the current year was a drought year worse that the preceding 10 years or if Colorado needed to deliver water to "catch up" because of a deficit in deliveries in the previous four years. The alternative limit on the Augmentation Water Supply Credit of the Projected Delivery plus 4,000 acre-feet was included because, during a wet cycle, the largest deficit or difference might be small and 140% of the Projected Delivery might therefore be too restrictive to be realistic for the required augmentation deliveries for the current year.

Mr. Barfield's objection to the Augmentation Water Supply Credit is that it is a "flawed approach" to estimate the required augmentation deliveries in the current year (p. 11). He acknowledges, however, that I described a methodology to estimate the amount of augmentation deliveries needed in the current year that is similar to Kansas' suggested approach, but says my approach differs fundamentally from what is contained in the Colorado Resolution (p. 12). Mr. Barfield and Mr. Book have misunderstood the Colorado Resolution. Both seem to believe that Colorado would simply make augmentation deliveries during the current year based on the "Projected Delivery," as that term is used in the Colorado Resolution, without any consideration of the hydrologic or climatic conditions during the current year. However, the "Projected Delivery" is simply a way to estimate the maximum augmentation deliveries that might be required during the year and to establish a limit on the Augmentation Water Supply Credit.

The Colorado Resolution also provides for a minimum 4,000 acre-feet delivery every year and states that "actual deliveries will be adjusted during the course of the year based on hydrologic and climatic conditions and the need to offset stream depletions in order to comply

with Colorado's Compact Allocations." *See* Colorado Resolution, ¶ 4. This is exactly how I explained Colorado and the RRWCD WAE would operate the CCP project in making deliveries. In his deposition, Mr. Book generally agreed with the procedure I described. While Mr. Barfield says that my approach "differs fundamentally" from what is contained in the Colorado RRCA Resolution (p. 12), it appears to me that Mr. Barfield simply failed to note that the Colorado Resolution states that actual deliveries will be adjusted during the course of the year based on hydrologic and climatic conditions and the need to offset stream depletions.

Finally, I disagree with Mr. Book's understanding of how Colorado's compliance is determined during water-short year administration (Book report, p.5). Mr. Book assumes that Colorado's allocation from Beaver Creek is removed from all five years in calculating the five-year running average in Table 5A in the RRCA Accounting Procedures if one year in the five-year period is a year of water-short administration. This is incorrect. Subsection IV.B of the FSS states: "If Water-Short Administration is in effect, such use [of water in excess of if a State's specific sub-basin allocations] is consistent with the requirements of Subsection V.B" Subsection V.B.3 of the FSS states: "Colorado action: <u>In those years when Water-Short Year Administration is in effect</u>, Colorado agrees to limit its use of the flexibility identified in Subsection IV.B., to the extent that <u>any portion of Colorado's Allocation from Beaver Creek cannot be used on any other Sub-basin in Colorado</u>"(emphasis added). The above underlined language clearly indicates that the limitation on the use of Colorado's allocation from Beaver Creek in another sub-basin is limited to the year when water-short year administration is in effect, not in every year included in the five-year running average.

Not only is the language of the FSS clear, but Mr. Book's interpretation would lead to an unreasonable result. For example, this situation could occur if in the first four years of a five year period there were no water-short year administration in effect and then the 5th year was a year in which there was water short-year administration. Assume that based on the prior four years when water-short year administration was not in effect, Colorado delivered sufficient augmentation water and was in Compact compliance for those first four years. If the fifth year is a water-short administration year, Mr. Book's interpretation is that the Colorado's allocations for Beaver Creek would have to be removed not only in fifth year but also in all the previous four years. Colorado could then have a large shortage it would be unable to make up in the fifth year. That would clearly be unreasonable and is inconsistent with the clear language of Subsection V.B.3 of the FSS.

2.4 Kansas' Objection Number 4: The Colorado Resolution Lacks "Temporal Limits"

The first of the additional problems that Mr. Barfield identifies is that the Colorado's Proposal lacks any "temporal limits" (p. 12). Mr. Barfield asserts that the Ogallala aquifer of

eastern Colorado, which is the source of augmentation supply for the CCP project, is finite and exhaustible and is not sustainable at current rates of water levels declines. He refers to Mr. Larson's report. In his report, Mr. Larson states that groundwater levels in Colorado and especially in the area within and near the proposed Compact Compliance Wells have been steadily declining and that based on current rates of groundwater level decline, the saturated thickness in this area would be exhausted in about 150 years (Larson report, p. 7).

