

**Whipple, John J., OSE**

**From:** Scott Balcomb [scott@balcombgreen.com]  
Don Ostler

**Sent:** Wed 2/7/2007 10:38 AM

**Cc:** Ted Kowalski; Trujillo, Tanya, OSE; S Farris; Rod Kuharich; Robert King; Randy Seaholm; Mutz, Phil, OSE; Pete Michaels; Patrick Tyrrell; Norman Johnson; Larry Anderson; Whipple, John J., OSE; John W. Shields; Dantonio, John, OSE; Jerry Olds; Brown, Jayne, HSD; James Lochhead Esq.; Hal Simpson; Erika Olson; Eric Kuhn; Lopez, Estevan, OSE; Dennis Strong; Dallin W. Jensen; Carol D. Angel; Castillo, Candise, NMPD

**Subject:** RE: Flaming Gorge Pipeline Project

**Attachments:**

Don:

I concur with the suggestion that Aaron Million should try to fit himself into the regularly scheduled Commission work meeting and follow up meeting on May 10-11. I see no reason to have a special meeting for his project.

Second, we should put some thought between now and then in determining what action if any is available to the Commission. Some dialogue on what we can and/or should do between now and then would probably be beneficial.

Next, if there's any advanced information that Million is willing to furnish, I'd certainly like to look at it before we get to the May meetings. Perhaps our technical advisors would appreciate it as well.

Finally, I do not know that I'm in a position to ratify your concern about the affects on power production in the basin fund. Upstream beneficial use will always have that impact; that's a serious mine field in my estimation.

I'm happy to discuss these issues with you or others in the Commission at the convenience.

Very truly yours,  
Scott Balcomb  
Balcomb & Green, P.C.  
818 Colorado Ave.  
P.O. Drawer 790  
Glenwood Springs, CO 81602  
970-945-6546  
970-945-8902 Fax

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-----Original Message-----

**From:** Don Ostler [<mailto:dostler@uc.usbr.gov>]  
**Sent:** Tuesday, January 30, 2007 3:35 PM  
**To:** scott@balcombgreen.com; landerson@barnettwater.com; rbratton@brattonhill.com; ptyrre@seo.wyo.gov; Rod.Kuharich@state.co.us; john.dantonio@state.nm.us; Don Ostler; dennisstrong@utah.gov  
**Cc:** sfarris@ago.state.nm.us; JLochhead@BHF-Law.com; dmerritt@crwcd.org; e' @crwcd.org; djensen@pblutah.com; jshiel@seo.wyo.gov; carol.angel@state.co.us; Hal.Simpson@state.co.us; john.cyran@state.co.us; Randy.Seaholm@state.co.us; ted.kowalski@state.co.us; estevan.lopez@state.nm.us;

OSE-1519

jayne.brown@state.nm.us; john.whipple@state.nm.us;  
 t .trujillo@state.nm.us; pmicha@state.wy.us; Jane Bird;  
 je.,olds@utah.gov; normanjohnson@utah.gov; robertking@utah.gov  
 Subject: Flaming Gorge Pipeline Project

Commissioners:

I have received the attached letter from Jeff Fassett, representing the Million Resource Conservation Group for the Flaming Gorge (or Green River) pipeline project, requesting an opportunity to brief the Commission on the details of this project. Some of you (not everyone ) have had preliminary discussions with Aaron Million in the past. New information is now emerging regarding the project including the preliminary analysis of the Bureau of Reclamation, UC Regional Office in response to Mr. Millions' request to contract for water out of Flaming Gorge Reservoir. We also recently had a very brief discussion with Mr. Rick Gold at our last Commission meeting as part of his agency report to the Commission. Jeff has requested that we meet with them by about mid-March or so.....The Bureau staff have also requested an opportunity to brief the Commission on several big policy issues that they see coming out of this.

I think it would be very useful for the Commission to schedule a work meeting briefing and discussion on this project at least to aid in the dissemination of information for all 4 states. However, I have been unable to find any specific reason that this discussion could not wait until our regularly scheduled Commission work meeting on May 10, 2007 ( Commission meeting would follow on May 11, 2007). I have talked with both Jeff and the Bureau and they would like to meet as soon as convenient, but there is no real milestone deadline they are trying to meet. The Bureau should be able to give us something in writing in advance so we can have a better discussion...

At present, my intention would be to put this on the agenda for our work meeting on May 10th. If you have concerns about this or want to do it sooner as requested by Jeff, please let me know...

Some of the potential policy issues regarding this are as follows:

1. The Bureau has done a mini-hydrologic determination for this part of the upper basin. We will need our engineering committee to get into this and determine that the assumptions are reasonable and acceptable to us.
2. I think the Bureau was somewhat surprised to find that there is not as much water available for contract out of Flaming Gorge as they thought....maybe only 150,000 ac-ft (remember the upper end of this project was going to be 450,000ac-ft)
3. The recent commitments to fish flows have significantly impacted the amount of water available for contract. Are the fish flows higher than actually needed based upon science justification? Would they have been negotiated differently if we had known the limitations on contract water availability?
4. The Flaming Gorge contract decision will limit other potential users of the reservoir capacity in the future unless factored in now...

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5 The assumptions about where Wyoming will divert future flows from Green River System will affect this contract decision. Diversions higher in the system will restrict the amount available for contract...

6. What will be the effects on power production and the basin fund? Early indications are that contract water payments will go into the basin fund and will make it better off, but power production may take a hit..

Thanks  
Don Ostler  
Upper Colorado River Commission

**Whipple, John J., OSE**

**m:** Don Ostler [dostler@uc.usbr.gov] **Sent:** Tue 1/30/2007 3:34 PM  
 scott@balcombgreen.com; landerson@barnettwater.com; rbratton@brattonhill.com; ptyrre@seo.wyo.gov; Rod.Kuharich@state.co.us;  
 Dantonio, John, OSE; Don Ostler; dennisstrong@utah.gov

**Cc:** sfarris@ago.state.nm.us; JLochhead@BHF-Law.com; dmerritt@crwcd.org; ekuhn@crwcd.org; djensen@pblutah.com;  
 jshiel@seo.wyo.gov; carol.angel@state.co.us; Hal.Simpson@state.co.us; john.cyran@state.co.us; Randy.Seaholm@state.co.us;  
 ted.kowalski@state.co.us; Lopez, Estevan, OSE; Brown, Jayne, HSD; Whipple, John J., OSE; Trujillo, Tanya, OSE; pmicha@state.wy.us;  
 Jane Bird; jerryolds@utah.gov; normanjohnson@utah.gov; robertking@utah.gov

**Subject:** Flaming Gorge Pipeline Project

**Attachments:**

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3. The recent commitments to fish flows have significantly impacted the amount of water available for contract. Are the fish flows higher than actually needed based upon science justification? Would they have been negotiated differently if we had known the limitations on contract

OSE-1522

water availability?

4. The Flaming Gorge contract decision will limit other potential users of the reservoir capacity in the future unless factored in now...
5. The assumptions about where Wyoming will divert future flows from the Green River System will affect this contract decision. Diversions higher in the system will restrict the amount available for contract...
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Thanks  
Don Ostler  
Upper Colorado River Commission

OSE-1523



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**Whipple, John J., OSE**

**From:** Whipple, John J., OSE **Sent:** Tue 3/27/2007 4:13 PM  
**To:** tgcarr@azwater.gov; grzimmerman@crb.ca.gov; kay.brothers@lvvwd.com  
**Cc:**  
**Subject:** changes to hydro determination  
**Attachments:**  hydrodeter.changes2007a.doc(21KB)

All:

Attached are the proposed changes to the May 2006 Draft Hydrologic Determination. Please confirm your concurrence with the proposed changes.

Thanks, John Whipple

OSE-1524

The following changes to the Bureau of Reclamation's May 2006 Draft Hydrologic Determination are proposed:

Page 3, Approach, second paragraph:

~~The~~Neither the Lower Division states nor the Upper Colorado River Commission does not agree with the modeling assumption for the of an objective minimum release used in this report of 8.23 maf and the assumed delivery of 0.75 maf each year toward the Mexican Treaty obligation included therein. At the request of the Commission, this hydrologic investigation considers for planning purposes both the objective minimum release of 8.23 maf and a minimum release from Lake Powell of 7.48 maf annually. However, this hydrologic determination does not quantify the Colorado River Compact Article III(c) requirement or make or rely on a critical compact interpretation regarding Article III(c). The 1988 Hydrologic Determination also showed the Upper Basin yields under these both minimum release scenarios.


Page 7, Conclusions, first paragraph, first sentence:

It is concluded that based on the analysis performed by Reclamation in consultation with the Upper Colorado River Commission, the Upper Basin yield and New Mexico water allocation needed to support New Mexico's revised Upper Basin depletions schedule are reasonably likely to be available.



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**Whipple, John J., OSE**

**From:** Whipple, John J., OSE **Sent:** Tue 3/27/2007 3:50 PM  
**To:** Whipple, John J., OSE; ptyrre@seo.wyo.gov; jshiel@seo.wyo.gov; dennisstrong@utah.gov; robertking@utah.gov; scott@balcombgreen.com; rod.kuharich@state.co.us; randy.seaholm@state.co.us; pmicha@state.wy.us; normanjohnson@utah.gov; ted.kowalski@state.co.us; jlochhead@bhf-law.com  
**Cc:** dostler@uc.usbr.gov; Dantonio, John, OSE; Lopez, Estevan, OSE; Trujillo, Tanya, OSE  
**Subject:** 2006 hydro determination changes - revised  
**Attachments:**  hydrodeter.changes2007a.doc(2.1KB)

All:

California requests a slight revision to the proposed Hydro Determination changes transmitted moments ago. The attached includes California's suggested edit in addition to the edits worked out with Arizona. Can you accept the proposed changes? Thanks again for your prompt attention to this matter.

John Whipple

---

**From:** Whipple, John J., OSE  
**Sent:** Tue 3/27/2007 3:35 PM  
**To:** ptyrre@seo.wyo.gov; jshiel@seo.wyo.gov; dennisstrong@utah.gov; robertking@utah.gov; scott@balcombgreen.com; rod.kuharich@state.co.us; randy.seaholm@state.co.us; pmicha@state.wy.us; normanjohnson@utah.gov; ted.kowalski@state.co.us; jlochhead@bhf-law.com  
**Cc:** dostler@uc.usbr.gov; Dantonio, John, OSE; Lopez, Estevan, OSE; Trujillo, Tanya, OSE  
**Subject:** 2006 hydro determination changes

All:

ase review the attached proposed changes to the May 2006 Draft Hydrologic Determination that were negotiated between . . . zona and New Mexico. Please let us know if the proposed changes are acceptable to you. As you know, we would like to get this issue resolved as soon as possible. Thank you for your assistance.

John Whipple

OSE-1526

The following changes to the Bureau of Reclamation's May 2006 Draft Hydrologic Determination are proposed by Arizona and New Mexico:

Page 3. Approach, second paragraph:


~~The~~Neither the Lower Division states nor the Upper Colorado River Commission ~~does not~~ agree with the modeling assumption for the~~of~~ an objective minimum release used in this report ~~of 8.23 maf~~ and ~~the assumed delivery of 0.75 maf each year toward the Mexican Treaty obligation included therein.~~ At the request of the Commission, this hydrologic investigation considers for planning purposes both the objective minimum release of 8.23 maf and a minimum release from Lake Powell of 7.48 maf annually. However, this hydrologic determination does not quantify the Colorado River Compact Article III(c) requirement or make or rely on a critical compact interpretation regarding Article III(c). The 1988 Hydrologic Determination also showed the Upper Basin yields under ~~these~~both minimum release scenarios.

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**From:** Whipple, John J., OSE **Sent:** Tue 3/27/2007 3:35 PM  
**To:** ptyrre@seo.wyo.gov; jshiel@seo.wyo.gov; dennisstrong@utah.gov; robertking@utah.gov; scott@balcombgreen.com; rod.kuharich@state.co.us; randy.seaholm@state.co.us; pmicha@state.wy.us; normanjohnson@utah.gov; ted.kowalski@state.co.us; jlochhead@bhf-law.com  
**Cc:** dostler@uc.usbr.gov; Dantonio, John, OSE; Lopez, Estevan, OSE; Trujillo, Tanya, OSE  
**Subject:** 2006 hydro determination changes  
**Attachments:**  hydrodeter.changes2007a.doc(21KB)

All:

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John Whipple

OSE-1528

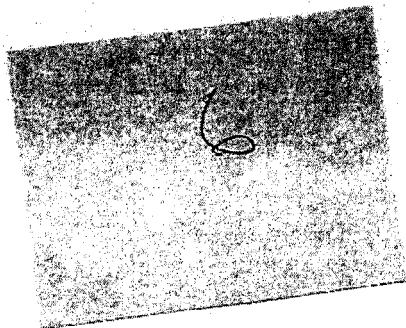
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Page 3. Approach. second paragraph:

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**Whipple, John J., OSE**

---

**From:** Dave Trueman [DTRUEMAN@uc.usbr.gov]  
**To:** Whipple, John J., OSE; Don Ostler  
**Cc:**  
**Subject:** Fwd: Hydro determination transmittal memo signed  
**Attachments:**

**Sent:** Tue 5/1/2007 12:52 PM

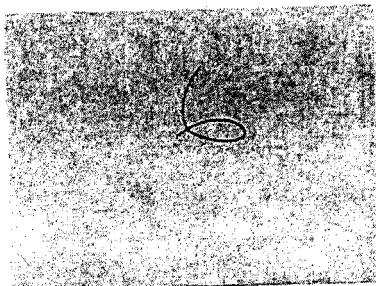
ASWS Limbaugh signed the transmittal memo for the Hydro Determination and it is on it's way to the Secretary's office.

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OSE-1531









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**Whipple, John J., OSE**

**From:** Dave Trueman [DTRUEMAN@uc.usbr.gov] **Sent:** Wed 6/13/2007 12:54 PM  
**To:** David King; Jayne Harkins; Larry Walkoviak; Terry Fulp; Randy Seaholm; Whipple, John J., OSE; Robert King; Carol DeAngelis; Chris Gorbach; Connie Rupp; John Simons; Pat Page  
**Cc:**  
**Subject:** Hydro Determination  
**Attachments:**  [transmittal letter to Governors.pdf\(138KB\)](#)  [Final Hydrologic Determination-May 23, 2007.pdf\(628KB\)](#)

Good News,

By now the governor's should have received the Secretary's approval letter by federal express and we are free to share the signed HD as promised. Many of you contributed to the effort and I'd like to convey my personal thanks for a job well done.

Regards - DaveT

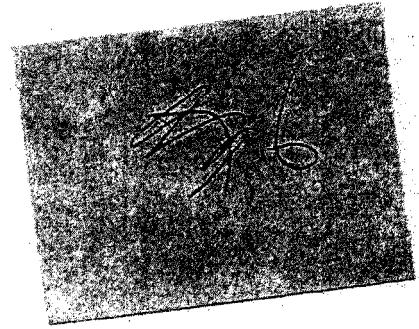
David Trueman  
Division Manager UC-400  
Resources Management Division  
US Bureau of Reclamation  
125 S. State Street, Rm 6432  
Salt Lake City, UT 84138-1174  
(801) 524-3759 work  
801-633-5039 cell  
(801) 524-5499 fax  
trueman@uc.usbr.gov

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OSE-1533





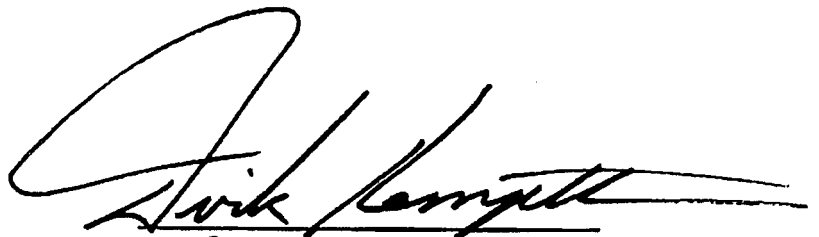
**HYDROLOGIC DETERMINATION  
2007**

**Water Availability from Navajo Reservoir and  
the Upper Colorado River Basin for Use in New Mexico**

**April 2007**

**MAY 23 2007**

**Date**



**Secretary of the Interior**

## **I. Executive Summary**

Determination as to the availability of water under long-term service contracts for uses from Navajo Reservoir involves a projection into the future of estimated water uses and water supplies. On the basis of this hydrologic investigation, water depletions by the Upper Basin states from the Upper Colorado River Basin can be reasonably allowed to rise to an annual average of 5.76 million acre-feet (maf) per year, exclusive of Colorado River Storage Project (CRSP) reservoir evaporation from Lake Powell, Flaming Gorge Reservoir, and the Aspinall Unit. This depletion level can be achieved under the same shortage criteria upon which the allowable Upper Basin yield was determined in the 1988 Hydrologic Determination.

This document determines the availability through at least 2060 of water from New Mexico's Upper Basin allocation and Navajo Reservoir to service a proposed contract for the Navajo Nation's consumptive uses in New Mexico under the Navajo-Gallup Water Supply Project in the annual amount of 20,780 acre-feet (af) and the Navajo Indian Irrigation Project (NIIP) in the amount of 270,000 af per year on average over any period of ten consecutive years. It also is likely that sufficient water will be available from Navajo Reservoir to service the proposed contract after the 2060 planning horizon, depending upon future storage, hydrologic conditions, and other factors. This determination does not guarantee that the United States will be able to deliver water under the proposed contract without shortages in deliveries, and does not obligate the United States to maintain storage facilities beyond their useful lives. The proposed contract is part of a Navajo Nation water rights settlement in the Upper Basin in New Mexico, and the settlement provides that uses made pursuant to the contract will be subject to administration in accordance with the Upper Colorado River Basin Compact and New Mexico state law. Implementation of the Navajo-Gallup Water Supply Project and the NIIP is subject to compliance with federal environmental laws including the National Environmental Policy Act and the Endangered Species Act.

## **II. Introduction**

The State of New Mexico has proposed the Navajo-Gallup Water Supply Project to provide a renewable water supply from the San Juan River for municipal and domestic uses for Indian and non-Indian communities located within New Mexico. Uses under the project by the Jicarilla Apache Nation and the City of Gallup would be supplied through the Jicarilla Apache Nation's Navajo Reservoir water supply contract approved by Congress in 1992. Uses in New Mexico under the project by the Navajo Nation would be supplied through a proposed new Navajo Reservoir water supply contract that is a component of the San Juan River Basin in New Mexico Navajo Nation Water Rights Settlement Agreement (hereinafter referred to as the Settlement Agreement) that the State of New Mexico and the Navajo Nation executed on April 19, 2005. The new contract also would supersede the existing Navajo Reservoir water supply contract for the NIIP.