I understand the mathematical basis of Mr. Larson's calculation of the "life span" of the aquifer within the area of the Compact Compliance Wells based on current rates of groundwater level declines. However, I do not agree with the conclusions that the saturated thickness in this area would be exhausted in 150 years because it is wrong to assume that groundwater level declines will continue indefinitely at current rates. As groundwater levels decline in the Ogallala aquifer in eastern Colorado, wells in Colorado in areas of limited saturated thickness will go out of production, thereby reducing future withdrawals from the aquifer and slowing the rates of decline. The Compact Compliance Wells are located in an area with the greatest saturated thickness, and this area has a higher rate of recharge because it is located in a sand hills region. In addition, Mr. Larson's extrapolated declines that occurred in the last 10 years, which includes periods of extreme drought in Colorado and low recharge to the aquifer. Therefore, this region of the aquifer will continue to have a water supply after wells in other areas in Colorado have gone out of production.

Figure 1 shows a summary of the irrigated acreage in relation to the saturated thickness as groundwater levels decline in the RRWCD over the next 20 years. Figure 2 shows the projected aquifer thickness in the basin 20-years into the future. Dr. Schreüder and I prepared these projections for the RRWCD Board of Directors to determine if there would be sufficient irrigated acreage in the RRWCD over the 20-year repayment period for the CCP project loan. The projection shows that groundwater levels will decline in some areas to the point that some wells will go out of production, which will reduce the amount of pumping from the aquifer. Most of the irrigated area is located such that it will have a sufficient groundwater supply at the end of 20 years to provide reasonable assurance that use fees will be available to repay the loan for the CCP project.

In addition to the reduction in irrigated acreage due to declining water levels, the RRWCD WAE has provided cost-sharing for federal programs to convert irrigated acreage to non-irrigated use. At the present time, approximately 35,000 irrigated acres in the RRWCD have been removed from irrigation. The State of Colorado and the RRWCD WAE have submitted an application for an amendment to the Republican River Conservation Reserve Enhancement Program (CREP) to convert an additional 30,000 irrigated acres in the RRWCD to non-irrigated use. Thus, reduction of irrigated acreage in the RRWCD is a part of Colorado's and the RRWCD's long-term strategy for Compact compliance. Figures 3a and 3b show the locations of the retired acres in the northern and southern portions of the RRWCD, respectively.

As shown in the figures, the retirement of irrigated lands has been concentrated on lands adjacent to the South Fork.

Mr. Barfield suggests that based on the RRCA's lack of experience with any augmentation plan and given the potential for conditions in the Basin to change, Colorado's Proposal must require a periodic review (p.12). Colorado is relying on the CCP as a permanent, long term solution to assist it into coming into Compact compliance and the RRWCD WAE will have expended over $70 million to purchase groundwater rights, acquire easements, and construct the CCP project. Colorado and the RRWCD WAE are entitled to some certainty in making such large financial expenditures. If the RRCA conducts a periodic review of the augmentation plan, Colorado should not have to file a new application and the burden should be on other States to demonstrate the need for any change to the augmentation plan that has been approved.

Mr. Barfield states that it concerns him, in view of the ongoing depletion of the Ogallala aquifer and the depletions of streamflows due to Colorado's irrigation of 550,000 acres in the Basin from groundwater, that Colorado has not addressed the issue of its over-pumping in its plans to achieve Compact compliance and instead proposes to facilitate the "ongoing, aggressive depletion of this finite and non-replenishable supply of groundwater." (p. 12). As stated above, reduction of irrigated acreage and pumping in the Colorado portion of the Basin is both inevitable and part of Colorado's and the RRWCD WAE's long-term strategy for compliance with the Compact. In addition, Mr. Barfield is wrong that the groundwater supply is non-replenishable because the groundwater is recharged from precipitation as reflected in the RRCA Groundwater Model.

The RRWCD Board of Directors initially focused its efforts on providing cost-sharing for federal programs to convert irrigated acres in the RRWCD to non-irrigated uses on the assumption that the CCP project would not be needed in the short-term to achieve Compact compliance. The cost sharing programs were structured so that the irrigated lands closest to the rivers in the RRWCD were given a higher rate of payment to encourage the removal of lands irrigated by wells that have the largest impact on streamflow. However, within a few years it became apparent that efforts to reduce irrigated acreage were not bringing Colorado into compliance with its Allocations.

Projections made using the RRCA Groundwater Model showed that curtailment of all groundwater pumping in the Basin would not bring Colorado into compliance with its allocations for many years. These results are shown in Figure 9 of my expert report. Therefore, at the current time, absent a significant change in hydrology in the Basin, the only way for Colorado to achieve Compact compliance is to build the CCP project. However, to repay the loan for the CCP project and to pay for cost-sharing to retire irrigated acres in the RRWCD, the RRWCD WAE needs revenues from use fees on the diversion of groundwater for irrigation.

Mr. Barfield would put Colorado in a "Catch-22" position – he wants Colorado to significantly reduce groundwater pumping, which would deprive the RRWCD WAE of revenues needed to repay the loan for the CCP project and to pay the cost-sharing required to retire irrigated acres in the RRWCD. This in turn would mean that Colorado would be out of compliance with the Compact for decades. As engineer for the RRWCD WAE, I have spent considerable time assisting the Board of Directors of the RRWCD in evaluating options to assist the State of Colorado to comply with the Compact. It is my opinion that the CCP project is the only way that Colorado can comply with the statewide test for Compact compliance.

Colorado has never claimed, however, that the CCP will address all of the issues associated with its Compact compliance, and the CCP project is not the only action being taken to reduce Colorado's beneficial consumptive use. Approximately 140 million dollars have been spent or committed by the RRWCD WAE to help Colorado come into compact compliance. Included in this figure is the cost sharing for federal programs to retire irrigated acreage and to purchase and lease surface water rights to assist the State of Colorado with Compact Compliance. As shown in Figure 10 of my expert report, Colorado and the RRWCD WAE are using a wide range of tools to reduce Colorado's overuse, including reducing consumptive use by surface water rights, draining Bonny Reservoir, and the CCP project. Not shown explicitly in Figure 10 is the reduction in Colorado's CBCU from reducing irrigated acreage in Colorado by either land retirement programs or acres going out of production, but the projection in Figure 10 includes an estimate of the effect of reducing the irrigated acreage

2.5 Kansas' Objection Number 5: Colorado's Proposed Changes to the RRCA Accounting Procedures Require Full Review by the States

The second additional problem Mr. Barfield identifies is that the States have not conducted a detailed review of Colorado's proposed changes to the RRCA Accounting Procedures (p. 12-13). Mr. Barfield's objection ignores the fact that the application for the CCP project was submitted to the RRCA in March of 2008, that the proposed changes have been available for review by Kansas for more than a year, and that the States agreed to confidential discussions at which it was certainly possible to discuss and conduct a detailed review of Colorado's proposed changes to the RRCA Accounting Procedures. It should be noted that Nebraska supports the CCP project and has withdrawn its additional issues. Only Kansas insists that the proposed changes still require a detailed review.

Mr. Barfield also states that every augmentation plan is unique, which is why every augmentation plan must be approved separately by the RRCA (p.13). Paragraph 7 of Colorado's Resolution specifically addresses Mr. Barfield's concern. It states: "The approval of this augmentation plan and the related accounting procedures shall not govern the approval of

any future proposed augmentation plan and related augmentation procedures submitted by any other State under Subsection III.B.1.k of the FSS."

Mr. Barfield suggests that rather than proposing a generic accounting term for augmentation water supply, or 'AWS,' the term denoting augmentation water supply under Colorado's Proposal should be limited to that proposal, such as 'Colorado's North Fork augmentation water supply,' or a term to that particular and specific meaning and effect (p.13). While I do object to such a change, the language of paragraph 7 of the Colorado Resolution is more than sufficient to address Mr. Barfield's concern.

Mr. Barfield also states that an additional table in the RRCA Accounting Procedures may be helpful to ensure and to clarify where and how this augmentation water will be applied to the various tests of compliance under the FSS (p.13). As stated above, I do not object to clarification of how the augmentation water supply deliveries to the North Fork will be entered in Table 4A to determine Colorado's compliance with the sub-basin non-impairment requirement, although I do not believe an additional table is necessary for that purpose.

Mr. Barfield states that the RRCA Accounting Procedures must fully specify the RRCA Groundwater Model runs to be completed and details on how limits on deliveries for augmentation credit will be determined and documented (p.13). Paragraph 2 of the Colorado Resolution specifies that "Net depletions from the Colorado Compact Compliance Wells shall be computed by the RRCA Groundwater Model and included in Colorado's Computed Beneficial Use of groundwater pursuant to paragraph III.D.1 of the revised RRCA Accounting Procedures." It goes on to specify that "Groundwater pumping from the Compact Compliance Wells shall be measured by totalizing flow meters, and the measured groundwater pumping from such wells shall be included in the base 'run' of the RRCA Groundwater Model in accordance with paragraph III.D.1 of the revised RRCA Accounting Procedures."

Because Kansas insisted that every augmentation plan must be approved separately, Colorado addresses the unique aspects of the CCP project in both the Colorado Resolution and the revised RRCA Accounting Procedures. Mr. Barfield does not propose specific changes to the RRCA Accounting Procedures and the disagreements that Kansas has expressed go to whether the Pipeline water should be included in the RRCA Groundwater Model and whether Kansas will approve the CCP project in any form unless Colorado first addresses the sub-basin non-impairment requirement in the South Fork sub-basin.

2.6 Kansas' Objection Number 6: Colorado's "Catch-Up" Provisions Are Inadequate

The third additional problem Mr. Barfield identifies is that a "catch-up" provision has not been the subject of any sustained discussion among the States prior to this arbitration (p.13).