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On June 19, 2003, the Upper Colorado River Commission resolved that the States of the Upper Division consent to the Navajo-Gallup Water Supply Project, provided that water diverted by the project for use in New Mexico shall be a part of the consumptive use apportionment made to the State of New Mexico by Article III(a) of the Upper Colorado River Basin Compact. The maximum amount of consumptive use through the project by the Navajo Nation in New Mexico that would be permitted in any one year under the Settlement Agreement and the proposed contract is 20,780 acre-feet.

Public Law 87-483 at section 11(a) requires that no long-term contract, except contracts for the NIIP and the San Juan-Chama Project, shall be entered into for the delivery of water stored in Navajo Reservoir, or any other waters of the San Juan River and its tributaries to which the United States is entitled, until the Secretary of the Interior has determined by hydrologic investigation that sufficient water to fulfill such contract is reasonably likely to be available for use in the State of New Mexico under the allocations made in Articles III and XIV of the Upper Colorado River Basin Compact, has submitted such determination to Congress, and Congress has approved the contract. The last such hydrologic determination was approved by the Secretary on February 2, 1989 (Hydrologic Determination, 1988, Water Availability from Navajo Reservoir and the Upper Colorado River Basin for Use in New Mexico, hereinafter referred to as the 1988 Hydrologic Determination). The 1988 Hydrologic Determination evaluated the availability of water from the Navajo Reservoir water supply for the Jicarilla Apache Nation's Navajo Reservoir water supply contract. The State of New Mexico, by letter dated May 3, 2005, requested that the 1988 Hydrologic Determination be updated to evaluate the availability of water to service the proposed Navajo-Gallup Water Supply Project.

This hydrologic investigation is made for the purpose of contracting for water from the Navajo Reservoir water supply for the Navajo Nation's uses in New Mexico under the Navajo-Gallup Water Supply Project. The Bureau of Reclamation prepared this hydrologic investigation in consultation with the Upper Colorado River Commission because of the critical nature of this determination of the Upper Basin water supply. The Upper Colorado River Basin Compact created and defined several areas of responsibility for the Commission that directly and indirectly relate to this investigation.

### III. Upper Basin Yield

#### A. General Upper Basin Hydrology

Based on the Bureau of Reclamation's Colorado River Simulation System (CRSS), natural flows for the period 1906-2000, the natural runoff from the Upper Colorado River Basin averages about 15.3 maf per year at Lee Ferry. Of this amount, approximately 2 maf per year originates in the San Juan River Basin above Bluff, Utah. New Mexico can only develop its Upper Basin allocation from the San Juan River and its tributaries. The Bureau of Reclamation's Colorado River System Consumptive Uses and Losses Report for 1996-2000 indicates that ~~current consumptive uses from the San Juan River Basin~~

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average about 382,400 af per year in New Mexico and about 192,500 af per year in Colorado. Only minor amounts of depletions are made in the San Juan River Basin in Utah and Arizona.

## B. Approach

This hydrologic investigation considers and uses many of the same basic assumptions as the 1988 Hydrologic Determination. Both investigations assume use of the CRSS natural flows at Lee Ferry, minimum releases from Lake Powell of between 7.48 maf and 8.23 maf annually, an allowable overall shortage of no more than 6 percent for a critical period, either maintenance or use of the minimum power pools at CRSP units, reduced storage capacity in Lake Powell due to sedimentation, and inclusion of bank storage. The CRSS natural flows at Lee Ferry for the period 1971-1980 were increased to reflect recalculation of historic irrigation depletions in the Upper Basin using the Soil Conservation Service (SCS) modified Blaney-Cridle method with SCS effective precipitation. The revised CRSS natural flows for 1971-1980 are consistent with the CRSS natural flows at Lee Ferry determined for the remainder of the 1906-2000 period of record. Also, sedimentation in Lake Powell was adjusted to reflect a 2060 planning horizon, and a 4 percent bank storage factor was used in this investigation consistent with Reclamation's current CRSS model.

Neither the Lower Division states nor the Upper Colorado River Commission agree with the modeling assumption for the objective minimum release used in this report. At the request of the Commission, this hydrologic investigation considers for planning purposes both the objective minimum release of 8.23 maf and a minimum release from Lake Powell of 7.48 maf annually. However, this hydrologic determination does not quantify the Colorado River Compact Article III(c) requirement or make or rely on a critical compact interpretation regarding Article III(c). The 1988 Hydrologic Determination also showed the Upper Basin yields under these minimum release scenarios.

Mass balance analyses were used to analyze potential water use by the Upper Basin under 2060 conditions. The mass balance considers Upper Basin reservoir storage, natural flows at Lee Ferry, deliveries to the Lower Basin, consumptive use demands in the Upper Basin, and CRSP evaporation as a function of storage volume. All existing Upper Basin storage capacity was included in the analysis because all storage supports water use in the Upper Basin and impacts stream flows. The CRSP and non-CRSP reservoirs as groups were assumed to be the same percent full each year, and CRSP storage was assumed to be distributed between units in accordance with the average historic storage distribution. The CRSP reservoir evaporation that is used in the mass balance analyses includes evaporation from Lake Powell, Flaming Gorge Reservoir, and the Aspinall Unit that is shared among the Upper Division States, but excludes evaporation from Navajo Reservoir which is chargeable to the states based on use. Shared CRSP reservoir evaporation is modeled using a regression equation relating historic shared CRSP reservoir evaporation from Lake Powell, Flaming Gorge Reservoir, and the Aspinall Unit to the aggregate historic storage volume in these reservoirs plus Navajo Reservoir. ~~Evaporation equations were developed for both active and live storage, and were applied~~



to estimate annual shared CRSP evaporation based upon yearly reservoir storage volume (surface area). The 1988 Hydrologic Determination considered variations in shared CRSP reservoir evaporation with storage for conducting statistical trace analyses to evaluate possible frequencies and magnitudes of shortages; however, it deducted a long-term average shared CRSP reservoir evaporation of 0.52 maf per year from the critical-period Upper Basin yield of at least 6.0 maf/yr to determine the amount of water available for Upper Basin uses through the critical period.

**C. Results**

Mass balance analyses were performed for various combinations of storage, Lower Basin deliveries, and overall shortages to evaluate the allocation of water to the Upper Basin (see mass balance analyses provided in Appendix A). The following is a summary of the results of the analyses:

<u>Storage Assumption</u>	<u>Minimum Lower Basin Delivery (maf)</u>	<u>Yield without Shortages (maf)</u>	<u>Yield with 6% Overall Shortages (maf)</u>
Maintain minimum power pools	8.25	5.55	5.79
	7.50	6.30	6.57
Use minimum power pools	8.25	5.72	5.98
	7.50	6.47	6.76

The yield for this analysis is defined as the amount of water available at Lee Ferry for use, on average, by the Upper Basin, exclusive of shared CRSP reservoir evaporation. Shortages in the above table are defined as 6 percent or less overall computed shortage for any period of 25 consecutive years consistent with the 1988 Hydrologic Determination. Results are shown for minimum Lower Basin deliveries of 8.25 maf and 7.50 maf as was done in the 1988 Hydrologic Determination. The analyses in this investigation should not be construed to prejudice the positions of either the Upper Colorado River Commission or the States of the Lower Division as to the interpretation or administration of Article III of the Colorado River Compact.

For those analyses that use an allowable or tolerable overall shortage of 6 percent or less of the use over any period of 25 consecutive years, the results indicate that there would be 5 years of shortage to meet all demands on the Upper Basin out of 95 years of record used in this investigation. However, the annual amounts of computed shortages for those five years would not fully materialize because Upper Basin consumptive uses will be below average under critical period hydrology due to physical water supply shortages at the sites of use in the Upper Basin. For example, the natural flow at Lee Ferry for 1977 was only 5.55 maf, and severe water supply shortages occurred throughout the Upper Basin in that year. The computations of shortage in this analysis give conservatively ~~large estimates of annual shortages at Lee Ferry and do not fully reflect all factors,~~

including physical shortages in the Upper Basin that might contribute or relate to a shortage condition at any given time. The computed shortages in this investigation do not equate to administrative calls to curtail Upper Basin uses.

#### **D. Comparison to 1988 Hydrologic Determination**

The 1988 Hydrologic Determination concluded that the total Upper Basin yield, including CRSP reservoir evaporation, is at least 6.0 maf per year for the 1953-1977 critical period hydrology with a 6 percent allowable overall shortage for the period. Under the conditions assumed in the current investigation, the shared CRSP evaporation varies with CRSP storage assumptions and storage levels. Assuming an average annual Upper Basin use of 5.79 maf, an annual Lower Basin delivery of 8.25 maf, and maintenance of the power pools, the shared CRSP evaporation would range from an average of about 0.25 maf per year over the worst 25-year period of reservoir storage draw down (1953-1977) to an average of about 0.49 maf per year over the period of record used in the analysis (1906-2000). Thus, the total Upper Basin depletion, including both Upper Basin uses and CRSP reservoir evaporation, would average about 6.04 maf per year or more over any period of 25 consecutive years. The total Upper Basin depletion amount for this scenario for the 1953-1977 period is comparable to the total Upper Basin depletion of 6.0 maf per year determined to be available for the period by the 1988 Hydrologic Determination. The difference is due to the revisions made to the CRSS natural flows for 1971-1980. If the minimum power pools are used, the shared CRSP reservoir evaporation is reduced due to increased reservoir storage draw downs.

### **IV. Water Use Projections**

#### **A. Upper Basin**

The Upper Colorado River Commission last approved depletions schedules for the Upper Division States for planning purposes in 1999. The depletions schedules, dated January 2000, project that the total Upper Basin use exclusive of shared CRSP reservoir evaporation will average about 5.37 maf per year under 2060 development conditions. Unless additional Upper Basin water development occurs by 2060 as compared to the January 2000 depletions schedules, the Upper Basin use may average less than about 5.40 maf per year from now through 2060. The time required to develop the Upper Basin allocation reduces risk of shortage within the 2060 planning horizon.

#### **B. State of New Mexico**

For use in this investigation, the New Mexico Interstate Stream Commission provided the Bureau of Reclamation with a preliminary revised schedule of anticipated depletions through 2060 from the Upper Basin in New Mexico dated May 2006 (see Appendix B). The revised depletions schedule includes irrigation depletions calculated using the SCS modified Blaney-Criddle method with SCS effective precipitation so that demands and supply for this hydrologic investigation are evaluated using consistent methodologies.

The irrigation depletions for the Navajo Nation's irrigation projects are water right depletion amounts provided by the Settlement Agreement. Both this hydrologic investigation and the 1988 Hydrologic Determination assume use of the full depletion amount for the NIIP. This is a conservative assumption because the total NIIP depletion right is not expected to be fully utilized under normal farm management practices. The revised depletions schedule does not include New Mexico's allocation of shared CRSP reservoir evaporation. The revised New Mexico depletions schedule shows a total anticipated depletion of 642,000 af per year, on average, for uses in New Mexico under 2060 development conditions. This represents an increase in New Mexico's total Upper Basin depletion, excluding shared CRSP reservoir evaporation, of 23,000 af per year, or about 0.02 maf per year, as compared to the January 2000 depletions schedules.

## **V. Probabilities of Calls to Curtail Upper Basin Uses**

The 1988 Hydrologic Determination included a probabilistic risk analysis of administrative calls to curtail Upper Basin uses that indicated that: (1) such calls would occur rarely at an Upper Basin demand level of 6.1 maf per year, though their effects could have significant impact to the Upper Basin; and (2) the frequency and magnitude of such calls would diminish rapidly below this demand level. The risk analysis was made using the CRSS model. It is not necessary for this investigation to duplicate such a risk analysis.

The computations of shortage in this current investigation give conservatively large estimates of annual shortages at Lee Ferry and do not fully reflect all factors, including physical shortages in the Upper Basin that might contribute or relate to a shortage condition at any given time. While this investigation uses a 2060 reservoir storage sedimentation condition for Lake Powell, a risk analysis should vary the storage development and sedimentation conditions over time. In addition, it will take decades to develop the Upper Basin allocation. Therefore, risk of shortage is reduced within a 2060 planning horizon. Even using the CRSS model, computed shortages would not necessarily equate to administrative calls to curtail Upper Basin uses.

## **VI. Physical Availability of Water from Navajo Reservoir**

The Bureau of Reclamation, using a detailed hydrologic model for the San Juan River Basin, has evaluated the physical availability of water from Navajo Reservoir and the San Juan River for the Navajo-Gallup Water Supply Project, taking into account, among other things, the habitat needs of San Juan River populations of fish species listed as endangered under the Endangered Species Act. The physical water supply analysis contained in the Biological Assessment, Navajo-Gallup Water Supply Project, dated August 16, 2005, indicates that sufficient water is likely to be available from the Navajo Reservoir water supply for the Navajo Nation's uses under the project. Although the depletions for individual uses in New Mexico that were used in the Biological Assessment differ slightly from those in New Mexico's May 2006 revised depletions

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schedule, the physical water supply analysis in the Biological Assessment assumes up to about 640,500 af per year of depletion, on average, in New Mexico from the San Juan River. This amount of total average depletion in New Mexico is not significantly different than the amount of total average depletion in New Mexico shown in the May 2006 revised New Mexico depletions schedule under 2060 development conditions.

## VII. Conclusions

It is concluded that based on the analysis performed by Reclamation in consultation with the Upper Colorado River Commission, the Upper Basin yield and New Mexico water allocation needed to support New Mexico's revised Upper Basin depletions schedule are reasonably likely to be available. The mass balance analyses results are sufficient to conclude that: (1) the Upper Basin yield is at least 5.76 maf per year, on average, excluding shared CRSP reservoir evaporation; (2) New Mexico's Upper Basin allocation is at least 642,400 af per year, excluding shared CRSP reservoir evaporation; and (3) the total anticipated average annual consumptive use in New Mexico from the Upper Basin, including Navajo Reservoir evaporation of 642,000 af per year as shown in the revised New Mexico depletions schedule is not likely to exceed New Mexico's Upper Basin allocation. This conclusion is reached assuming full use of the Navajo Nation's proposed depletion rights under the Settlement Agreement for both the Navajo-Gallup Water Supply Project and the NIIP.

Based upon this hydrologic investigation for a planning horizon through 2060, the May 2006 revised New Mexico depletions schedule, and the Biological Assessment for the Navajo-Gallup Water Supply Project, sufficient water is reasonably likely to be available from the Navajo Reservoir water supply through at least 2060 to fulfill the contract that is proposed by the Settlement Agreement to provide water for the Navajo Nation's uses in New Mexico under the Navajo-Gallup Water Supply Project and the NIIP. If the term of the contract extends beyond 2060, or is perpetual as proposed by the Settlement Agreement, the risk of shortages in deliveries under the contract may increase after 2060 depending upon future storage, hydrologic conditions, and other factors. Section 11(a) of Public Law 87-483 allows for contracting of water from Navajo Reservoir up to a total amount that, in the event of shortage, still results in a reasonable amount of water being available for the diversion requirements of the NIIP and the San Juan-Chama Project.

## VIII. Disclaimers

### A. Interstate Compacts and Federal Laws

Nothing in this report is intended to interpret the provisions of the Colorado River Compact (45 Stat. 1057), the Upper Colorado River Basin Compact (63 Stat. 31), the Water Treaty of 1944 between the United States of America and the United Mexican States (59 Stat. 1219), the decree entered by the Supreme Court of the United States in *Arizona v. California, et al.* (376 U.S. 340), the Boulder Canyon Project Act (45 Stat.

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1057), the Boulder Canyon Project Adjustment Act (54 Stat. 774), the Colorado River Storage Project Act (70 Stat. 105), or the Colorado River Basin Project Act (82 Stat. 885). Implementation of the Navajo-Gallup Water Supply Project and the NIIP is subject to compliance with federal environmental laws including the National Environmental Policy Act and the Endangered Species Act.

**B. Proposed Navajo Reservoir Water Contract**

This determination is not to be construed as acceptance by the Department of the Interior of the terms of the Settlement Agreement, including the terms of the proposed contract. This determination also does not guarantee that the United States would be able to deliver water under the proposed contract without shortages in deliveries on account of drought or other causes outside the control of the Secretary. Nothing in this determination shall be construed to impose on the United States any obligation to maintain CRSP storage facilities, including Navajo Dam and Reservoir, or NIIP or Navajo-Gallup Water Supply Project facilities beyond their useful lives or to take extraordinary measures to keep these facilities operating.

## List of Appendices

APPENDIX A - Mass Balance Analysis

APPENDIX B - Reservoir Storage

APPENDIX C - CRSP Evaporation Analysis

APPENDIX D - New Mexico Depletion Schedule

APPENDIX E - Upper Colorado River Commission Resolution

## **APPENDIX A**

### **Mass Balance Analysis**

Upper Basin Yield Mass Balance Analysis

Run 1 - Maintain CRSP Minimum Power Pools, 8.25 maf Lower Basin Delivery, No Shortage

CR Natural Flow at Lee Ferry (plus)	Total Carry- Over Storage (plus)	CRSP Carry- Over Storage (plus)	Lower Basin Delivery (minus)	Upper Basin Use (minus)	Shared CRSP Evap (minus)	Net Available to Stores (subtotal)	Spill to LC (minus)	Shortage (plus)	UC Basin Year-end Storage (equals)	CRSP Year- end Storage	Variables		
CY													
1906	18,550,021	29,530,030	24,847,704	8,250,000	5,550,000	749,290	33,530,781	4,000,731	0	29,530,030	24,847,704	Storage	30,167,576 af
1907	21,201,694	29,530,030	24,847,704	8,250,000	5,550,000	749,290	36,182,434	6,652,404	0	29,530,030	24,847,704	Sedimentation Rate (Active)	24,292 af/yr
1908	12,218,817	29,530,030	24,847,704	8,250,000	5,550,000	725,218	27,223,829	0	0	27,223,829	22,907,009	Bank Storage	4%
1909	22,355,201	27,223,829	22,907,009	8,250,000	5,550,000	725,218	35,054,712	5,524,682	0	29,530,030	24,847,704	Adjusted Storage (2060)	29,530,030 af
1910	14,650,616	29,530,030	24,847,704	8,250,000	5,550,000	749,290	29,631,356	101,326	0	29,530,030	24,847,704	UB Demand Level	5,550,000 af/yr
1911	15,499,729	29,530,030	24,847,704	8,250,000	5,550,000	749,290	30,480,488	950,439	0	29,530,030	24,847,704	LB Delivery	8,250,000 af/yr
1912	18,823,410	29,530,030	24,847,704	8,250,000	5,550,000	749,290	33,604,150	4,074,120	0	29,530,030	24,847,704		
1913	14,336,373	29,530,030	24,847,704	8,250,000	5,550,000	749,157	29,517,247	0	0	29,517,247	24,836,947		
1914	21,354,814	29,517,247	24,836,947	8,250,000	5,550,000	749,157	36,322,904	6,792,673	0	29,530,030	24,847,704		
1915	13,823,277	29,530,030	24,847,704	8,250,000	5,550,000	739,725	28,613,582	0	0	28,613,582	24,076,569	Results	
1916	20,142,892	28,613,582	24,076,569	8,250,000	5,550,000	739,725	34,216,740	4,686,719	0	29,530,030	24,847,704	Average CRSP Evap	527,920 af/yr
1917	22,942,804	29,530,030	24,847,704	8,250,000	5,550,000	749,290	37,923,544	8,393,514	0	29,530,030	24,847,704	Total Yield w/ CRSP evap	6,077,920 af/yr
1918	15,865,939	29,530,030	24,847,704	8,250,000	5,550,000	749,290	30,846,679	1,316,649	0	29,530,030	24,847,704		
1919	12,651,369	29,530,030	24,847,704	8,250,000	5,550,000	729,686	27,651,713	0	0	27,651,713	23,267,218	Shortage Years	Shortage
1920	22,287,632	27,651,713	23,267,218	8,250,000	5,550,000	729,686	35,409,659	5,879,829	0	29,530,030	24,847,704		
1921	22,526,781	29,530,030	24,847,704	8,250,000	5,550,000	749,290	37,507,521	7,977,491	0	29,530,030	24,847,704	1963	0 af
1922	18,447,198	29,530,030	24,847,704	8,250,000	5,550,000	749,290	33,427,938	3,897,908	0	29,530,030	24,847,704	1964	0 af
1923	19,024,048	29,530,030	24,847,704	8,250,000	5,550,000	749,290	34,004,798	4,474,796	0	29,530,030	24,847,704	1967	0 af
1924	13,877,798	29,530,030	24,847,704	8,250,000	5,550,000	742,354	28,965,474	0	0	28,965,474	24,201,318	1968	0 af
1925	14,300,701	28,965,474	24,201,318	8,250,000	5,550,000	734,577	28,781,831	0	0	28,781,831	24,767,982	1977	0 af
1926	15,213,731	28,781,831	24,201,318	8,250,000	5,550,000	740,284	29,435,988	0	0	29,435,988	24,767,982		
1927	19,539,212	29,435,988	24,767,982	8,250,000	5,550,000	748,201	34,426,187	4,896,164	0	29,530,030	24,847,704	NI allocation (w/o evap)	618,750 af/yr
1928	16,954,334	29,530,030	24,847,704	8,250,000	5,550,000	749,290	31,835,074	2,405,044	0	29,530,030	24,847,704		
1929	21,829,598	29,530,030	24,847,704	8,250,000	5,550,000	749,290	36,810,322	7,290,296	0	29,530,030	24,847,704	Note: NI allocation is exclusive of its portion of CRSP evaporation. Navajo evaporation would be primarily charged against NI's allocation. Shared CRSP evaporation is already removed from UC demands.	
1930	14,821,041	29,530,030	24,847,704	8,250,000	5,550,000	749,290	29,601,781	71,751	0	29,530,030	24,847,704		
1931	8,474,134	29,530,030	24,847,704	8,250,000	5,550,000	686,538	23,517,628	0	0	23,517,628	19,788,638		
1932	17,422,187	23,517,628	19,788,638	8,250,000	5,550,000	654,758	26,485,055	0	0	26,485,055	22,285,545		
1933	12,183,500	26,485,055	22,285,545	8,250,000	5,550,000	661,949	24,206,607	0	0	24,206,607	20,368,371		
1934	6,178,192	24,206,607	20,368,371	8,250,000	5,550,000	532,849	16,031,950	0	0	16,031,950	13,489,900		
1935	12,630,349	16,031,950	13,489,900	8,250,000	5,550,000	450,618	14,411,881	0	0	14,411,881	12,128,543	Total Upper Basin depletion, inc. CRSP evap:	
1936	14,848,873	14,411,881	12,128,543	8,250,000	5,550,000	437,996	14,822,558	0	0	14,822,558	12,472,271	1953-1977	5,870,057 af/yr
1937	14,306,056	14,822,558	12,472,271	8,250,000	5,550,000	442,943	14,885,671	0	0	14,885,671	12,525,376	1931-1977	3,971,255 af/yr
1938	18,148,319	14,885,671	12,525,376	8,250,000	5,550,000	483,935	18,750,056	0	0	18,750,056	15,777,018	1906-2000	6,077,920 af/yr
1939	11,164,059	18,750,056	15,777,018	8,250,000	5,550,000	491,825	15,822,489	0	0	15,822,489	13,145,364		
1940	9,931,657	15,822,489	13,145,364	8,250,000	5,550,000	414,284	11,339,882	0	0	11,339,882	9,541,797	Flow Adjustments:	
1941	20,116,578	11,339,882	9,541,797	8,250,000	5,550,000	431,015	17,225,525	0	0	17,225,525	14,484,220	1971	203,226 af
1942	17,225,136	17,225,525	14,484,220	8,250,000	5,550,000	522,737	20,127,925	0	0	20,127,925	16,906,410	1972	228,885 af
1943	13,731,401	20,127,925	16,936,410	8,250,000	5,550,000	548,608	19,512,717	0	0	19,512,717	16,418,781	1973	252,377 af
1944	15,269,422	16,418,781	14,178,751	8,250,000	5,550,000	550,819	20,531,231	0	0	20,531,231	17,081,871	1974	196,384 af
1945	14,140,528	20,531,231	17,275,843	8,250,000	5,550,000	559,188	20,312,881	0	0	20,312,881	14,375,923	1975	246,565 af
1946	11,095,453	20,312,881	17,091,871	8,250,000	5,550,000	573,198	17,084,936	0	0	17,084,936	14,375,923	1976	173,250 af
1947	16,439,488	17,084,936	14,375,923	8,250,000	5,550,000	511,717	19,212,705	0	0	19,212,705	16,166,390	1977	112,291 af
1948	15,139,294	19,212,705	16,166,390	8,250,000	5,550,000	577,243	22,566,096	0	0	22,566,096	18,987,982	1978	152,187 af
1949	16,933,554	20,009,755	18,987,982	8,250,000	5,550,000	590,873	21,315,839	0	0	21,315,839	17,925,799	1979	153,559 af
1950	13,140,416	22,566,096	18,987,982	8,250,000	5,550,000	558,488	19,463,047	0	0	19,463,047	16,376,967	1980	161,863 af
1951	12,505,864	21,315,839	17,835,799	8,250,000	5,550,000	605,942	25,862,527	0	0	25,862,527	21,781,725		
1952	20,805,422	19,463,047	16,376,967	8,250,000	5,550,000	638,572	22,589,374	0	0	22,589,374	19,007,588		
1953	11,165,419	25,862,527	21,781,725	8,250,000	5,550,000	543,381	16,742,094	0	0	16,742,094	14,087,442		
1954	8,496,102	22,589,374	19,007,588	8,250,000	5,550,000	432,065	11,923,937	0	0	11,923,937	10,033,259		
1955	8,413,908	16,742,094	14,087,442	8,250,000	5,550,000	383,222	9,197,489	0	0	9,197,489	7,739,121		
1956	11,426,874	11,923,937	10,033,259	8,250,000	5,550,000	401,055	15,497,299	0	0	15,497,299	13,881,544		
1957	21,500,963	9,197,489	7,739,121	8,250,000	5,550,000	493,820	18,066,288	0	0	18,066,288	15,201,670		
1958	15,882,511	16,497,297	13,881,544	8,250,000	5,550,000	481,325	13,403,132	0	0	13,403,132	11,277,911		
1959	6,698,169	18,066,288	15,201,670	8,250,000	5,550,000	384,885	10,742,407	0	0	10,742,407	9,039,075		
1960	11,324,160	13,403,132	11,277,911	8,250,000	5,550,000	314,281	6,838,396	0	0	6,838,396	5,585,790		
1961	10,010,259	10,742,407	9,039,075	8,250,000	5,550,000	285,097	9,810,998	0	0	9,810,998	8,338,990		
1962	17,377,609	6,838,396	5,885,793	8,250,000	5,550,000	285,014	4,656,284	0	0	4,656,284	3,825,391		
1963	8,840,900	9,810,998	8,338,990	8,250,000	5,550,000	107,571	1,532,299	0	0	1,532,299	1,289,335		
1964	10,863,586	4,656,284	3,825,391	8,250,000	5,550,000	225,909	7,381,417	0	0	7,381,417	6,211,008		
1965	19,875,027	4,656,284	3,825,391	8,250,000	5,550,000	251,764	4,009,497	0	0	4,009,497	3,373,745		
1966	10,679,844	7,381,417	6,211,008	8,250,000	5,550,000	182,341	1,887,966	0	0	1,887,966	1,420,336		
1967	11,870,830	4,009,497	3,373,745	8,250,000	5,550,000	185,754	1,462,164	0	0	1,462,164	1,230,321		
1968	13,739,932	1,887,966	1,420,336	8,250,000	5,550,000	176,918	2,757,407	0	0	2,757,407	2,320,188		
1969	15,272,159	1,462,164	1,230,321	8,250,000									



Upper Basin Yield Mass Balance Analysis

Run 2 - Maintain CRSP Minimum Power Pools, 8.25 maf Lower Basin Delivery, 6% Overall Shortage

CV	CR Natural Flow at Lee Ferry (plus)	Total Carry- Over Storage (plus)	CRSP Carry- Over Storage	Lower Basin Delivery (minus)	Upper Basin Use (minus)	Shared CRSP Evap (minus)	Nit Available to Stores (subtotal)	Spill to LC (minus)	Shortage (plus)	UC Basin Year-end Storage (equals)	CRSP Year- end Storage	Variables
1906	18,590,021	29,530,030	24,847,704	8,250,000	5,790,000	749,290	33,290,761	3,760,731	0	29,530,030	24,847,704	Storage
1907	21,201,604	29,530,030	24,847,704	8,250,000	5,790,000	749,290	35,942,434	6,412,404	0	29,530,030	24,847,704	Sedimentation Rate (Active)
1908	22,218,817	29,530,030	24,847,704	8,250,000	5,790,000	722,739	26,986,108	0	0	26,986,108	22,707,150	Bank Storage
1909	22,356,301	26,986,108	22,707,150	8,250,000	5,790,000	722,739	34,579,670	5,049,640	0	29,530,030	24,847,704	Adjusted Storage (2060)
1910	14,850,616	29,530,030	24,847,704	8,250,000	5,790,000	747,858	29,292,789	0	0	29,292,789	24,732,223	UB Demand Level
1911	15,499,729	29,530,030	24,732,223	8,250,000	5,790,000	747,858	30,104,660	574,629	0	29,530,030	24,847,704	LB Delivery
1912	16,623,410	29,530,030	24,847,704	8,250,000	5,790,000	749,290	33,364,150	3,834,120	0	29,530,030	24,847,704	
1913	14,536,373	29,530,030	24,847,704	8,250,000	5,790,000	746,678	29,279,726	0	0	29,279,726	24,637,088	
1914	21,354,814	26,279,726	24,637,088	8,250,000	5,790,000	746,678	35,847,862	6,317,832	0	29,530,030	24,847,704	
1915	13,623,277	29,530,030	24,847,704	8,250,000	5,790,000	737,246	28,378,061	0	0	28,378,061	21,876,710	Results
1916	20,142,892	28,378,061	23,876,710	8,250,000	5,790,000	737,246	33,741,707	4,211,677	0	29,530,030	24,847,704	Average CRSP Evap
1917	22,942,804	29,530,030	24,847,704	8,250,000	5,790,000	749,290	37,683,544	8,153,514	0	29,530,030	24,847,704	Total Yield w/ CRSP evap
1918	15,865,839	29,530,030	24,847,704	8,250,000	5,790,000	749,290	30,606,879	1,078,649	0	29,530,030	24,847,704	
1919	12,551,389	29,530,030	24,847,704	8,250,000	5,790,000	727,207	27,414,192	0	0	27,414,192	23,067,356	
1920	22,287,832	27,414,192	23,067,356	8,250,000	5,790,000	727,207	34,934,817	5,404,587	0	29,530,030	24,847,704	Shortage Years
1921	22,526,781	29,530,030	24,847,704	8,250,000	5,790,000	749,290	37,267,521	7,737,491	0	29,530,030	24,847,704	1963
1922	18,447,198	29,530,030	24,847,704	8,250,000	5,790,000	749,290	33,187,938	3,657,908	0	29,530,030	24,847,704	1964
1923	18,024,046	29,530,030	24,847,704	8,250,000	5,790,000	749,290	33,764,786	4,234,756	0	29,530,030	24,847,704	1967
1924	13,877,798	29,530,030	24,847,704	8,250,000	5,790,000	739,875	28,627,953	0	0	28,627,953	24,088,662	1968
1925	14,430,701	28,627,953	24,088,662	8,250,000	5,790,000	728,561	28,291,704	0	0	28,291,704	23,805,728	1977
1926	15,213,731	28,291,704	23,805,728	8,250,000	5,790,000	728,082	28,737,342	0	0	28,737,342	24,180,706	
1927	19,539,212	28,737,342	24,180,706	8,250,000	5,790,000	741,017	33,495,537	3,965,507	0	29,530,030	24,847,704	NM allocation (w/o evap)
1928	16,654,334	29,530,030	24,847,704	8,250,000	5,790,000	749,290	31,695,874	2,165,044	0	29,530,030	24,847,704	
1929	21,829,585	29,530,030	24,847,704	8,250,000	5,790,000	749,290	36,570,325	7,040,295	0	29,530,030	24,847,704	Note: NM allocation is exclusive of its portion of CRSP evaporation. Navajo evaporation would be primarily charged against NM's allocation. Shared CRSP evaporation is already removed from UC demands.
1930	14,621,041	29,530,030	24,847,704	8,250,000	5,790,000	747,552	29,363,519	0	0	29,363,519	24,707,565	
1931	8,474,134	29,363,519	24,707,565	8,250,000	5,790,000	680,619	23,117,034	0	0	23,117,034	19,451,562	
1932	17,422,187	23,117,034	19,451,562	8,250,000	5,790,000	644,003	25,855,218	0	0	25,855,218	21,755,575	
1933	12,163,500	25,855,218	21,755,575	8,250,000	5,790,000	646,458	23,352,250	0	0	23,352,250	19,649,490	
1934	6,178,192	23,352,250	19,649,490	8,250,000	5,790,000	532,720	14,957,731	0	0	14,957,731	12,586,011	Total Upper Basin depletion, inc. CRSP evap:
1935	12,630,349	14,957,731	12,586,011	8,250,000	5,790,000	425,948	13,122,133	0	0	13,122,133	11,041,468	1953-1977
1936	14,648,873	13,122,133	11,041,468	8,250,000	5,790,000	408,877	13,322,129	0	0	13,322,129	11,209,732	1983-1977
1937	14,306,056	13,322,129	11,209,732	8,250,000	5,790,000	409,467	13,176,718	0	0	13,176,718	11,089,880	1931-1977
1938	18,148,319	13,176,718	11,089,880	8,250,000	5,790,000	448,192	16,840,844	0	0	16,840,844	14,170,535	1908-2000
1939	11,154,059	16,840,844	14,170,535	8,250,000	5,790,000	449,704	13,515,199	0	0	13,515,199	11,372,208	
1940	8,331,837	13,515,199	11,372,208	8,250,000	5,790,000	368,272	9,038,585	0	0	9,038,585	7,605,413	
1941	20,116,878	9,038,585	7,605,413	8,250,000	5,790,000	380,995	14,734,268	0	0	14,734,268	12,397,880	Flow Adjustments:
1942	17,225,136	14,734,268	12,397,880	8,250,000	5,790,000	468,792	17,450,612	0	0	17,450,612	14,683,616	1971
1943	13,731,401	17,450,612	14,683,616	8,250,000	5,790,000	488,820	18,653,193	0	0	18,653,193	14,012,637	1972
1944	15,369,422	18,653,193	14,012,637	8,250,000	5,790,000	480,266	17,493,349	0	0	17,493,349	14,719,577	1973
1945	14,140,528	17,493,349	14,719,577	8,250,000	5,790,000	493,929	17,099,948	0	0	17,099,948	14,388,554	1974
1946	11,095,453	17,099,948	14,388,554	8,250,000	5,790,000	454,348	13,701,053	0	0	13,701,053	11,528,593	1975
1947	16,439,486	13,701,053	11,528,593	8,250,000	5,790,000	439,332	15,861,207	0	0	15,861,207	13,177,942	1976
1948	15,138,294	15,861,207	13,177,942	8,250,000	5,790,000	466,396	16,294,105	0	0	16,294,105	13,710,487	1977
1949	18,933,584	16,294,105	13,710,487	8,250,000	5,790,000	498,004	18,689,684	0	0	18,689,684	15,726,220	1978
1950	13,140,416	18,689,684	15,726,220	8,250,000	5,790,000	508,313	17,281,761	0	0	17,281,768	14,541,561	1979
1951	12,505,894	17,281,768	14,541,561	8,250,000	5,790,000	472,674	15,275,008	0	0	15,275,008	12,852,979	1980
1952	20,805,422	15,275,008	12,852,979	8,250,000	5,790,000	518,945	21,523,485	0	0	21,523,485	18,110,589	
1953	11,165,419	21,523,485	18,110,589	8,250,000	5,790,000	546,455	18,102,449	0	0	18,102,449	15,232,996	
1954	8,496,102	18,102,449	15,232,996	8,250,000	5,790,000	448,209	12,110,342	0	0	12,110,342	10,190,108	
1955	9,413,906	12,110,342	10,190,108	8,250,000	5,790,000	338,901	7,150,349	0	0	7,150,349	5,016,579	
1956	11,426,874	7,150,349	5,016,579	8,250,000	5,790,000	297,081	11,448,867	0	0	11,448,867	9,833,517	
1957	21,500,963	4,284,996	3,805,560	8,250,000	5,790,000	386,845	12,884,533	0	0	12,884,533	10,841,542	
1958	15,862,511	11,448,867	9,833,517	8,250,000	5,790,000	351,798	8,990,903	0	0	8,990,903	5,807,998	
1959	9,598,169	8,990,903	6,807,998	8,250,000	5,790,000	272,663	5,302,401	0	0	5,302,401	4,461,644	
1960	11,524,160	8,990,903	6,807,998	8,250,000	5,790,000	199,419	1,073,241	0	0	1,073,241	903,066	
1961	10,810,250	5,302,401	4,461,644	8,250,000	5,790,000	188,150	4,222,699	0	0	4,222,699	3,553,142	
1962	17,777,609	1,073,241	903,066	8,250,000	5,790,000	176,949	-1,153,349	0	1,153,349	0	0	
1963	8,840,900	4,222,699	3,553,142	8,250,000	5,790,000	132,876	-3,308,290	0	3,308,290	0	0	
1964	10,863,586	0	0	8,250,000	5,790,000	191,775	5,843,252	0	0	5,843,252	4,748,449	
1965	19,875,027	0	0	8,250,000	5,790,000	213,377	2,069,719	0	0	2,069,719	1,741,541	
1966	10,679,844	5,843,252	4,748,449	8,250,000	5,790,000	154,478	-453,929	0	453,929	0	0	
1967	11,670,830	2,069,719	1,741,541	8,250,000	5,790,000	132,876	-432,544	0	432,544	0	0	
1968	13,738,932	0	0	8,250,000	5,790,000	144,231	1,087,928	0	0	1,087,928	915,425	
1969	15,272,159	0	0	8,250,000	5,790,000	167,449	2,224,615	0	0	2,224,615	1,871,877	
1970	15,344,136	1,087,928	915,425	8,250,000	5,790,000	192,476	3,485,798	0	0	3,485,798	2,933,084	
1971	15,493,659	2,224,615	1,871,877	8,250,000	5,790,000	184,700	2,437,734	0	0	2,437,734	2,051,283	
1972	13,186,637	3,485,798	2,933,084	8,250,000	5,790,000	284,568	5,796,301	0	0	5,796,301	4,879,755	
1973	18,650,183	2,437,734	2,051,283	8,250,000	5,790,000	382,834	8,549,229	0	0	8,549,229		