Mr. Barfield also states that Colorado has not included any detail in the Colorado Resolution and such a provision must be distinct from the normal compliance requirements, and it must be clearly articulated in the augmentation plan and its associated documents (p. 13).

I disagree that the “catch-up” provision has not been the subject of any sustained discussion among the States prior to the arbitration. From a very early date, Kansas expressed concern that Colorado would over-deliver water in one year and then deliver little or no water in the other years of the five-year running average used to determine Colorado compliance under the statewide test. Kansas has expressed this concern by saying that Colorado would over-deliver augmentation water in wet years and then deliver little or no augmentation in dry years. Either way, it represents the possibility that Colorado would “pre-load” deliveries so that no deliveries would be required for the next three or four years or that Colorado would over-deliver water to “catch-up” for under-deliveries in the preceding four years so that no deliveries would be required for the next three or four years.

Colorado developed the limit on Augmentation Water Supply credits to address Kansas’ concern and developed Exhibit 4 to the Colorado Resolution at the request of Kansas and Nebraska to illustrate how the limitation would be applied. While Exhibit 4 shows that Colorado could make deliveries to “catch-up” for under-deliveries in previous years and could receive a maximum AWS credit of 20,500 acre-feet in a single year based on the Colorado Ground Water Commission’s banking rules, the exhibit also illustrates that the year in which a large delivery drops off in the five-year running average accounting can set up a need to deliver a very large amount in that year to stay in Compact compliance. It is important to note that the compact accounting is done on a 5-year running average and any over or under delivery in a given year is well within the flexibility allowed under the RRCA Accounting Procedures.

In my opinion, it would not be reasonable for the RRWCD WAE to operate the CCP project in a manner that would require large over deliveries in some years because this could be a problem if the Pipeline deliveries had to be reduced due to well maintenance or mechanical problems and it establishes a pattern of large over deliveries every fifth year. Colorado has never suggested that it or the RRWCD WAE would operate the CCP project in that fashion, and the Colorado Resolution clearly states that Colorado will make a minimum annual delivery of 4,000 acre-feet and will adjust actual deliveries during the course of the year based on hydrological and climatic conditions and the need to offset stream depletions to comply with Colorado’s Compact Allocations. As stated above, there is little or no difference between Mr. Book and me on the basic procedure for how this would be done.

2.7 Kansas' Objection Number 7: Colorado Must Explain the Reasons for its Increase in Augmentation Water to 25,000 Acre-Feet per Year

The fourth and final additional problem Mr. Barfield identifies is that Colorado added language to the Colorado Resolution that would allow its augmentation to increase to the level of 25,000 acre-feet per year, which he says is vastly in excess of Colorado's current state of non-compliance (p. 13). Mr. Barfield states that any plans to expand the water supply must be separately approved by the RRCA (p. 13).

Paragraph 6 of the Colorado Resolution provides that Colorado may acquire additional groundwater rights to be pumped through the Compact Compliance Wells upon the terms and conditions of the resolution; however, paragraph 6 requires Colorado to file a notice identifying the additional groundwater rights and gives RRCA members sixty days from the notice to object to the addition of groundwater rights. If there is an objection, the notice is treated as an application for approval of an augmentation plan.

The reason for including this provision is simple. The RRWCD WAE purchased additional groundwater rights that were not included in the application filed with the RRCA. The RRWCD WAE intends to trade those groundwater rights for rights located in closer proximity to the Compact Compliance Wells and did not want to go through the expense to prepare a new application for approval of an augmentation plan if Nebraska and Kansas agreed that the addition of these groundwater rights could be incorporated based on the current resolution.

The difference between Colorado's Allocation and its CBCU is projected to grow slowly over time as the effects of past pumping deplete streamflows. For that reason, the RRWCD WAE sized the Pipeline to a capacity that it could deliver up to 25,000 acre-feet per year, with the understanding that it would be necessary in the future to acquire additional groundwater rights. During the design process of the CCP project, a cost analysis showed that the pipeline capacity could be increased from 15,000 ac-ft/yr to 25,000 ac-ft/yr with only a 5% increase in project cost. The RRWCD Board of directors concluded that a two-thirds increase in capacity for a 5% increase in cost was well worth the extra cost, even though the need for the additional capacity is many decades into the future.

The RRWCD Board of Directors has recognized that the CCP project needs to be a long-term solution to Compact compliance. One of the criteria for selecting the location of the project was the saturated thickness of the aquifer at the location of the Compact Compliance Wells. Another was to locate the Compact Compliance Wells at sufficient distance from the North Fork to minimize stream depletions from pumping. The Board has also recognized that conservation and reducing groundwater withdrawals will have to accompany operation of the CCP project over time, but it also recognized that stream depletions are projected to grow in the future. To the extent Kansas has concerns about the addition of groundwater rights, the

Colorado Resolution allows the Kansas RRCA member to object, which then will require the separate RRCA consideration of the additional groundwater rights.