Upper Basin Yield Mass Balance Analysis

Run 4 - Maintain CRSP Minimum Power Pools, 7.50 maf Lower Basin Delivery, 6% Overall Shortage

CY	CR Natural Flow at Lee Ferry (plus)	Total Carry-Over Storage (plus)	CRSP Carry-Over Storage	Lower Basin Delivery (minus)	Upper Basin Use (minus)	Shared CRSP Evap (minus)	Net Available to Store (subtotal)	Spill to LC (minus)	Shortage (plus)	UC Basin Storage (equals)	CRSP Year-end Storage	Variables
1904	18,550,021	29,530,030	24,847,704	7,500,000	6,570,000	749,290	33,286,761	3,730,731	0	29,530,030	24,847,704	Storage
1907	21,201,694	29,530,030	24,847,704	7,500,000	6,570,000	749,290	35,912,434	6,282,404	0	29,530,030	24,847,704	Sedimentation Rate (Active)
1908	12,218,817	29,530,030	24,847,704	7,500,000	6,570,000	722,429	26,956,418	0	0	26,956,418	22,682,188	Bank Storage
1909	22,356,301	29,530,030	24,847,704	7,500,000	6,570,000	722,429	34,520,290	4,990,260	0	29,530,030	24,847,704	Adjusted Storage (2080)
1910	14,650,616	29,530,030	24,847,704	7,500,000	6,570,000	747,548	29,363,098	0	0	29,363,098	24,707,241	UB Demand Level
1911	15,496,729	29,530,030	24,847,704	7,500,000	6,570,000	747,548	30,045,280	515,249	0	29,530,030	24,847,704	LB Delivery
1912	18,623,410	29,530,030	24,847,704	7,500,000	6,570,000	749,290	33,334,150	3,804,120	0	29,530,030	24,847,704	
1913	14,538,373	29,530,030	24,847,704	7,500,000	6,570,000	746,368	29,250,036	0	0	29,250,036	24,612,108	
1914	21,354,814	29,250,036	24,612,108	7,500,000	6,570,000	746,368	35,788,482	6,258,451	0	29,530,030	24,847,704	
1916	13,623,277	29,530,030	24,847,704	7,500,000	6,570,000	736,936	28,346,371	0	0	28,346,371	23,851,728	
1918	20,142,892	28,346,371	23,851,728	7,500,000	6,570,000	736,936	33,685,327	4,152,296	0	29,530,030	24,847,704	Residuals
1917	22,942,604	29,530,030	24,847,704	7,500,000	6,570,000	749,290	37,987,814	6,123,514	0	29,530,030	24,847,704	Average CRSP Evap
1918	15,865,939	29,530,030	24,847,704	7,500,000	6,570,000	749,290	30,876,879	1,048,849	0	29,530,030	24,847,704	Total Yield w/ CRSP evap
1919	12,651,369	29,530,030	24,847,704	7,500,000	6,570,000	726,897	27,384,502	0	0	27,384,502	23,042,374	
1920	22,287,832	27,384,502	23,042,374	7,500,000	6,570,000	726,897	34,875,237	5,345,207	0	29,530,030	24,847,704	Shortage Years
1921	22,526,781	29,530,030	24,847,704	7,500,000	6,570,000	749,290	37,237,521	7,707,491	0	29,530,030	24,847,704	Shortage
1922	18,447,108	29,530,030	24,847,704	7,500,000	6,570,000	749,290	33,157,538	3,627,908	0	29,530,030	24,847,704	1963
1923	19,024,046	29,530,030	24,847,704	7,500,000	6,570,000	749,290	33,734,788	4,204,758	0	29,530,030	24,847,704	1964
1924	13,877,798	29,530,030	24,847,704	7,500,000	6,570,000	739,565	28,998,263	0	0	28,998,263	24,063,679	1967
1925	14,430,701	28,998,263	24,063,679	7,500,000	6,570,000	726,027	28,232,937	0	0	28,232,937	23,756,279	1968
1926	15,213,731	28,232,937	23,756,279	7,500,000	6,570,000	726,568	28,650,099	0	0	28,650,099	24,107,296	1969
1927	19,536,212	28,650,099	24,107,296	7,500,000	6,570,000	740,106	33,376,205	3,845,175	0	29,530,030	24,847,704	1977
1928	16,954,334	29,530,030	24,847,704	7,500,000	6,570,000	749,290	31,075,074	2,136,054	0	29,530,030	24,847,704	1978
1929	21,829,585	29,530,030	24,847,704	7,500,000	6,570,000	749,290	36,340,325	7,010,295	0	29,530,030	24,847,704	1979
1930	14,821,041	29,530,030	24,847,704	7,500,000	6,570,000	747,242	29,333,829	0	0	29,333,829	24,847,704	1980
1931	8,474,134	29,333,829	24,847,704	7,500,000	6,570,000	679,696	23,058,267	0	0	23,058,267	19,402,113	Flow Adjustments:
1932	17,422,187	23,058,267	19,402,113	7,500,000	6,570,000	642,479	25,767,975	0	0	25,767,975	21,582,186	1971
1933	12,183,500	25,767,975	21,582,186	7,500,000	6,570,000	644,346	23,237,129	0	0	23,237,129	19,552,814	1972
1934	6,178,192	23,237,129	19,552,814	7,500,000	6,570,000	530,032	14,815,299	0	0	14,815,299	12,486,154	1973
1935	12,630,349	14,815,299	12,486,154	7,500,000	6,570,000	422,695	12,952,943	0	0	12,952,943	10,899,105	1974
1936	14,648,873	12,952,943	10,899,105	7,500,000	6,570,000	405,171	12,126,744	0	0	12,126,744	11,044,548	1975
1937	14,306,056	13,126,744	11,044,548	7,500,000	6,570,000	441,138	16,594,582	0	0	16,594,582	13,943,040	1976
1938	18,148,219	12,952,943	10,899,105	7,500,000	6,570,000	444,309	12,244,432	0	0	12,244,432	11,144,375	1977
1939	11,184,059	16,594,582	13,943,040	7,500,000	6,570,000	382,368	8,743,721	0	0	8,743,721	7,357,303	1978
1940	9,931,857	8,743,721	7,357,303	7,500,000	6,570,000	374,594	14,415,805	0	0	14,415,805	12,130,013	1979
1941	20,116,878	14,415,805	12,130,013	7,500,000	6,570,000	461,903	17,109,038	0	0	17,109,038	14,396,203	1980
1942	17,225,136	17,109,038	14,396,203	7,500,000	6,570,000	481,434	16,288,986	0	0	16,288,986	13,706,179	Percentage shortage =
1943	13,731,491	17,109,038	14,396,203	7,500,000	6,570,000	481,434	16,288,986	0	0	16,288,986	13,706,179	5.8%
1944	15,369,422	16,288,986	13,706,179	7,500,000	6,570,000	481,434	16,288,986	0	0	16,288,986	13,706,179	3.12%
1945	14,140,528	17,109,038	14,396,203	7,500,000	6,570,000	485,637	16,691,867	0	0	16,691,867	14,045,179	1.54%
1946	11,095,453	16,691,867	14,045,179	7,500,000	6,570,000	445,608	13,271,712	0	0	13,271,712	11,167,329	
1947	16,439,486	13,271,712	11,167,329	7,500,000	6,570,000	430,153	15,211,045	0	0	15,211,045	12,799,159	
1948	15,139,254	15,211,045	12,799,159	7,500,000	6,570,000	456,786	15,823,553	0	0	15,823,553	13,314,546	
1949	18,933,584	15,823,553	13,314,546	7,500,000	6,570,000	487,974	18,199,163	0	0	18,199,163	15,213,476	
1950	13,140,416	18,199,163	15,213,476	7,500,000	6,570,000	497,870	16,771,709	0	0	16,771,709	14,112,362	
1951	12,505,894	16,771,709	14,112,362	7,500,000	6,570,000	461,826	14,745,777	0	0	14,745,777	12,407,864	
1952	20,805,422	14,745,777	12,407,864	7,500,000	6,570,000	505,702	20,975,497	0	0	20,975,497	17,849,591	
1953	11,165,419	20,975,497	17,849,591	7,500,000	6,570,000	534,824	17,536,092	0	0	17,536,092	14,755,543	
1954	8,496,102	17,536,092	14,755,543	7,500,000	6,570,000	436,199	11,525,995	0	0	11,525,995	9,698,416	
1955	9,413,908	11,525,995	9,698,416	7,500,000	6,570,000	321,620	6,548,383	0	0	6,548,383	5,510,062	
1956	11,426,874	6,548,383	5,510,062	7,500,000	6,570,000	239,462	3,668,376	0	0	3,668,376	3,064,525	
1957	21,500,963	3,668,376	3,064,525	7,500,000	6,570,000	373,394	12,231,868	0	0	12,231,868	10,292,363	
1958	15,882,511	10,292,363	8,685,263	7,500,000	6,570,000	338,005	7,422,030	0	0	7,422,030	6,245,181	
1959	9,598,169	8,685,263	7,422,030	7,500,000	6,570,000	258,535	4,617,855	0	0	4,617,855	3,885,472	
1960	11,524,160	7,422,030	6,245,181	7,500,000	6,570,000	184,963	372,950	0	0	372,950	313,816	
1961	10,010,259	4,617,855	3,885,472	7,500,000	6,570,000	173,373	3,507,186	0	0	3,507,186	2,951,081	
1962	17,377,609	3,507,186	2,951,081	7,500,000	6,570,000	169,481	-1,891,935	0	1,891,935	0	0	
1963	8,840,900	0	0	7,500,000	6,570,000	132,876	-3,309,290	0	3,309,290	0	0	
1964	10,883,588	0	0	7,500,000	6,570,000	191,465	5,613,562	0	0	5,613,562	4,723,467	
1965	19,875,027	0	0	7,500,000	6,570,000	212,454	2,010,952	0	0	2,010,952	1,682,093	
1966	10,679,844	5,613,562	4,723,467	7,500,000	6,570,000	153,864	-542,082	0	542,082	0	0	
1967	11,670,830	2,010,952	1,682,093	7,500,000	6,570,000	132,876	-482,944	0	482,944	0	0	
1968	13,739,832	0	0	7,500,000	6,570,000	143,821	1,058,238	0	0	1,058,238	890,442	
1969	15,272,159	0	0	7,500,000	6,570,000	186,526	2,185,848	0	0	2,185,848	1,822,428	
1970	15,344,136	1,058,238	890,442	7,500,000	6,570,000	190,952	3,396,556	0	0	3,396,556	2,859,875	
1971	15,493,659	2,185,848	1,822,428	7,500,000	6,570,000	192,588	2,322,603	0	0	2,322,603	1,954,397	
1972	13,106,637	3,396,556	2,859,875	7,500,000	6,570,000	228,795	6,678,001	0	0	6,678,001	5,617,444	
1973	18,650,193	2,322,603	1,954,397	7,500,000	6,570,000	281,318	5,630,111	0	0	5,630,111	4,737,392	
1974	13,285,426	6,678,001	5,617,444	7,500,000	6,570,000	278,829	8,353,944					