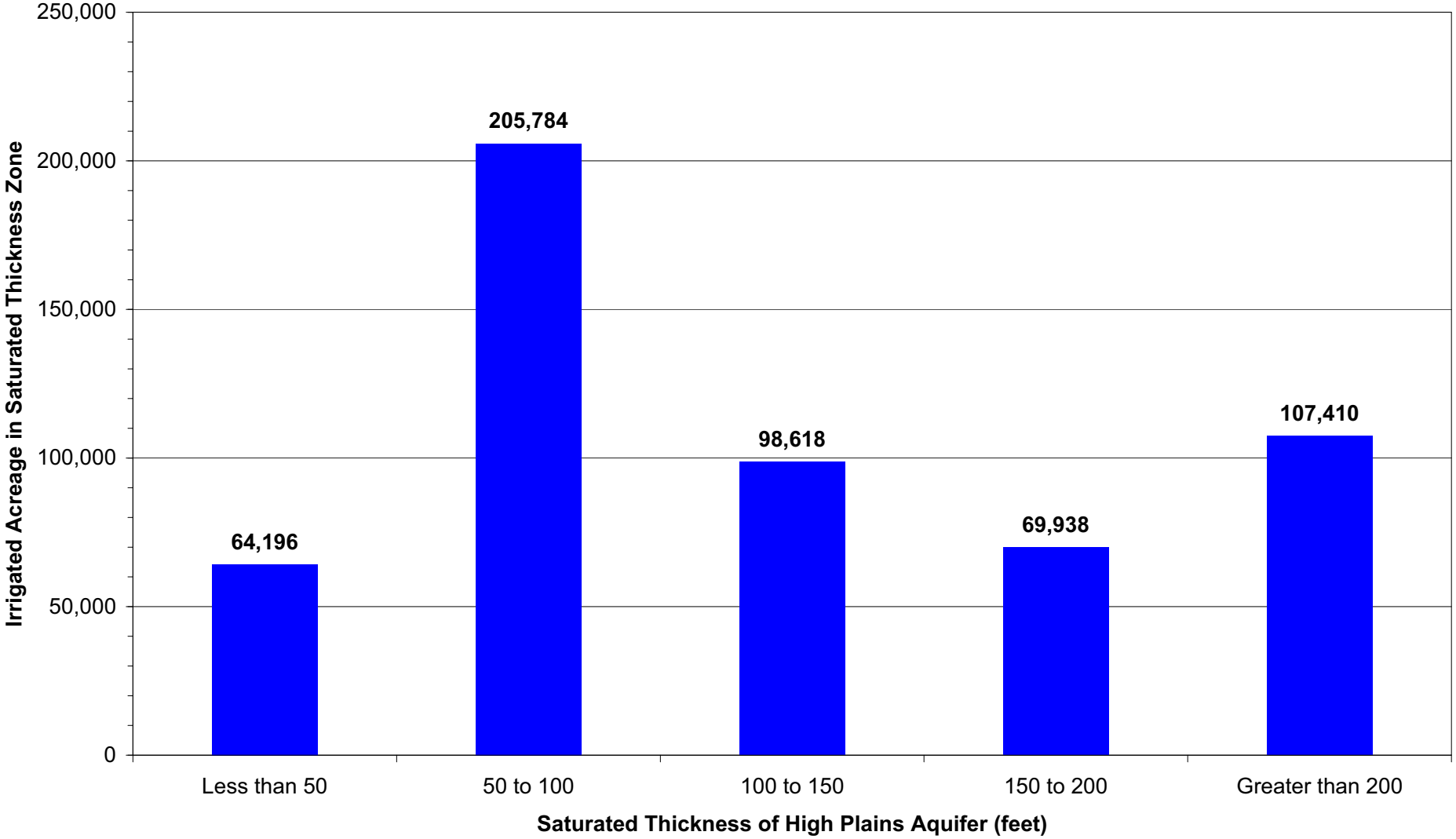
3.0 Conclusions

Mr. Barfield states that Mr. Wolfe does not recognize the consequences of the Colorado Proposal for Kansas (p. 13). He states that it bears repeating that the Colorado Proposal does nothing to address Colorado's non-compliance on the South Fork and that Colorado is seeking to obtain accounting credits that would offset South Fork overuse under the statewide test of compliance (p. 13). As stated above, Mr. Wolfe has acknowledged that the Colorado Proposal does not address the sub-basin non-impairment requirement in the South Fork sub-basin. However, the statewide test and the sub-basin non-impairment requirement are separate tests of Compact compliance. The Colorado Proposal is intended to address compliance with the statewide test and does not offset South Fork overuse under the sub-basin non-impairment requirement.

In the Conclusion section of Mr. Barfield's report, he states that the bigger issue in the arbitration is the effect of Subsection III.B.1.k of the FSS and whether a State can use the FSS' dispute resolution procedures to impose the terms of augmentation plans (p. 14). He states that if a State can do so, then Kansas will have lost its ability to protect its waters under the FSS and the Compact itself. While it appears to me that this is a legal issue rather than a technical issue, it is my opinion, based on my experience in interstate water disputes, that arbitration is an appropriate way to try to resolve such disputes. Experts are often able to agree on engineering and technical facts, but if States disagree on legal issues underlying engineering and technical issues, it makes it difficult for experts to resolve the engineering and technical issues. My experience indicates to me that invoking the jurisdiction of the U.S. Supreme Court to resolve disputes can be lengthy and very expensive. In my opinion, arbitration by a neutral arbitrator can be useful in clarifying and resolving what are often disagreements on legal issues that underlie engineering and technical issues.

Figure 1

Republican River Basin
Summary of Irrigated Acreage by Saturated Thickness
(estimated saturated thickness in 2032 after another 25 years with current level of pumping)



Note, if all acres with saturated thickness of less than 50 feet are removed from production, the net improvement to compact compliance is about 800 ac-ft/yr after 25 years.

Analysis for Oct 11, 2007 Presentation.xls, Chart3, 10/10/2007

Estimated Regional Saturated Thickness 25 years after 2006

Republican River Compact Administration Groundwater Model

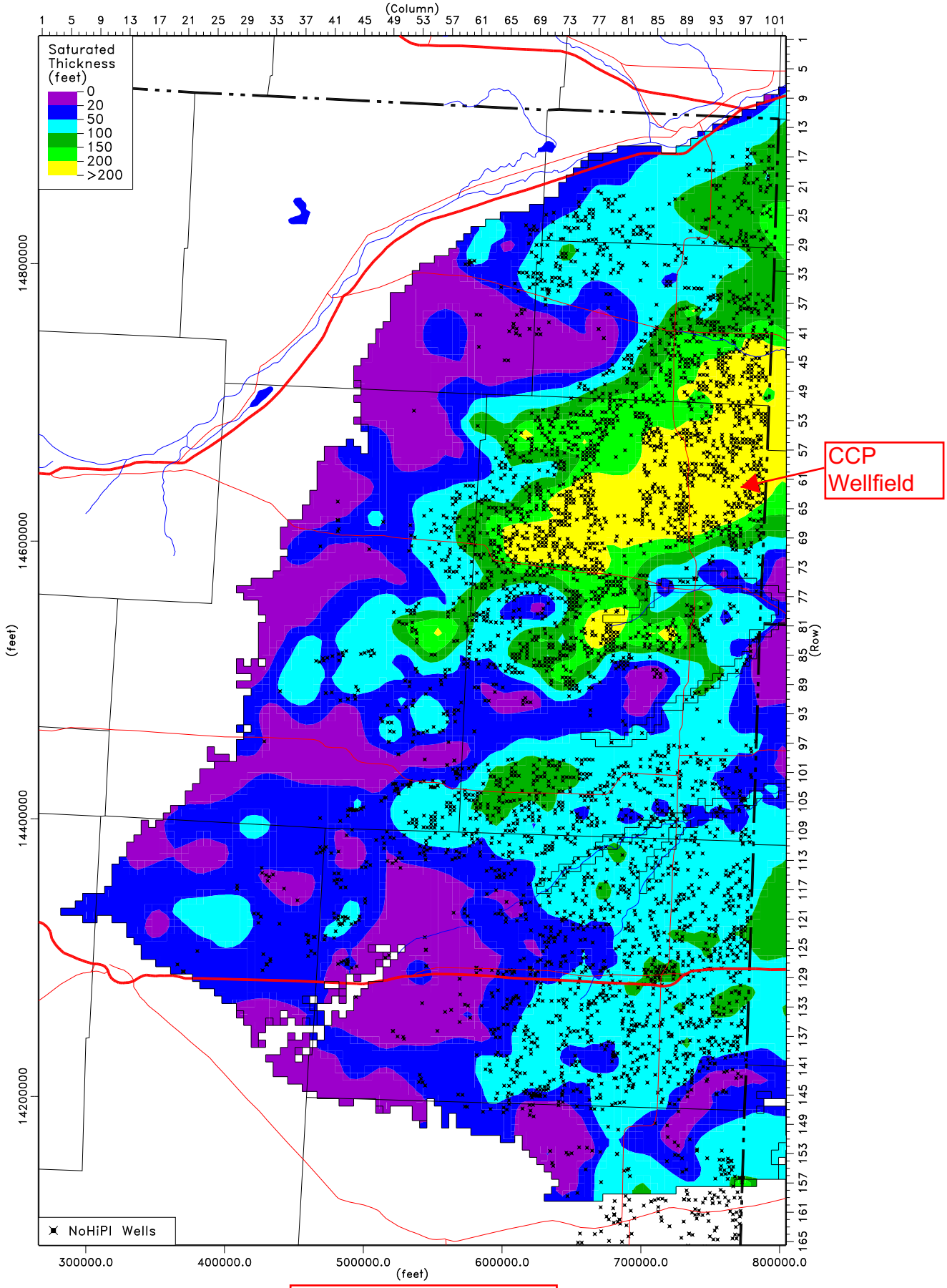
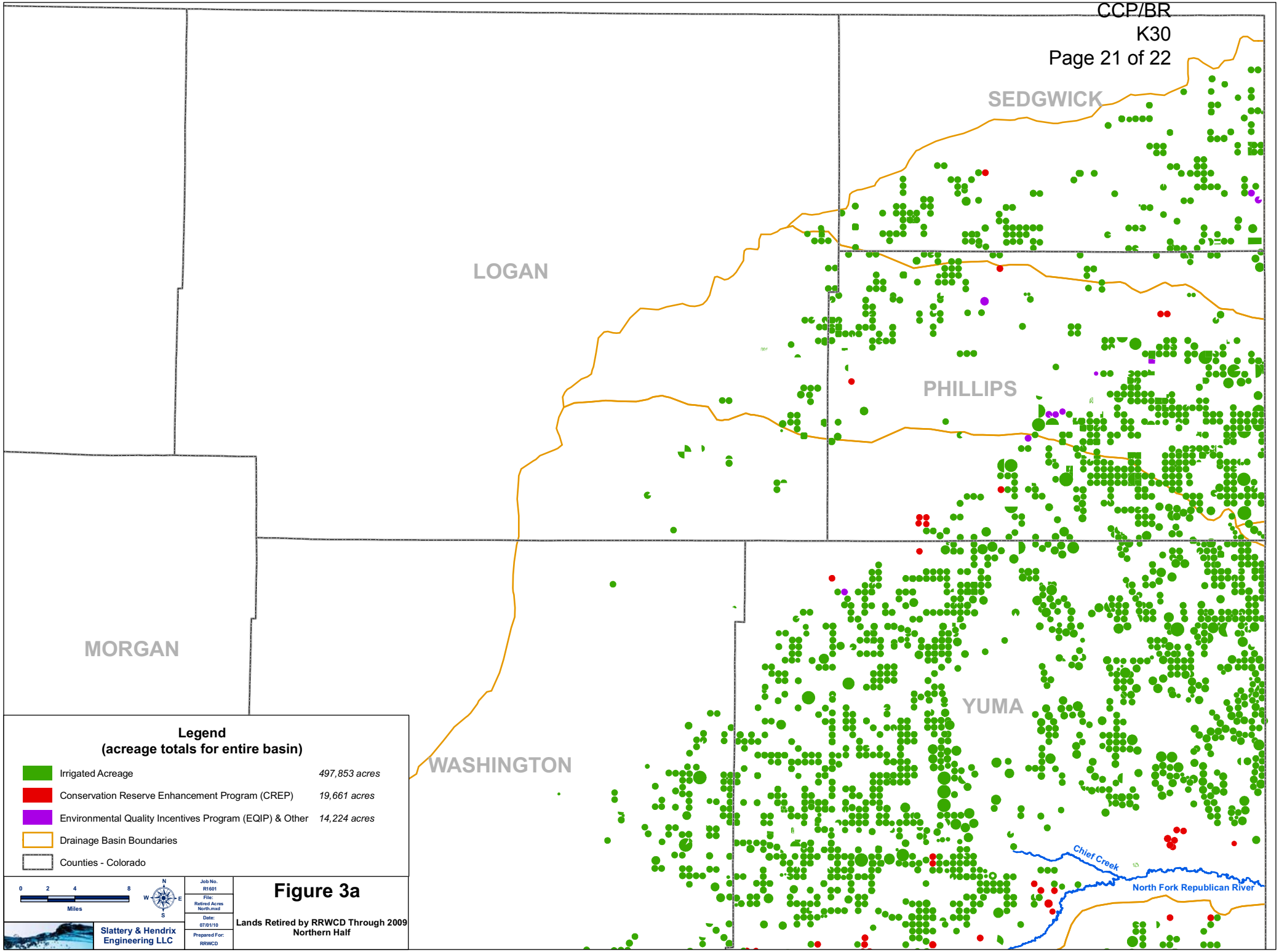