Upper Basin Yield Mass Balance Analysis

Run 5 - Use CRSP Minimum Power Pools, 8.25 maf Lower Basin Delivery, No Shortage

CY	CR Natural Flow at Lee Ferry (plus)	Total Carry-Over Storage (plus)	CRSP Carry-Over Storage	Lower Basin Delivery (minus)	Upper Basin Use (minus)	Shared CRSP Evap (minus)	Net Available to Store (subtotal)	Spill to LC (minus)	Shortage (plus)	UC Basin Year-end Storage (equals)	CRSP Year-end Storage	Variables
1904	18,550,021	33,833,590	29,151,263	8,250,000	5,720,000	725,390	37,688,221	3,854,631	0	33,833,590	29,151,263	Storage
1907	21,201,694	33,833,590	29,151,263	8,250,000	5,720,000	725,390	40,338,854	6,506,304	0	33,833,590	29,151,263	Sedimentation Rate (Active)
1908	22,356,817	33,833,590	29,151,263	8,250,000	5,720,000	699,302	31,385,105	0	0	31,385,105	27,039,907	Bank Storage
1909	22,356,817	33,833,590	27,039,907	8,250,000	5,720,000	899,302	39,076,104	5,236,514	0	33,833,590	29,151,263	Adjusted Storage (2060)
1910	14,650,816	33,833,590	29,151,263	8,250,000	5,720,000	724,918	31,786,288	0	0	31,786,288	29,151,263	UB Demand Level
1911	15,499,729	33,833,590	29,151,263	8,250,000	5,720,000	724,918	34,594,099	760,509	0	33,833,590	29,151,263	LB Delivery
1912	18,623,410	33,833,590	29,151,263	8,250,000	5,720,000	725,390	37,761,810	3,928,020	0	33,833,590	29,151,263	
1913	14,536,373	33,833,590	29,151,263	8,250,000	5,720,000	723,715	33,878,248	0	0	33,878,248	29,151,263	
1914	21,354,814	33,833,590	29,151,263	8,250,000	5,720,000	723,715	40,337,348	6,503,758	0	33,833,590	29,151,263	
1915	13,623,277	33,833,590	29,151,263	8,250,000	5,720,000	714,096	32,772,771	0	0	32,772,771	28,237,254	Results
1916	20,142,892	32,772,771	28,237,254	8,250,000	5,720,000	714,096	38,231,566	4,297,976	0	33,833,590	29,151,263	Average CRSP Evap
1917	22,942,804	33,833,590	29,151,263	8,250,000	5,720,000	725,390	42,081,004	8,247,414	0	33,833,590	29,151,263	Total Yield w/ CRSP evap
1918	15,865,939	33,833,590	29,151,263	8,250,000	5,720,000	725,390	35,004,139	1,170,549	0	33,833,590	29,151,263	
1919	12,651,269	33,833,590	29,151,263	8,250,000	5,720,000	703,858	31,811,100	0	0	31,811,100	27,408,672	Shortage Years
1920	22,867,632	31,811,100	27,408,672	8,250,000	5,720,000	703,858	39,424,974	5,561,284	0	33,833,590	29,151,263	Shortage
1921	16,447,198	33,833,590	29,151,263	8,250,000	5,720,000	725,390	41,664,381	7,831,391	0	33,833,590	29,151,263	1963
1922	10,024,046	33,833,590	29,151,263	8,250,000	5,720,000	725,390	37,585,398	3,751,808	0	33,833,590	29,151,263	1964
1923	13,877,798	33,833,590	29,151,263	8,250,000	5,720,000	725,390	38,162,246	4,328,858	0	33,833,590	29,151,263	1967
1924	14,430,701	33,833,590	29,151,263	8,250,000	5,720,000	716,777	33,024,611	0	0	33,024,611	28,454,241	1968
1925	15,213,731	32,779,753	28,243,270	8,250,000	5,720,000	705,558	32,779,753	0	0	32,779,753	28,243,270	1977
1926	19,539,212	33,314,836	28,704,301	8,250,000	5,720,000	708,648	33,314,836	0	0	33,314,836	28,704,301	
1927	18,954,334	33,833,590	29,151,263	8,250,000	5,720,000	719,867	34,164,181	4,330,591	0	33,833,590	29,151,263	NI allocation (w/o evap)
1928	21,829,585	33,833,590	29,151,263	8,250,000	5,720,000	725,390	36,962,534	2,258,944	0	33,833,590	29,151,263	
1929	14,621,041	33,833,590	29,151,263	8,250,000	5,720,000	725,390	40,967,785	7,134,195	0	33,833,590	29,151,263	Note: NI allocation is exclusive of its portion of CRSP evaporation. Navajo evaporation would be primarily charged against NI's allocation. Shared CRSP evaporation is already removed from UC demands.
1930	8,474,134	33,762,025	29,087,879	8,250,000	5,720,000	714,606	35,760,025	0	0	33,762,025	29,087,879	
1931	17,452,187	27,605,852	23,785,399	8,250,000	5,720,000	658,207	27,605,852	0	0	27,605,852	23,785,399	
1932	12,183,500	30,435,128	26,223,124	8,250,000	5,720,000	627,333	28,021,294	0	0	28,021,294	24,143,347	
1933	8,178,192	28,021,294	24,143,347	8,250,000	5,720,000	513,222	15,718,234	0	0	15,718,234	16,987,674	
1934	12,630,349	19,716,264	18,987,674	8,250,000	5,720,000	406,222	17,970,391	0	0	17,970,391	15,483,417	Total Upper Basin depletion, inc. CRSP evap:
1935	14,648,873	17,970,391	15,483,417	8,250,000	5,720,000	390,704	16,258,560	0	0	16,258,560	15,731,706	1953-1977
1936	14,308,066	18,258,560	15,731,706	8,250,000	5,720,000	393,164	18,201,452	0	0	18,201,452	15,682,501	1931-1977
1937	18,148,310	18,201,452	15,682,501	8,250,000	5,720,000	432,434	21,947,337	0	0	21,947,337	18,909,963	1906-2000
1938	11,164,056	21,947,337	18,909,963	8,250,000	5,720,000	437,780	16,703,817	0	0	16,703,817	16,115,170	
1939	9,931,657	18,703,817	16,115,170	8,250,000	5,720,000	356,461	14,308,612	0	0	14,308,612	12,328,375	Flow Adjustments:
1940	20,116,678	14,308,612	12,328,375	8,250,000	5,720,000	371,160	20,084,330	0	0	20,084,330	17,304,802	1971
1941	17,225,136	20,084,330	17,304,802	8,250,000	5,720,000	482,377	22,877,060	0	0	22,877,060	19,711,064	1972
1942	13,731,401	22,877,060	19,711,064	8,250,000	5,720,000	484,411	22,154,060	0	0	22,154,060	19,088,114	1973
1943	15,369,422	22,154,060	19,088,114	8,250,000	5,720,000	486,433	23,067,089	0	0	23,067,089	19,874,751	1974
1944	14,140,528	23,067,089	19,874,751	8,250,000	5,720,000	492,723	22,744,874	0	0	22,744,874	19,587,146	1975
1945	11,095,453	22,744,874	19,587,146	8,250,000	5,720,000	453,859	19,418,468	0	0	19,418,468	17,291,368	1976
1946	16,439,486	19,418,468	17,291,368	8,250,000	5,720,000	440,031	21,445,923	0	0	21,445,923	18,477,961	1977
1947	15,139,294	21,445,923	18,477,961	8,250,000	5,720,000	489,090	25,148,127	0	0	25,148,127	24,656,969	1978
1948	16,933,584	22,148,127	19,081,262	8,250,000	5,720,000	502,742	24,656,969	0	0	24,656,969	21,201,541	1979
1949	13,140,418	24,656,969	21,201,541	8,250,000	5,720,000	514,629	23,262,756	0	0	23,262,756	20,043,357	1980
1950	12,505,904	23,262,756	20,043,357	8,250,000	5,720,000	479,827	21,319,023	0	0	21,319,023	18,368,623	
1951	20,806,422	21,319,023	18,368,623	8,250,000	5,720,000	526,102	27,628,343	0	0	27,628,343	23,804,778	
1952	11,165,410	27,628,343	23,804,778	8,250,000	5,720,000	557,478	24,266,285	0	0	24,266,285	20,908,004	
1953	8,496,102	24,266,285	20,908,004	8,250,000	5,720,000	458,530	18,333,856	0	0	18,333,856	15,796,582	
1954	9,413,908	18,333,856	15,796,582	8,250,000	5,720,000	343,218	13,434,547	0	0	13,434,547	11,575,301	
1955	11,426,874	13,434,547	11,575,301	8,250,000	5,720,000	261,206	10,630,214	0	0	10,630,214	9,159,069	
1956	21,500,963	10,630,214	9,159,069	8,250,000	5,720,000	308,243	17,852,034	0	0	17,852,034	15,382,216	
1957	15,842,511	17,852,034	15,382,216	8,250,000	5,720,000	401,013	19,344,432	0	0	19,344,432	16,667,301	
1958	9,598,169	19,344,432	16,667,301	8,250,000	5,720,000	366,449	14,606,152	0	0	14,606,152	12,584,765	
1959	11,524,180	14,606,152	12,584,765	8,250,000	5,720,000	286,914	11,873,398	0	0	11,873,398	10,230,205	
1960	10,010,250	11,873,398	10,230,205	8,250,000	5,720,000	213,395	7,700,263	0	0	7,700,263	6,634,601	
1961	17,377,600	7,700,263	6,634,601	8,250,000	5,720,000	203,083	10,904,789	0	0	10,904,789	9,395,644	
1962	8,840,900	10,904,789	9,395,644	8,250,000	5,720,000	180,871	5,598,018	0	0	5,598,018	4,829,707	
1963	10,883,586	5,598,018	4,829,707	8,250,000	5,720,000	90,114	2,398,489	0	0	2,398,489	2,066,558	
1964	15,875,027	2,398,489	2,066,558	8,250,000	5,720,000	117,696	8,185,921	0	0	8,185,921	7,053,982	
1965	10,679,844	8,185,921	7,053,982	8,250,000	5,720,000	142,780	4,752,904	0	0	4,752,904	4,096,136	
1966	11,670,830	4,752,904	4,096,136	8,250,000	5,720,000	80,677	2,372,858	0	0	2,372,858	2,044,471	
1967	13,739,932	2,372,858	2,044,471	8,250,000	5,720,000	52,551	2,060,259	0	0	2,060,259	1,800,982	
1968	15,272,156	2,060,259	1,800,982	8,250,000	5,720,000	62,717	3,329,701	0	0	3,329,701	2,868,894	
1969	15,244,136	3,329,701	2,868,894	8,250,000	5,720,000	89,587	4,614,250	0	0	4,614,250	3,975,671	
1970	15,493,656	4,614,250	3,975,671	8,250,000	5,720,000	118,224	6,019,685	0	0	6,019,685	5,186,604	
1971	13,186,637	6,019,685	5,186,604	8,250,000	5,720,000	123,531	5,112,790	0	0	5,112,790	4,405,217	
1972	18,650,193	5,112,790	4,405,217	8,250,000	5,720,000	161,977	9,631,006	0	0	9,631,006	8,298,144	
1973	13,285,426	9,631,006	8,298,144	8,250,000	5,720,000							

Upper Basin Yield Mass Balance Analysis

Run 6 - Use CRSP Minimum Power Pools, 8.25 maf Lower Basin Delivery, 6% Overall Shortage

CY	CR Natural Flow at Lee Ferry (plus)	Total Carry-Over Storage (plus)	CRSP Carry-Over Storage	Lower Basin Delivery (minus)	Upper Basin Use (minus)	Shared CRSP Evap (minus)	Net Available to Store (subtotal)	Spill to LC (minus)	Shortage (plus)	UC Basin Year-end Storage (equals)	CRSP Year-end Storage	Variables
1906	18,550,021	33,833,590	29,151,263	8,250,000	5,980,000	725,390	37,428,221	3,594,631	0	33,833,590	29,151,263	Storage
1907	21,201,694	33,833,590	29,151,263	8,250,000	5,980,000	725,390	40,075,654	6,248,304	0	33,833,590	29,151,263	Sedimentation Rate (Active)
1908	12,218,817	33,833,590	29,151,263	8,250,000	5,980,000	696,563	31,125,844	0	0	31,125,844	26,818,249	Bank Storage
1909	22,356,201	31,125,844	26,818,249	8,250,000	5,980,000	896,563	38,555,581	4,721,091	0	33,833,590	29,151,263	Adjusted Storage (2080)
1910	14,650,816	33,833,590	29,151,263	8,250,000	5,980,000	722,179	33,832,027	0	0	33,832,027	28,891,434	UB Demand Level
1911	15,499,729	33,833,590	29,151,263	8,250,000	5,980,000	722,179	34,079,577	245,987	0	33,833,590	29,151,263	LB Delivery
1912	18,623,410	33,833,590	29,151,263	8,250,000	5,980,000	725,390	37,501,810	3,658,020	0	33,833,590	29,151,263	
1913	14,536,373	33,833,590	29,151,263	8,250,000	5,980,000	720,976	33,418,987	0	0	33,418,987	28,794,038	
1914	21,354,814	33,418,987	28,794,038	8,250,000	5,980,000	720,976	39,822,825	5,989,235	0	33,833,590	29,151,263	
1915	13,823,277	33,833,590	29,151,263	8,250,000	5,980,000	711,258	32,515,509	0	0	32,515,509	28,015,598	Results
1916	20,142,892	32,515,509	28,015,598	8,250,000	5,980,000	711,258	37,717,044	3,883,454	0	33,833,590	29,151,263	Average CRSP Evap
1917	22,942,804	33,833,590	29,151,263	8,250,000	5,980,000	725,390	41,821,004	7,987,414	0	33,833,590	29,151,263	Total Yield w/ CRSP evap
1918	15,865,919	33,833,590	29,151,263	8,250,000	5,980,000	725,390	34,744,139	910,549	0	33,833,590	29,151,263	
1919	12,651,369	33,833,590	29,151,263	8,250,000	5,980,000	701,120	31,553,839	0	0	31,553,839	27,187,013	Shortage Years
1920	22,287,632	31,553,839	27,187,013	8,250,000	5,980,000	701,120	38,910,351	5,076,782	0	33,833,590	29,151,263	Shortage
1921	22,526,781	33,833,590	29,151,263	8,250,000	5,980,000	725,390	41,404,981	7,571,381	0	33,833,590	29,151,263	1963
1922	18,447,198	33,833,590	29,151,263	8,250,000	5,980,000	725,390	37,325,398	3,491,808	0	33,833,590	29,151,263	1964
1923	19,024,048	33,833,590	29,151,263	8,250,000	5,980,000	725,390	37,902,246	4,068,656	0	33,833,590	29,151,263	1967
1924	13,877,798	33,833,590	29,151,263	8,250,000	5,980,000	714,039	32,787,349	0	0	32,787,349	28,232,583	1968
1925	14,430,701	32,787,349	28,232,583	8,250,000	5,980,000	897,400	32,270,651	0	0	32,270,651	27,804,623	1977
1926	15,213,731	32,270,651	27,804,623	8,250,000	5,980,000	696,184	32,559,168	0	0	32,559,168	28,053,238	
1927	19,539,212	32,559,168	28,053,238	8,250,000	5,980,000	711,823	37,156,587	3,322,997	0	33,833,590	29,151,263	NM allocation (w/o evap)
1928	16,954,234	33,833,590	29,151,263	8,250,000	5,980,000	725,390	35,832,334	1,998,944	0	33,833,590	29,151,263	
1929	21,829,585	33,833,590	29,151,263	8,250,000	5,980,000	725,390	40,707,785	6,874,195	0	33,833,590	29,151,263	Note: NM allocation is exclusive of its portion of CRSP evaporation. Navajo evaporation would be primarily charged against NM's allocation. Shared CRSP evaporation is already removed from UC demands.
1930	14,821,041	33,833,590	29,151,263	8,250,000	5,980,000	721,868	33,502,763	0	0	33,502,763	28,866,220	
1931	8,474,134	33,502,763	28,866,220	8,250,000	5,980,000	850,148	27,096,749	0	0	27,096,749	23,346,753	
1932	17,422,187	27,096,749	23,346,753	8,250,000	5,980,000	609,447	29,679,489	0	0	29,679,489	25,572,060	
1933	12,183,500	29,679,489	25,572,060	8,250,000	5,980,000	608,675	27,024,314	0	0	27,024,314	23,284,342	
1934	6,178,192	27,024,314	23,284,342	8,250,000	5,980,000	489,480	18,483,028	0	0	18,483,028	15,925,107	Total Upper Basin depletion, inc. CRSP evap:
1935	12,830,349	18,483,028	15,925,107	8,250,000	5,980,000	377,502	16,505,872	0	0	16,505,872	14,221,578	1953-1977
1936	14,848,873	16,505,872	14,221,578	8,250,000	5,980,000	357,112	16,567,634	0	0	16,567,634	14,274,782	1981-1977
1937	14,308,058	16,567,634	14,274,782	8,250,000	5,980,000	354,902	16,288,688	0	0	16,288,688	14,034,623	1981-1977
1938	18,149,219	16,288,688	14,034,623	8,250,000	5,980,000	389,402	19,817,805	0	0	19,817,805	17,075,182	1986-2000
1939	11,184,058	19,817,805	17,075,182	8,250,000	5,980,000	390,177	16,261,657	0	0	16,261,657	14,097,348	
1940	9,331,637	16,261,657	14,097,348	8,250,000	5,980,000	304,264	11,758,959	0	0	11,758,959	10,131,803	Flow Adjustments:
1941	20,116,878	11,758,959	10,131,803	8,250,000	5,980,000	314,703	17,330,935	0	0	17,330,935	14,932,457	1971
1942	17,225,136	17,330,935	14,932,457	8,250,000	5,980,000	401,631	19,924,440	0	0	19,924,440	17,187,040	1972
1943	13,731,401	19,924,440	17,187,040	8,250,000	5,980,000	419,487	19,008,373	0	0	19,008,373	16,378,027	1973
1944	15,369,422	19,008,373	16,378,027	8,250,000	5,980,000	417,381	19,728,415	0	0	19,728,415	16,968,143	1974
1945	14,140,528	19,728,415	16,968,143	8,250,000	5,980,000	419,647	19,219,295	0	0	19,219,295	16,559,482	1975
1946	11,095,453	19,219,295	16,559,482	8,250,000	5,980,000	376,846	15,707,903	0	0	15,707,903	13,534,041	1976
1947	16,439,486	15,707,903	13,534,041	8,250,000	5,980,000	359,182	17,556,227	0	0	17,556,227	15,128,294	1977
1948	15,139,294	17,556,227	15,128,294	8,250,000	5,980,000	384,448	18,083,073	0	0	18,083,073	15,580,505	1978
1949	16,933,584	18,083,073	15,580,505	8,250,000	5,980,000	414,405	20,372,251	0	0	20,372,251	17,552,877	1979
1950	13,140,416	20,372,251	17,552,877	8,250,000	5,980,000	422,676	16,859,991	0	0	16,859,991	14,249,903	1980
1951	12,506,864	16,859,991	14,249,903	8,250,000	5,980,000	384,133	16,731,752	0	0	16,731,752	14,433,429	
1952	20,805,422	16,731,752	14,433,429	8,250,000	5,980,000	427,143	22,900,031	0	0	22,900,031	19,730,831	
1953	11,165,419	22,900,031	19,730,831	8,250,000	5,980,000	455,126	16,360,324	0	0	16,360,324	16,659,224	
1954	8,496,102	19,730,831	16,659,224	8,250,000	5,980,000	352,857	13,293,466	0	0	13,293,466	11,453,834	
1955	9,413,908	13,293,466	11,453,834	8,250,000	5,980,000	234,293	8,243,183	0	0	8,243,183	7,102,238	
1956	11,428,874	8,243,183	7,102,238	8,250,000	5,980,000	149,099	5,290,958	0	0	5,290,958	4,558,728	
1957	21,500,963	5,290,958	4,558,728	8,250,000	5,980,000	193,021	12,368,901	0	0	12,368,901	10,657,133	
1958	15,862,511	12,368,901	10,657,133	8,250,000	5,980,000	282,741	13,718,671	0	0	13,718,671	11,820,105	
1959	9,569,169	13,718,671	11,820,105	8,250,000	5,980,000	245,190	8,841,650	0	0	8,841,650	7,618,029	
1960	11,524,180	8,841,650	7,618,029	8,250,000	5,980,000	182,732	5,973,078	0	0	5,973,078	5,146,447	
1961	10,010,259	5,973,078	5,146,447	8,250,000	5,980,000	88,352	1,666,985	0	0	1,666,985	1,436,286	
1962	17,377,609	1,666,985	1,436,286	8,250,000	5,980,000	73,239	4,741,355	0	0	4,741,355	4,085,188	
1963	8,840,500	4,741,355	4,085,188	8,250,000	5,980,000	55,493	-703,237	0	703,237	0	0	
1964	10,863,586	0	0	8,250,000	5,980,000	5,017	-3,371,431	0	3,371,431	0	0	
1965	19,875,027	0	0	8,250,000	5,980,000	64,427	5,580,600	0	0	5,580,600	4,808,285	
1966	10,679,844	5,580,600	4,808,285	8,250,000	5,980,000	85,136	1,945,307	0	0	1,945,307	1,676,091	
1967	11,670,830	1,945,307	1,676,091	8,250,000	5,980,000	25,726	-639,589	0	639,589	0	0	
1968	13,739,932	0	0	8,250,000	5,980,000	5,017	-495,085	0	495,085	0	0	
1969	15,272,159	0	0	8,250,000	5,980,000	15,942	1,026,217	0	0	1,026,217	884,196	
1970	15,344,136	1,026,217	884,196	8,250,000	5,980,000	38,320	2,102,633	0	0	2,102,633	1,811,127	
1971	15,403,659	2,102,633	1,811,127	8,250,000	5,980,000	82,558	3,303,132	0	0	3,303,132	2,848,003	
1972	13,186,837	3,303,132	2,848,003	8,250,000	5,980,000	63,582	2,196,207	0	0	2,196,207	1,892,288	
1973	18,650,193	2,196,207	1,892,288	8,250,000	5,980,000	97,793	8,518,607	0	0	8,518,607	5,616,478	
1974	13,285,428	6,518,607	5,616,478	8,250,000	5,980,000	122,344	5,441,689	0	0	5,441,689	4,688,598	
1975	17,072,561	5,441,689	4,688,598	8,250,000	5,980,000	149,350	8,134,800	0	0	8,134,800	7,009,002	
1976	11,313,561	8,134,800	7,009,002	8,250,000	5,980,000	145,622	5,072,739	0	0	5,072,739	4,370,709	
1977	5,551,188	5,072,739	4,370,709	8,250,000	5,980,000	59,020	-3,665,093	0	3,665,093	0	0	
1978	15,335,909	0	0	8,250,000	5,980,000	18,613	1,089,295	0	0	1,089,295	938,544	
1979	17,825,429	1,089,295	938,544	8,250,000	5,980,000	65,786	4,618,938	0	0	4,618,938	3,979,710	
1980	17,927,076	4,618,938	3,979,710	8,250,000	5,980,000	141,217	8,174,797	0	0	8,174,797	7,043,464	
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Upper Basin Yield Mass Balance Analysis

Run 7 - Use CRSP Minimum Power Pools, 7.50 maf Lower Basin Delivery, No Shortage

CY	CR Natural Flow at Lee Ferry (plus)	Total Carry-Over Storage (plus)	CRSP Carry-Over Storage	Lower Basin Delivery (minus)	Upper Basin Use (minus)	Shared CRSP Evap (minus)	Net Available to Store (subtotal)	Spill to LC (minus)	Shortage (plus)	UC Basin Year-end Storage (equals)	CRSP Year-end Storage	Variables	
1906	18,550,021	33,833,590	29,151,263	7,500,000	6,470,000	725,390	37,688,221	3,854,631	0	33,833,590	29,151,263	Storage	35,233,298 af
1907	21,201,694	33,833,590	29,151,263	7,500,000	6,470,000	725,390	40,330,894	6,506,304	0	33,833,590	29,151,263	Sedimentation Rate (Active)	37,000 af/yr
1908	12,218,817	33,833,590	29,151,263	7,500,000	6,470,000	699,302	31,383,105	0	0	31,383,105	27,039,907	Bank Storage	4%
1909	22,356,301	31,383,105	27,039,907	7,500,000	6,470,000	699,302	36,070,104	5,236,514	0	33,833,590	29,151,263	Adjusted Storage (2060)	33,833,590 af
1910	14,650,618	33,833,590	29,151,263	7,500,000	6,470,000	724,918	33,789,288	0	0	33,789,288	29,113,062	UB Demand Level	6,470,000 af/yr
1911	15,499,729	33,789,288	29,113,062	7,500,000	6,470,000	724,918	34,594,099	760,509	0	33,833,590	29,151,263	LB Delivery	7,500,000 af/yr
1912	16,623,410	33,833,590	29,151,263	7,500,000	6,470,000	725,390	37,781,610	3,628,020	0	33,833,590	29,151,263		
1913	14,536,370	33,833,590	29,151,263	7,500,000	6,470,000	723,715	33,876,248	0	0	33,876,248	29,015,696		
1914	21,354,814	33,876,248	29,015,696	7,500,000	6,470,000	723,715	40,331,248	6,500,758	0	33,833,590	29,151,263		
1915	12,834,277	33,833,590	29,151,263	7,500,000	6,470,000	714,096	32,771,771	0	0	32,772,771	28,237,254		
1916	20,142,852	32,772,771	28,237,254	7,500,000	6,470,000	714,096	38,251,568	4,397,976	0	33,833,590	29,151,263	Results	
1917	22,942,804	33,833,590	29,151,263	7,500,000	6,470,000	725,390	42,081,004	8,247,414	0	33,833,590	29,151,263	Average CRSP Evap	483,436 af/yr
1918	15,865,939	33,833,590	29,151,263	7,500,000	6,470,000	725,390	35,004,139	1,170,549	0	33,833,590	29,151,263	Total Yield w/ CRSP evap	6,833,436 af/yr
1919	12,651,369	33,833,590	29,151,263	7,500,000	6,470,000	703,858	31,811,100	0	0	31,811,100	27,408,672	Shortage Years	
1920	22,871,832	31,811,100	27,408,672	7,500,000	6,470,000	703,858	39,424,874	5,991,284	0	33,833,590	29,151,263	Shortage	
1921	22,526,781	33,833,590	29,151,263	7,500,000	6,470,000	725,390	41,664,981	7,831,391	0	33,833,590	29,151,263	1963	0 af
1922	16,447,194	33,833,590	29,151,263	7,500,000	6,470,000	725,390	37,585,298	3,751,808	0	33,833,590	29,151,263	1964	0 af
1923	19,024,048	33,833,590	29,151,263	7,500,000	6,470,000	725,390	38,182,246	4,228,656	0	33,833,590	29,151,263	1967	0 af
1924	13,877,798	33,833,590	29,151,263	7,500,000	6,470,000	716,777	33,024,811	0	0	33,024,811	28,454,241	1968	0 af
1925	14,430,701	33,024,811	28,454,241	7,500,000	6,470,000	705,858	32,779,753	0	0	32,779,753	28,243,270	1977	0 af
1926	15,213,731	32,779,753	28,243,270	7,500,000	6,470,000	708,648	33,314,836	0	0	33,314,836	28,704,301		
1927	19,539,212	33,314,836	28,704,301	7,500,000	6,470,000	719,867	36,164,184	4,330,591	0	33,833,590	29,151,263	NM allocation (w/o evap)	722,250 af/yr
1928	16,954,334	33,833,590	29,151,263	7,500,000	6,470,000	725,390	36,092,534	2,256,944	0	33,833,590	29,151,263		
1929	21,829,585	33,833,590	29,151,263	7,500,000	6,470,000	725,390	40,867,785	7,134,195	0	33,833,590	29,151,263	Note: NM allocation is exclusive of its portion of CRSP evaporation. Navajo evaporation would be primarily charged against NM allocation. Shared CRSP evaporation is almost removed from UC demands.	
1930	14,821,041	33,833,590	29,151,263	7,500,000	6,470,000	724,806	33,780,025	0	0	33,780,025	29,087,879	Total Upper Basin depletion, inc. CRSP evap:	
1931	8,474,134	33,780,025	29,087,879	7,500,000	6,470,000	658,307	27,605,652	0	0	27,605,652	23,765,399	1953-1977	6,684,611 af/yr
1932	17,422,187	27,605,652	23,765,399	7,500,000	6,470,000	622,811	30,435,128	0	0	30,435,128	26,223,124	1931-1977	6,806,021 af/yr
1933	12,163,500	30,435,128	26,223,124	7,500,000	6,470,000	627,133	28,081,284	0	0	28,081,284	24,143,347	1906-2000	6,833,436 af/yr
1934	6,178,192	28,081,284	24,143,347	7,500,000	6,470,000	513,222	18,716,264	0	0	18,716,264	16,987,674		
1935	12,830,549	18,716,264	16,987,674	7,500,000	6,470,000	405,222	17,970,291	0	0	17,970,291	15,483,417		
1936	14,648,873	17,970,291	15,483,417	7,500,000	6,470,000	390,704	18,258,580	0	0	18,258,580	15,731,706		
1937	14,306,058	18,258,580	15,731,706	7,500,000	6,470,000	393,164	18,201,452	0	0	18,201,452	15,682,501		
1938	15,148,319	18,201,452	15,682,501	7,500,000	6,470,000	432,434	21,947,337	0	0	21,947,337	18,909,983		
1939	11,164,059	21,947,337	18,909,983	7,500,000	6,470,000	437,780	18,703,617	0	0	18,703,617	16,115,170		
1940	9,931,857	18,703,617	16,115,170	7,500,000	6,470,000	356,461	14,308,812	0	0	14,308,812	12,328,575		
1941	20,116,678	14,308,812	12,328,575	7,500,000	6,470,000	371,160	20,840,330	0	0	20,840,330	17,304,602	Flow Adjustments:	
1942	17,225,136	20,840,330	17,304,602	7,500,000	6,470,000	482,377	22,877,090	0	0	22,877,090	19,711,064	1971	203,226 af
1943	13,731,401	22,877,090	19,711,064	7,500,000	6,470,000	484,411	22,154,080	0	0	22,154,080	19,088,114	1972	226,985 af
1944	15,369,422	22,154,080	19,088,114	7,500,000	6,470,000	485,433	23,067,069	0	0	23,067,069	19,874,751	1973	252,377 af
1945	14,140,528	23,067,069	19,874,751	7,500,000	6,470,000	492,723	22,744,874	0	0	22,744,874	19,597,146	1974	196,384 af
1946	11,095,453	22,744,874	19,597,146	7,500,000	6,470,000	453,859	19,416,468	0	0	19,416,468	18,728,368	1975	246,665 af
1947	16,439,480	19,416,468	18,728,368	7,500,000	6,470,000	440,031	21,445,923	0	0	21,445,923	18,477,981	1976	173,250 af
1948	15,139,294	21,445,923	18,477,981	7,500,000	6,470,000	489,090	22,148,127	0	0	22,148,127	19,081,262	1977	112,251 af
1949	16,933,584	22,148,127	19,081,262	7,500,000	6,470,000	502,742	24,606,969	0	0	24,606,969	21,201,541	1978	152,187 af
1950	13,140,416	24,606,969	21,201,541	7,500,000	6,470,000	514,629	23,262,756	0	0	23,262,756	19,858,623	1979	153,556 af
1951	12,505,864	23,262,756	20,043,357	7,500,000	6,470,000	479,827	21,310,233	0	0	21,310,233	18,368,623	1980	161,893 af
1952	20,805,422	21,310,233	18,368,623	7,500,000	6,470,000	528,102	27,626,343	0	0	27,626,343	23,804,778		
1953	11,163,419	27,626,343	23,804,778	7,500,000	6,470,000	557,478	26,261,285	0	0	26,261,285	20,908,004		
1954	8,496,102	24,266,285	20,908,004	7,500,000	6,470,000	458,530	18,333,556	0	0	18,333,556	15,796,582		
1955	6,413,908	18,333,556	15,796,582	7,500,000	6,470,000	343,218	13,434,547	0	0	13,434,547	11,575,301		
1956	11,428,874	13,434,547	11,575,301	7,500,000	6,470,000	261,206	10,830,214	0	0	10,830,214	9,159,069		
1957	21,500,963	10,830,214	9,159,069	7,500,000	6,470,000	308,243	17,852,934	0	0	17,852,934	15,382,216		
1958	15,862,511	17,852,934	15,382,216	7,500,000	6,470,000	401,013	19,344,432	0	0	19,344,432	16,887,201		
1959	9,598,160	19,344,432	16,887,201	7,500,000	6,470,000	366,449	14,606,162	0	0	14,606,162	12,584,765		
1960	11,524,180	14,606,162	12,584,765	7,500,000	6,470,000	288,914	11,873,398	0	0	11,873,398	10,230,205		
1961	10,010,256	11,873,398	10,230,205	7,500,000	6,470,000	213,395	7,700,263	0	0	7,700,263	6,534,801		
1962	17,377,609	7,700,263	6,534,801	7,500,000	6,470,000	203,083	10,904,789	0	0	10,904,789	9,395,644		
1963	6,840,900	10,904,789	9,395,644	7,500,000	6,470,000	180,671	5,565,018	0	0	5,565,018	4,820,707		
1964	10,863,586	5,565,018	4,820,707	7,500,000	6,470,000	90,114	2,398,489	0	0	2,398,489	2,066,556		
1965	19,875,027	2,398,489	2,066,556	7,500,000	6,470,000	117,696	8,185,821	0	0	8,185,821	7,052,982		
1966	10,879,844	8,185,821	7,052,982	7,500,000	6,470,000	142,760	4,752,904	0	0	4,752,904	4,095,130		
1967	11,670,830	4,752,904	4,095,130	7,500,000	6,470,000	80,877	2,372,858	0	0	2,372,858	2,044,471		
1968	13,739,932	2,372,858	2,044,471	7,500,000	6,470,000	52,531	2,090,259	0	0	2,090,259	1,800,882		
1969	16,272,156	2,090,259	1,800,882	7,500,000	6,470,000	62,717	3,329,701	0	0	3,329,701	2,866,894		
1970	15,344,136	3,329,701	2,866,894	7,500,000	6,470,000	69,587	4,614,250	0	0	4,614,250	3,975,671		
1971	18,493,858	4,614,250	3,975,671	7,500,000	6,470,000	118,224	6,019,685	0	0	6,019,685	5,188,604		
1972	13,186,837	6,019,685	5,188,604	7,500,000	6,470,000	123,531	5,112,790	0	0	5,112,790	4,405,217		
1973	18,650,183	5,112,790	4,405,217	7,500,000	6,470,000	161,877	6,631,006	0	0	6,631,006	5,298,144		
1974	13,285,426	6,631,006	5,298,144	7,500,000	6,470,000	200,853	8,745,780	0	0	8,745,780	7,535,427		
1975	17,072,661	8,745,780	7,535,427	7,500,000	6,470,000	221,897	11,626,544	0	0	11,626,544	10,017,513		
1976	11,313,561	11,626,544	10,017,513	7,500,000	6,470,000	221,923							

Upper Basin Yield Mass Balance Analysis

Run 8 - Use CRSP Minimum Power Pools, 7.50 maf Lower Basin Delivery, 6% Overall Shortage

CY	CR Natural Flow at Lee Ferry (plus)	Total Carry-Over Storage (plus)	CRSP Carry-Over Storage	Lower Basin Delivery (minus)	Upper Basin Use (minus)	Shared CRSP Evap (minus)	Net Available to Store (subtotal)	Spill to LC (minus)	Shortage (plus)	UC Basin Year-end Storage (equals)	CRSP Year-end Storage	Variables	
1906	18,550,021	33,833,590	29,151,263	7,500,000	8,760,000	725,390	37,398,221	3,564,631	0	33,833,590	29,151,263	Storage	35,233,298 af
1907	21,201,864	33,833,590	29,151,263	7,500,000	8,760,000	725,390	40,049,894	8,216,304	0	33,833,590	29,151,263	Sedimentation Rate (Active)	37,000 af/yr
1908	12,218,817	33,833,590	29,151,263	7,500,000	8,760,000	698,247	31,096,160	0	0	31,096,160	26,792,673	Bank Storage	4%
1909	22,356,301	33,833,590	29,151,263	7,500,000	8,760,000	698,247	38,496,213	4,662,623	0	33,833,590	29,151,263	Adjusted Storage (2060)	33,833,590 af
1910	14,650,616	33,833,590	29,151,263	7,500,000	8,760,000	721,863	33,502,343	0	0	33,502,343	28,865,858	UB Demand Level	6,760,000 af/yr
1911	15,495,729	33,833,590	29,151,263	7,500,000	8,760,000	725,390	34,020,209	186,619	0	33,833,590	29,151,263	LB Delivery	7,500,000 af/yr
1912	18,623,410	33,833,590	29,151,263	7,500,000	8,760,000	725,390	37,471,610	3,638,020	0	33,833,590	29,151,263		
1913	14,538,373	33,833,590	29,151,263	7,500,000	8,760,000	720,660	33,389,320	0	0	33,389,320	28,768,462		
1914	21,354,814	33,833,590	29,151,263	7,500,000	8,760,000	720,660	39,763,457	5,929,867	0	33,833,590	29,151,263		
1915	13,623,277	33,833,590	29,151,263	7,500,000	8,760,000	711,041	32,485,825	0	0	32,485,825	27,990,019	Results	
1916	20,142,804	33,833,590	29,151,263	7,500,000	8,760,000	711,041	37,657,676	3,824,066	0	33,833,590	29,151,263	Average CRSP Evap	418,577 af/yr
1917	22,942,804	33,833,590	29,151,263	7,500,000	8,760,000	725,390	41,791,004	7,657,414	0	33,833,590	29,151,263	Total Yield w/ CRSP evap	7,176,577 af/yr
1918	15,865,939	33,833,590	29,151,263	7,500,000	8,760,000	725,390	34,714,139	880,540	0	33,833,590	29,151,263		
1919	12,651,369	33,833,590	29,151,263	7,500,000	8,760,000	700,804	31,524,155	0	0	31,524,155	27,181,438	Shortage Years	Shortage
1920	22,287,632	33,833,590	29,151,263	7,500,000	8,760,000	700,804	38,850,983	5,017,294	0	33,833,590	29,151,263		
1921	22,526,781	33,833,590	29,151,263	7,500,000	8,760,000	725,390	41,374,961	7,541,391	0	33,833,590	29,151,263	1963	1,436,802 af
1922	16,447,198	33,833,590	29,151,263	7,500,000	8,760,000	725,390	37,298,358	1,481,808	0	33,833,590	29,151,263	1964	1,401,431 af
1923	19,024,046	33,833,590	29,151,263	7,500,000	8,760,000	725,390	37,872,246	4,038,656	0	33,833,590	29,151,263	1967	727,708 af
1924	13,877,798	33,833,590	29,151,263	7,500,000	8,760,000	713,723	32,737,665	0	0	32,737,665	28,207,007	1968	525,065 af
1925	14,430,701	33,833,590	29,151,263	7,500,000	8,760,000	696,456	32,211,908	0	0	32,211,908	27,754,010	1977	3,913,425 af
1926	15,213,731	33,833,590	29,151,263	7,500,000	8,760,000	693,630	32,472,009	0	0	32,472,009	27,978,115		
1927	19,539,212	33,833,590	29,151,263	7,500,000	8,760,000	710,894	37,040,328	3,206,736	0	33,833,590	29,151,263	NM allocation (two evap)	754,875 af/yr
1928	16,954,334	33,833,590	29,151,263	7,500,000	8,760,000	725,390	35,802,534	1,968,944	0	33,833,590	29,151,263		
1929	21,829,585	33,833,590	29,151,263	7,500,000	8,760,000	725,390	40,677,785	6,844,195	0	33,833,590	29,151,263	Note: NM allocation is exclusive of its portion of CRSP evaporation. Navajo evaporation would be primarily charged against NM's allocation. Shared CRSP evaporation is already removed from UC demands.	
1930	14,821,041	33,833,590	29,151,263	7,500,000	8,760,000	721,552	33,473,079	0	0	33,473,079	28,840,644		
1931	8,474,134	33,833,590	29,151,263	7,500,000	8,760,000	649,207	27,038,006	0	0	27,038,006	23,296,139		
1932	17,422,187	33,833,590	29,151,263	7,500,000	8,760,000	607,963	29,592,300	0	0	29,592,300	25,496,937		
1933	12,183,500	33,833,590	29,151,263	7,500,000	8,760,000	806,523	26,906,276	0	0	26,906,276	23,185,226		
1934	6,176,192	33,833,590	29,151,263	7,500,000	8,760,000	486,740	18,340,726	0	0	18,340,726	15,802,503		
1935	12,630,349	33,833,590	29,151,263	7,500,000	8,760,000	374,189	16,336,890	0	0	16,336,890	14,075,981	Total Upper Basin depletion, inc. CRSP evap:	
1936	14,648,873	33,833,590	29,151,263	7,500,000	8,760,000	353,236	18,372,527	0	0	18,372,527	14,106,886	1953-1977	6,882,986 af/yr
1937	14,306,056	33,833,590	29,151,263	7,500,000	8,760,000	360,578	18,063,208	0	0	18,063,208	13,844,483	1931-1977	7,019,848 af/yr
1938	18,148,319	33,833,590	29,151,263	7,500,000	8,760,000	384,437	19,572,090	0	0	19,572,090	16,843,452	1906-2000	7,176,577 af/yr
1939	11,164,069	33,833,590	29,151,263	7,500,000	8,760,000	384,888	16,061,484	0	0	16,061,484	13,864,520		
1940	9,831,657	33,833,590	29,151,263	7,500,000	8,760,000	298,375	11,464,748	0	0	11,464,748	9,878,107		
1941	20,118,678	33,833,590	29,151,263	7,500,000	8,760,000	308,168	17,013,235	0	0	17,013,235	14,658,725	Flow Adjustments:	
1942	17,223,136	33,833,590	29,151,263	7,500,000	8,760,000	394,622	19,583,749	0	0	19,583,749	16,873,498	1971	203,228 af
1943	13,731,401	33,833,590	29,151,263	7,500,000	8,760,000	411,974	18,643,176	0	0	18,643,176	16,063,094	1972	226,985 af
1944	15,368,422	33,833,590	29,151,263	7,500,000	8,760,000	409,413	19,343,165	0	0	19,343,165	16,666,227	1973	252,377 af
1945	14,140,528	33,833,590	29,151,263	7,500,000	8,760,000	411,216	18,612,468	0	0	18,612,468	16,208,983	1974	196,384 af
1946	11,095,453	33,833,590	29,151,263	7,500,000	8,760,000	367,959	15,279,991	0	0	15,279,991	13,165,350	1975	246,666 af
1947	16,436,486	33,833,590	29,151,263	7,500,000	8,760,000	349,831	17,109,646	0	0	17,109,646	14,741,793	1976	173,250 af
1948	15,139,294	33,833,590	29,151,263	7,500,000	8,760,000	374,681	17,814,259	0	0	17,814,259	15,178,371	1977	112,291 af
1949	16,933,584	33,833,590	29,151,263	7,500,000	8,760,000	404,213	19,883,630	0	0	19,883,630	17,131,878	1978	152,187 af
1950	13,140,416	33,833,590	29,151,263	7,500,000	8,760,000	412,068	18,351,980	0	0	18,351,980	15,812,197	1979	153,559 af
1951	12,505,864	33,833,590	29,151,263	7,500,000	8,760,000	373,115	16,224,759	0	0	16,224,759	13,979,368	1980	161,893 af
1952	20,805,422	33,833,590	29,151,263	7,500,000	8,760,000	415,724	22,354,457	0	0	22,354,457	19,260,760		
1953	11,165,419	33,833,590	29,151,263	7,500,000	8,760,000	443,318	18,816,599	0	0	18,816,599	16,212,482		
1954	8,496,102	33,833,590	29,151,263	7,500,000	8,760,000	340,664	12,711,997	0	0	12,711,997	10,952,748		
1955	9,413,900	33,833,590	29,151,263	7,500,000	8,760,000	221,723	7,674,180	0	0	7,674,180	6,586,280		
1956	11,426,874	33,833,590	29,151,263	7,500,000	8,760,000	156,184	4,874,890	0	0	4,874,890	4,097,919		
1957	21,800,960	33,833,590	29,151,263	7,500,000	8,760,000	179,728	11,736,128	0	0	11,736,128	10,111,831		
1958	15,862,511	33,833,590	29,151,263	7,500,000	8,760,000	269,094	13,046,545	0	0	13,046,545	11,260,813		
1959	9,598,189	33,833,590	29,151,263	7,500,000	8,760,000	231,199	8,176,515	0	0	8,176,515	7,044,844		
1960	11,524,160	33,833,590	29,151,263	7,500,000	8,760,000	148,403	5,292,272	0	0	5,292,272	4,559,859		
1961	10,010,259	33,833,590	29,151,263	7,500,000	8,760,000	71,693	970,838	0	0	970,838	836,481		
1962	17,377,609	33,833,590	29,151,263	7,500,000	8,760,000	58,257	4,630,190	0	0	4,630,190	3,472,440		
1963	8,640,900	33,833,590	29,151,263	7,500,000	8,760,000	47,922	-1,436,832	0	1,436,832	0	0		
1964	10,863,586	33,833,590	29,151,263	7,500,000	8,760,000	5,017	-3,401,431	0	3,401,431	0	0		
1965	10,875,027	33,833,590	29,151,263	7,500,000	8,760,000	64,111	5,550,916	0	0	5,550,916	4,782,709		
1966	10,879,844	33,833,590	29,151,263	7,500,000	8,760,000	84,195	1,886,565	0	0	1,886,565	1,825,478		
1967	11,870,830	33,833,590	29,151,263	7,500,000	8,760,000	25,101	-727,706	0	727,706	0	0		
1968	13,739,932	33,833,590	29,151,263	7,500,000	8,760,000	5,017	-525,085	0	525,085	0	0		
1969	15,272,159	33,833,590	29,151,263	7,500,000	8,760,000	15,628	996,533	0	0	996,533	858,620		
1970	15,344,136	33,833,590	29,151,263	7,500,000	8,760,000	37,378	2,043,291	0	0	2,043,291	1,760,514		
1971	15,493,659	33,833,590	29,151,263	7,500,000	8,760,000	61,006	3,215,943	0	0	3,215,943	2,770,880		
1972	13,166,637	33,833,590	29,151,263	7,500,000	8,760,000	61,409	2,081,171	0	0	2,081,171	1,793,152		
1973	18,650,183	33,833,590	29,151,263	7,500,000	8,760,000	95,054	6,376,310	0	0	6,376,310	5,493,874		
1974	13,288,426	33,833,590	29,151,263	7,500,000	8,760,000	129,030	5,272,706	0	0	5,272,706	4,543,001		
1975	17,072,861	33,833,590	29,151,263	7,500,000	8,760,000	145,674	7,939,693	0	0	7,939,693	6,840,897		
1976	11,313,561	33,833,590	29,151,263	7,500,000	8,760,000	141,198	4,852,059						