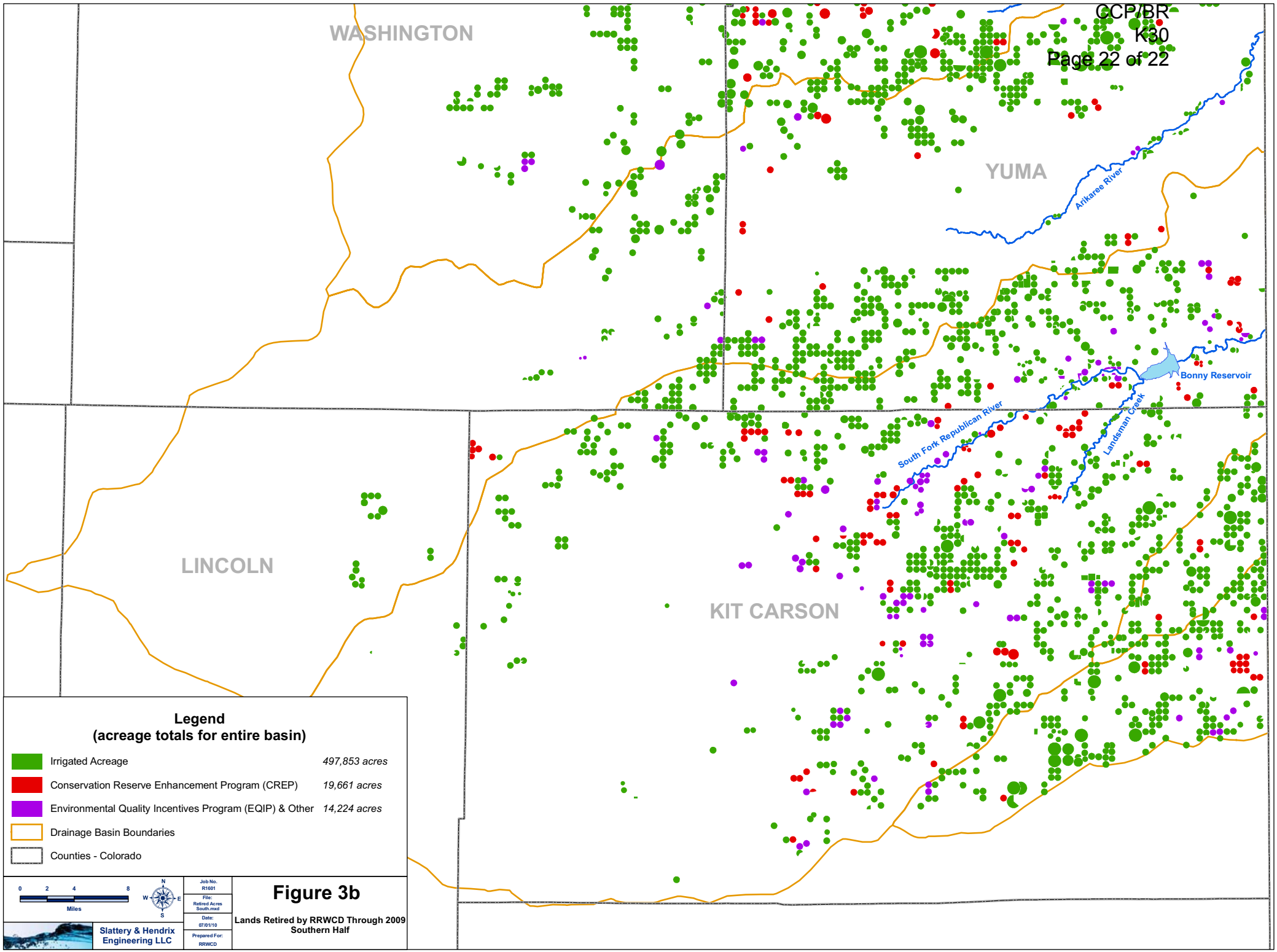


Figure 2


SEDGWICK
LOGAN
PHILLIPS
MORGAN
YUMA
WASHINGTON
Chief Creek
North Fork Republican River
Legend
(acreage totals for entire basin)
Irrigated Acreage 497,853 acres
Conservation Reserve Enhancement Program (CREP) 19,661 acres
Environmental Quality Incentives Program (EQIP) & Other 14,224 acres
Drainage Basin Boundaries
Counties - Colorado
0 2 4 8
Miles
N
W
E
S
Slattery & Hendrix Engineering LLC
Job No. R1601
File: Retired Acres North.mxd
Date: 07/01/10
Prepared For: RRWCD
Figure 3a
Lands Retired by RRWCD Through 2009
Northern Half


WASHINGTON
YUMA
LINCOLN
KIT CARSON
Arikaree River
Bonny Reservoir
South Fork Republican River
Landsman Creek
Legend
(acreage totals for entire basin)
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Date: 07/01/10
Prepared For: RRWCD
Slattery & Hendrix Engineering LLC
Figure 3b
Lands Retired by RRWCD Through 2009
Southern Half