## **APPENDIX B**

### **Reservoir Storage**



Upper Colorado River Basin Reservoir Storage

Upper Colorado River Basin Reservoirs	Complete	Live Capacity	CRSP Live	CRSP Active	CRSP Active + Other	State	Major Basin	Hydromet	Source
1 Big Sandy	X	38,300	829,500	748,500	38,300	WY	GR	BGRW	Hydromet
2 Blue Mesa	X	859,500			859,500	CO	GR	BMDC	Hydromet
3 Boulder Lake	X	22,280			22,280	WY	GR	BHRU	Jede Henderson Superintendent for Region IV
4 Bordo Hollow	X	11,778			11,778	UT	CR	CFRC	Link Knight from GJ office
5 Crawford	X	13,970			13,970	CO	CR	CFRC	Hydromet
6 Crystal	X	17,530	17,538	13,000	13,000	CO	CR	CFRC	Hydromet
7 Current Creek	X	15,450			15,450	UT	GR	CFRC	Hydromet
8 Dixon	X	252,078			252,078	CO	CR	CFRC	NRCS Website <a href="http://www.wcc.nrcs.usda.gov/waterreservoirsresv_pr.html">http://www.wcc.nrcs.usda.gov/waterreservoirsresv_pr.html</a> NRCS Website
9 Eden	X	13,164			13,164	WY	GR	EDRU	Carey Balkin at Pacific Corp. <a href="mailto:Connelly.Balkin@pacifiCorp.com">Connelly.Balkin@pacifiCorp.com</a> or 801-220-4636
10 Electric Lake - Utah Power & Light	X	31,500	3,740,000	3,515,700	31,500	UT	GR	EDRU	Bill Easley with the City of Craig Public Works Dept. 970-628-2014
11 Elkhead	X	10,400			10,400	CO	GR	EDRU	Hydromet
12 Fleming Gorge	X	3,748,000			3,748,000	UT	GR	EDRU	Hydromet
13 Fontenelle	X	344,800			344,800	WY	GR	EDRU	Jede Henderson Superintendent for Region IV
14 Fremont Lake	X	30,699			30,699	WY	GR	EDRU	Georgia Wear with Colorado Division of Water Resources <a href="mailto:george.wear@chw.state.co.us">george.wear@chw.state.co.us</a>
15 Gould	X	10,380			10,380	CO	CR	EDRU	Hydromet
16 Fruitgrowers	X	4,480			4,480	CO	CR	EDRU	NRCS Website <a href="http://www.wcc.nrcs.usda.gov/waterreservoirsresv_pr.html">http://www.wcc.nrcs.usda.gov/waterreservoirsresv_pr.html</a>
17 Grubby	X	640,033			640,033	CO	CR	EDRU	NRCS Website <a href="http://www.wcc.nrcs.usda.gov/waterreservoirsresv_pr.html">http://www.wcc.nrcs.usda.gov/waterreservoirsresv_pr.html</a>
18 Green Mountain	X	153,876			153,876	CO	CR	EDRU	NRCS Website <a href="http://www.wcc.nrcs.usda.gov/waterreservoirsresv_pr.html">http://www.wcc.nrcs.usda.gov/waterreservoirsresv_pr.html</a>
19 Groundhog	X	27,500			27,500	CO	CR	EDRU	NRCS Website <a href="http://www.wcc.nrcs.usda.gov/waterreservoirsresv_pr.html">http://www.wcc.nrcs.usda.gov/waterreservoirsresv_pr.html</a>
20 Gunley	X	12,035			12,035	CO	CR	EDRU	Georgia Wear with Colorado Division of Water Resources <a href="mailto:george.wear@chw.state.co.us">george.wear@chw.state.co.us</a>
21 Homestake	X	42,882			42,882	CO	CR	EDRU	NRCS Website <a href="http://www.wcc.nrcs.usda.gov/waterreservoirsresv_pr.html">http://www.wcc.nrcs.usda.gov/waterreservoirsresv_pr.html</a>
22 Jackson Gulch	X	9,951			9,951	CO	CR	JGRC	Hydromet
23 Joe's Valley	X	61,590			61,590	UT	CR	JVRU	Hydromet
24 Johnson	X	15,300			15,300	CO	CR	JVRU	Hydromet
25 Kenny Reservoir (Taylor Dr)	X	9,400			9,400	CO	CR	JVRU	Hydromet
26 Lake Powell	X	24,392,000	20,309,819	20,309,819	24,392,000	AZ	CR	GLDA	Ed.Little@state.co.us_Division of Water Resources for State of Colorado
27 Lake Vista Naughton	X	68,943			68,943	CO	CR	GLDA	Connelly Balkin at Pacific Corp. <a href="mailto:Connelly.Balkin@pacifiCorp.com">Connelly.Balkin@pacifiCorp.com</a> or 801-220-4636
28 Lemmon	X	30,782			30,782	CO	SJR	LMRC	Hydromet
29 Long Park	X	14,800			14,800	UT	GR	LMRC	Hydromet
30 McPhos	X	247,400			247,400	CO	CR	LMRC	Hydromet
31 Meeker Cabin	X	29,870			29,870	WY	GR	LMRC	Hydromet
32 Meeks	X	20,000			20,000	UT	GR	LMRC	Hydromet
33 Minersite	X	11,620			11,620	CO	CR	LMRC	Hydromet
34 Moon Lake	X	49,500			49,500	UT	GR	LMRC	Hydromet
35 Moon Lake Dam	X	42,800			42,800	CO	CR	LMRC	Hydromet
36 Morrow Point	X	117,025	117,025	42,120	117,025	CO	CR	LMRC	Georgia Wear with Colorado Division of Water Resources <a href="mailto:george.wear@chw.state.co.us">george.wear@chw.state.co.us</a>
37 Nanguanapp	X	22,700			22,700	CO	SJR	LMRC	Hydromet
38 Navajo	X	1,694,000	1,694,000	1,036,100	1,694,000	NM	SJR	LMRC	NRCS Website <a href="http://www.wcc.nrcs.usda.gov/waterreservoirsresv_pr.html">http://www.wcc.nrcs.usda.gov/waterreservoirsresv_pr.html</a>
39 New Fork Lake	X	20,340			20,340	WY	GR	LMRC	Hydromet
40 Pecos	X	16,703			16,703	CO	CR	LMRC	Jede Henderson Superintendent for Region IV
41 Pelican Lake	X	16,850			16,850	UT	GR	LMRC	Hydromet
42 Pleasant Valley (Lake Calatr)	X	7,275			7,275	CO	GR	LMRC	Ed.Little@state.co.us_Division of Water Resources for State of Colorado
43 Recapture Creek	X	16,000			16,000	UT	GR	LMRC	Hydromet
44 Redfleet	X	25,700			25,700	UT	GR	LMRC	Hydromet
45 Ridge	X	82,980			82,980	CO	CR	LMRC	Hydromet
46 Rifle Gap	X	12,708			12,708	CO	CR	LMRC	Great Plains Region Website
47 Ruess	X	102,330			102,330	CO	CR	LMRC	Hydromet
48 Sorfield	X	85,800			85,800	UT	GR	LMRC	Great Plains Region Website
49 Shadow Mountain	X	18,368			18,368	CO	CR	LMRC	Hydromet
50 Silver Jack	X	13,000			13,000	CO	CR	LMRC	Hydromet
51 Soldier Creek	X	1,105,810			1,105,810	UT	GR	LMRC	Ed.Little@state.co.us_Division of Water Resources for State of Colorado
52 Stagecoach	X	33,275			33,275	CO	GR	LMRC	Hydromet
53 Sturvation	X	165,320			165,320	CO	GR	LMRC	Ed.Little@state.co.us_Division of Water Resources for State of Colorado
54 Steeline	X	13,890			13,890	WY	GR	LMRC	Hydromet
55 Stenbook Lake	X	26,400			26,400	CO	GR	LMRC	Ed.Little@state.co.us_Division of Water Resources for State of Colorado
56 Steinaker	X	34,455			34,455	UT	GR	LMRC	Hydromet
57 Taylor Park	X	108,210			108,210	CO	CR	LMRC	Hydromet
58 Upper Stillwater	X	31,382			31,382	UT	GR	LMRC	Ed.Little@state.co.us_Division of Water Resources for State of Colorado
59 Vallecito	X	125,400			125,400	CO	CR	LMRC	Hydromet
60 Vega	X	33,311			33,311	CO	CR	LMRC	Hydromet
61 Williams Creek	X	10,084			10,084	CO	CR	LMRC	Erik Knight from GJ office
62 Williams Fork	X	98,824			98,824	CO	CR	LMRC	Georgia Wear with Colorado Division of Water Resources <a href="mailto:george.wear@chw.state.co.us">george.wear@chw.state.co.us</a>
63 Willow Lake	X	18,816			18,816	WY	GR	LMRC	Jede Henderson Superintendent for Region IV
64 Willow Creek	X	10,550			10,550	CO	CR	LMRC	Great Plains Region Website
65 Wildcat Mountain	X	96,000			96,000	CO	CR	LMRC	Great Plains Region Website
66 Yampoco	X	8,000			8,000	CO	CR	LMRC	Georgia Wear with Colorado Division of Water Resources <a href="mailto:george.wear@chw.state.co.us">george.wear@chw.state.co.us</a>
		35,233,298	30,731,061	25,665,339	30,167,578				Ed.Little@state.co.us_Division of Water Resources for State of Colorado
	Total Capacity								

**APPENDIX C**

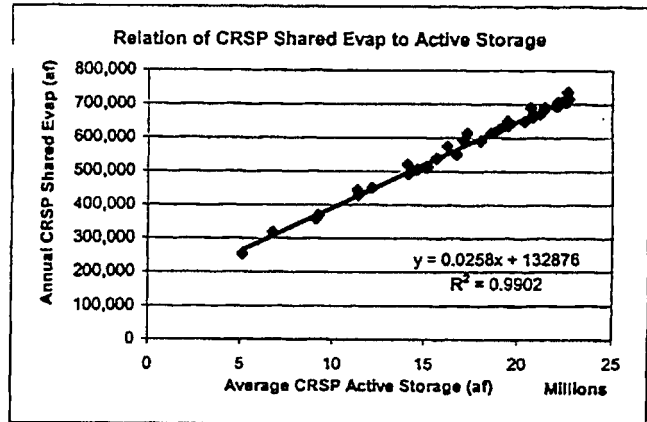
**CRSP Evaporation Analysis**

**Relationships of CRSP Shared Reservoir Evaporation to Total CRSP Storage**

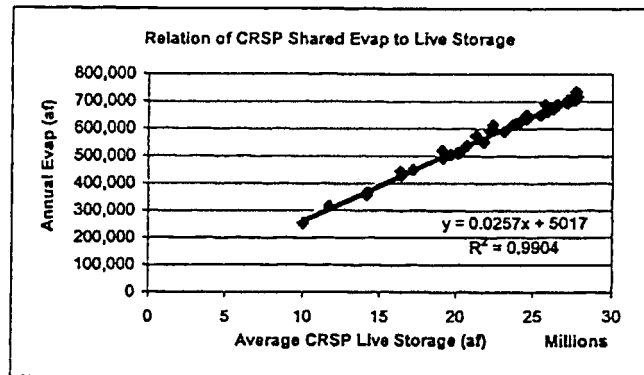
<u>Year</u>	<u>Average CRSP Live Storage (af)</u>	<u>Average CRSP Active Storage (af)</u>	<u>CRSP Shared Evap (af)</u>
1968	10,006,534	5,123,250	251,646
1969	11,701,142	6,764,000	315,083
1970	14,222,401	9,231,741	367,164
1971	16,417,858	11,354,088	442,260
1972	17,229,715	12,165,945	449,544
1973	19,703,066	14,639,296	504,409
1974	22,158,563	17,094,793	590,940
1975	23,634,096	18,570,326	613,612
1976	24,105,743	19,041,973	626,694
1977	20,730,592	15,672,536	537,406
1978	19,158,480	14,106,380	519,065
1979	22,336,514	17,284,414	612,639
1980	25,709,770	20,657,670	688,502
1981	25,392,305	20,340,205	648,525
1982	25,835,729	20,783,629	666,691
1983	27,692,454	22,840,354	734,416
1984	27,759,568	22,707,468	714,727
1985	27,619,938	22,567,838	702,973
1986	27,414,909	22,362,809	706,131
1987	27,153,464	22,101,364	705,172
1988	26,465,639	21,413,539	689,455
1989	24,540,351	19,488,251	634,821
1990	21,806,134	16,754,034	549,702
1991	20,141,572	15,089,472	510,689
1992	19,208,740	14,156,640	491,352
1993	21,297,564	16,245,464	573,884
1994	23,080,796	18,028,696	589,440
1995	24,500,724	19,448,624	649,206
1996	26,252,053	21,199,953	671,123
1997	26,416,641	21,364,541	681,115
1998	27,174,302	22,122,202	693,294
1999	27,050,819	21,998,719	694,007
2000	25,830,330	20,778,230	660,675
2001	23,802,258	18,750,158	614,593
2002	20,256,954	15,204,854	512,030
2003	16,472,537	11,420,437	427,526
2004	14,160,551	9,108,451	355,545

Regression Analyses

Active Storage:



Live Storage:



**Notes:**

- (1) Historic calendar year data from Bureau of Reclamation. Average storage values are based on the average of the end-of-year storage amounts for the year indicated and for the previous year. Storage amounts include storage in all CRSP units, including Lake Powell, Flaming Gorge Reservoir, Navajo Reservoir and the Aspinall Unit (Blue Mesa, Morrow Point and Crystal reservoirs).
- (2) CRSP shared evaporation includes lake evaporation for Lake Powell, Flaming Gorge Reservoir and the Aspinall Unit reservoirs, and is shared between the Upper Division States in proportions to their Upper Colorado River Basin Compact Article III(a) apportionments. CRSP shared evaporation is approximately 10,000 af at zero live CRSP storage (5,000 af based on the regression analyses) and approximately 130,000 af if storage in all CRSP reservoirs were at the top of the inactive pools (133,000 af based on the regression analysis). Lake evaporation for Navajo Reservoir is not included in CRSP shared evaporation.
- (3) Data for the period 1968-2004 were used in the regression analyses. Data prior to 1968 do not reflect a normal distribution of storage between CRSP unit reservoirs under future operational conditions (for example, Navajo Reservoir storage remained below the top of the inactive pool required for operation of the Navajo Indian Irrigation Project diversion from 1962 when it began storing water until 1968, and Morrow Point Reservoir began operation in 1968). For the period 1968-1977, the historic average end-of-year CRSP storage and annual CRSP evaporation amount were increased to reflect the average storage of 15,670 af and average evaporation amount of 340 af occurring at Crystal Reservoir after its initial filling in 1978.

Historic Storage and Evaporation at Colorado River Storage Project Reservoirs

Year	Lake Powell		Florissant-Gorras Reservoir		Navajo Reservoir		Blue Mesa Reservoir		Morrow Point Reservoir		Crystal Reservoir		TOTAL ALL CRISP Reservoirs		
	EOY Live Storage (M)	Annual Evap Amount (M)	EOY Live Storage (M)	Annual Evap Amount (M)	EOY Live Storage (M)	Annual Evap Amount (M)	EOY Live Storage (M)	Annual Evap Amount (M)	EOY Live Storage (M)	Annual Evap Amount (M)	EOY Live Storage (M)	Annual Evap Amount (M)	EOY Live Storage (M)	EOY Active Storage (M)	Total Annual Evap (M)
1961	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1962	970,000	25,000	13,000	833,500	20,000	31,634	6,323	0	0	0	0	0	70,000	660,500	53,323
1963	4,228,877	78,171	1,097,800	3,130	362,320	10,647	0	0	0	0	0	0	2,165,334	1,196,800	128,137
1964	8,155,838	144,900	2,308,300	41,522	604,111	10,630	0	0	0	0	0	0	3,707,097	5,026,100	207,031
1965	5,682,764	181,801	2,243,300	66,814	480,388	10,700	0	100	0	0	0	0	9,352,248	4,176,900	260,900
1966	8,237,331	158,145	2,298,300	88,132	684,132	13,048	248,900	2,500	0	0	0	0	9,432,283	4,611,100	242,308
1967	7,039,300	185,200	1,912,939	16,631	1,133,862	19,631	311,600	4,500	0	0	0	0	5,655,400	2,699,937	251,306
1968	9,527,661	252,105	1,565,599	54,074	1,133,862	16,631	652,333	6,000	400	0	0	0	12,824,480	10,410,800	317,068
1969	12,014,346	305,972	1,761,250	22,326	1,641,150	22,584	847,697	8,064	0	0	0	0	15,508,982	12,410,382	368,388
1970	12,873,499	360,552	2,704,322	68,523	1,641,150	22,584	431,077	7,287	0	0	0	0	17,215,384	12,410,382	402,425
1971	12,611,547	382,114	2,066,584	79,091	1,641,150	22,584	431,077	7,287	0	0	0	0	17,215,384	12,410,382	402,425
1972	17,387,042	417,299	2,938,158	77,892	1,132,431	19,991	415,981	7,155	0	0	0	0	22,102,095	17,113,995	521,477
1973	17,387,042	417,299	2,938,158	77,892	1,132,431	19,991	415,981	7,155	0	0	0	0	22,102,095	17,113,995	521,477
1974	17,387,042	417,299	2,938,158	77,892	1,132,431	19,991	415,981	7,155	0	0	0	0	22,102,095	17,113,995	521,477
1975	18,136,140	481,706	3,430,797	83,664	1,185,933	24,432	533,975	7,300	0	0	0	0	25,113,181	20,045,091	624,704
1976	18,136,140	481,706	3,430,797	83,664	1,185,933	24,432	533,975	7,300	0	0	0	0	25,113,181	20,045,091	624,704
1977	15,050,967	487,624	3,120,279	83,664	1,185,933	24,432	533,975	7,300	0	0	0	0	23,090,984	18,018,884	624,704
1978	15,343,762	443,338	1,960,703	82,883	1,279,818	22,425	416,276	7,960	0	0	0	0	19,838,288	13,328,188	624,704
1979	20,395,402	636,280	2,073,304	86,716	1,279,818	22,425	416,276	7,960	0	0	0	0	24,734,354	18,662,254	640,261
1980	21,602,374	606,694	2,397,144	97,120	1,233,240	24,297	494,251	7,871	0	0	0	0	26,985,188	21,633,090	640,261
1981	19,610,804	586,573	2,013,072	72,311	1,382,000	28,073	658,000	8,314	0	0	0	0	24,090,424	19,417,324	640,261
1982	22,052,376	638,967	2,783,196	78,299	1,475,159	28,337	740,227	7,870	0	0	0	0	27,812,876	22,519,833	665,076
1983	22,052,376	638,967	2,783,196	78,299	1,475,159	28,337	740,227	7,870	0	0	0	0	27,812,876	22,519,833	665,076
1984	21,991,834	621,218	3,179,535	85,654	1,545,720	30,691	893,402	8,680	0	0	0	0	27,006,201	22,654,101	745,021
1985	25,324,852	813,056	3,116,556	80,358	1,166,556	31,200	967,471	8,374	0	0	0	0	27,533,810	22,481,510	734,879
1986	25,041,008	813,810	3,218,414	81,807	1,075,143	24,350	576,033	6,384	0	0	0	0	27,006,201	22,654,101	745,021
1987	22,041,008	813,810	3,218,414	81,807	1,075,143	24,350	576,033	6,384	0	0	0	0	27,006,201	22,654,101	745,021
1988	21,223,202	803,875	2,858,441	77,101	1,140,810	24,350	576,033	6,384	0	0	0	0	27,006,201	22,654,101	745,021
1989	18,202,024	551,811	2,943,401	73,516	1,230,357	20,808	453,460	7,286	0	0	0	0	21,010,170	21,059,628	730,523
1990	15,246,718	470,890	3,049,072	75,352	1,381,813	20,808	453,460	7,286	0	0	0	0	25,620,552	20,968,452	713,738
1991	14,251,955	429,190	3,325,132	80,305	1,551,852	20,704	647,091	8,362	0	0	0	0	20,452,119	16,108,050	681,727
1992	13,334,335	403,300	3,013,793	78,487	1,527,220	20,854	600,946	8,254	0	0	0	0	19,831,025	14,776,825	541,310
1993	14,620,438	483,999	3,317,600	80,461	1,507,023	20,854	594,946	8,254	0	0	0	0	16,680,458	13,534,354	521,310
1994	17,220,702	504,264	2,835,277	70,486	1,391,103	20,854	578,320	8,254	0	0	0	0	24,000,871	18,056,571	604,838
1995	21,392,390	560,150	3,265,793	70,310	1,491,480	20,854	594,946	8,254	0	0	0	0	21,192,620	17,100,820	619,858
1996	20,407,890	582,091	3,249,287	70,159	1,197,296	21,184	601,723	8,508	0	0	0	0	20,848,529	21,796,429	619,858
1997	21,595,054	582,707	3,223,228	78,851	1,558,033	26,812	678,383	9,102	0	0	0	0	25,655,878	20,603,478	608,308
1998	21,443,940	605,287	3,309,537	78,646	1,412,077	26,168	577,827	8,186	0	0	0	0	27,177,704	22,125,904	722,442
1999	19,623,238	605,738	3,290,090	78,352	1,600,963	27,988	599,147	8,186	0	0	0	0	26,830,739	21,187,639	694,007
2000	17,965,852	532,868	2,816,393	72,303	1,334,015	26,563	544,265	8,102	0	0	0	0	24,720,820	16,677,820	607,528
2001	13,773,841	496,098	2,631,819	67,819	828,816	20,891	293,181	6,529	0	0	0	0	22,874,598	17,822,498	641,158
2002	11,466,774	352,778	2,006,058	67,223	710,076	17,065	111,208	6,259	0	0	0	0	17,039,312	12,567,212	532,921
2003	0,663,816	278,348	2,742,843	65,248	961,373	20,353	491,453	7,778	0	0	0	0	13,015,340	7,963,240	375,898
2004	0,663,816	278,348	2,742,843	65,248	961,373	20,353	491,453	7,778	0	0	0	0	13,015,340	7,963,240	375,898

- Notes:
- (1) Lake Powell statistics: Dead storage 1,863,000 af at elevation 3378; Live storage capacity 24,322,000 af between elevations 3370 and 3700; Active storage capacity 20,325,000 af between elevations 3490 and 3700. Storage began March 1963.
  - (2) Flaming Gorge Reservoir statistics: Dead storage 38,700 af at elevation 8740; Live storage capacity 3,749,500 af between elevations 8740 and 9040; Active storage capacity 3,516,000 af between elevations 8740 and 9040. Storage began November 1962.
  - (3) Navajo Reservoir statistics: Dead storage 12,000 af at elevation 5775; Live storage capacity 1,701,300 af between elevations 5775 and 6085; Active storage capacity 1,039,500 af between elevations 5900 and 6085. Storage began June 1962.
  - (4) Alton Reservoir statistics: Dead storage 9,000 af at elevation 6870; Live storage capacity 17,000 af between elevations 6870 and 6755; Active storage capacity 13,000 af between elevations 6700 and 6755. Storage began January 1968.
  - (5) Blue Mesa Reservoir - Dead storage 111,200 af at elevation 7358; Live storage capacity 820,600 af between elevations 7358 and 7518; Active storage capacity 748,800 af between elevations 7300 and 7518. Storage began October 1965. End-of-year 1965 total storage for Blue Mesa Reservoir was 85,240 af (0 live storage).
  - (6) Morrow Point Reservoir - Dead storage 105 af at elevation 6808; Live storage capacity 117,000 af between elevations 6808 and 7180; Active storage capacity 47,000 af between elevations 7100 and 7180. Storage began January 1968.
  - (7) Crystal Reservoir - Dead storage 9,000 af at elevation 6870; Live storage capacity 17,000 af between elevations 6870 and 6755; Active storage capacity 13,000 af between elevations 6700 and 6755. Storage began 1977.
  - (8) Total CRISP Live storage capacity is 30,750,400 af, and total CRISP Active storage capacity is 25,044,300 af. The total CRISP inactive storage capacity is 5,652,100 af. Evaporation amounts were computed using the method and coefficients described in Historical Inflows, Colorado River Storage Project, Bureau of Reclamation (Tom Ryan), October 1993.
  - (9) The following evaporation amounts are estimated from calculated evaporation for other years and relative total storage amount: Lake Powell for 1962-63, Flaming Gorge Reservoir for 1962-63, Navajo Reservoir for 1962, Blue Mesa Reservoir for 1965-66, Morrow Point Reservoir for 1968-70, and Crystal Reservoir for 1977-78. These evaporation amounts for Flaming Gorge, Navajo and Blue Mesa Reservoirs also were included for when storage began. Crystal Reservoir evaporation for 1978-2004 was estimated based on the evaporation amounts at Morrow Point Reservoir and the ratio of the surface area of Crystal Reservoir to the surface area of Morrow Point Reservoir at full capacity.
  - (10) CRISP shared evaporation includes lake evaporation for Lake Powell, Flaming Gorge Reservoir and the Aspinall Unit Reservoirs, and is shared between the Upper Division States in proportion to their Upper Colorado River Basin Compact Article III(b) apportionments. Lake evaporation for Navajo Reservoir is accounted separately.

**APPENDIX D**

**New Mexico Depletion Schedule**

**STATE OF NEW MEXICO SCHEDULE OF ANTICIPATED UPPER BASIN DEPLETIONS**  
(Units: 1000 acre-feet per year)

	2000	2010	2020	2030	2040	2050	2060
<b>IRRIGATION USES (1)</b>							
Navajo Nation Irrigation:							
Navajo Indian Irrigation Project	150.0	215.0	250.0	270.0	270.0	270.0	270.0
Fruitland-Cambridge Irrigation Project	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Hogback-Cudei Irrigation Project	15.5	15.5	21.3	21.3	21.3	21.3	21.3
Chaco River drainage irrigation	3.1	3.1	3.1	3.1	3.1	3.1	3.1
Crystal area irrigation	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Navajo Nation Irrigation Subtotal	176.9	241.9	282.7	302.7	302.7	302.7	302.7
Non-Navajo Irrigation:							
Above Navajo Dam (including Jicarilla)	1.9	1.9	1.9	1.9	1.9	1.9	1.9
Upper San Juan (excluding Hammond)	10.3	10.3	10.3	10.3	10.3	10.3	10.3
Hammond Irrigation Project	12.1	12.1	12.1	12.1	12.1	12.1	12.1
Animas River ditches	40.7	40.7	40.7	40.7	40.7	40.7	40.7
La Plata River ditches	5.9	5.9	5.9	5.9	5.9	5.9	5.9
Farmers Mutual Ditch	11.2	11.2	11.2	11.2	11.2	11.2	11.2
Jewett Valley Ditch	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Chaco River drainage irrigation	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Non-Navajo Irrigation Subtotal	86.5	86.5	86.5	86.5	86.5	86.5	86.5
Irrigation Total	263.4	328.4	369.2	389.2	389.2	389.2	389.2
<b>STOCKPOND EVAPORATION AND STOCK USE</b>							
	4.0	4.0	4.0	4.0	4.0	4.0	4.0
<b>MUNICIPAL AND DOMESTIC USES (1)</b>							
Current Municipal and Industrial Uses	9.7	9.7	9.7	9.7	9.7	9.7	9.7
Animas-La Plata Project:							
San Juan Water Commission	1.0	5.0	10.4	10.4	10.4	10.4	10.4
Navajo Nation	0.0	1.0	2.0	2.3	2.3	2.3	2.3
La Plata Conservancy District	0.0	0.0	0.8	0.8	0.8	0.8	0.8
Ridges Basin Reservoir Evaporation - NM share	0.0	0.0	0.1	0.1	0.1	0.1	0.1
Animas-La Plata Project Subtotal	1.0	6.0	13.3	13.6	13.6	13.6	13.6
Navajo-Gallup Water Supply Project: (2)							
Navajo Nation	0.0	0.0	7.9	10.2	12.5	12.5	12.5
Jicarilla Apache Nation	0.0	0.0	0.8	1.0	1.2	1.2	1.2
Navajo-Gallup Project Subtotal (within Basin)	0.0	0.0	8.7	11.2	13.7	13.7	13.7
Navajo Nation Municipal Use, Future (exc. NGWSP)	0.0	0.0	1.0	1.0	2.0	2.0	2.0
Jicarilla Apache Nation Municipal Use (exc. NGWSP)	0.0	0.0	0.0	0.4	0.6	0.6	0.6
Scattered Rural Domestic (including Jicarilla)	1.0	1.0	1.0	1.1	1.1	1.2	1.2
Municipal and Domestic Total	11.7	16.7	33.7	37.0	40.7	40.8	40.8
<b>POWER AND INDUSTRIAL USES</b>							
PNM - Navajo Reservoir contract (3)	15.2	15.2	16.2	16.2	16.2	16.2	16.2
BHP Billiton	37.0	37.0	38.0	39.0	39.0	39.0	39.0
Bloomfield Industrial	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Navajo Nation - Shiprock	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Navajo-Gallup Water Supply Project - NAPI (2)	0.0	0.0	0.7	0.7	0.7	0.7	0.7
Small Navajo Reservoir Contracts	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Power and Industrial Total	56.1	56.1	57.8	58.8	58.8	58.8	58.8
<b>EXPORTS</b>							
San Juan-Chama Project	105.2	105.2	105.2	105.2	105.2	105.2	105.2
Navajo-Gallup Water Supply Project: (2)							
Navajo Nation in New Mexico	0.0	0.0	4.0	5.8	7.6	7.6	7.6
City of Gallup	0.0	0.0	4.7	6.1	7.5	7.5	7.5
Navajo-Gallup Project Subtotal (Export)	0.0	0.0	8.7	11.9	15.1	15.1	15.1
Export Total	105.2	105.2	113.9	117.1	120.3	120.3	120.3
<b>RESERVOIR EVAPORATION</b>							
Navajo Reservoir Evaporation	28.3	28.0	27.7	27.7	27.7	27.7	27.7
Small Reservoir Evaporation	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Reservoir Evaporation Total	29.5	29.2	28.9	28.9	28.9	28.9	28.9
<b>TOTAL DEPLETIONS (4)</b>							
State Share of Upper Basin Yield (5)	469.9	539.6	607.5	635.0	641.9	642.0	642.0
Remaining Available (5,6)	642.4	642.4	642.4	642.4	642.4	642.4	642.4
Percent of State Share Remaining	172.5%	102.8%	34.9%	7.4%	0.5%	0.4%	0.4%
	28.9%	16.0%	5.4%	1.2%	0.1%	0.1%	0.1%

**NOTES:**

- (1) Does not reflect post-1965 transfers from irrigation to municipal and industrial uses.  
(2) Proposed Navajo-Gallup Water Supply Project depletions in New Mexico total 29,500 acre-feet per year. Exports to Gallup are anticipated to be supplied through a subcontract with the Jicarilla Apache Nation. Exports for Navajo Nation uses in Arizona are not included.  
(3) Supplied through a subcontract with the Jicarilla Apache Nation.  
(4) This is a schedule of anticipated depletions for planning purposes only. It is not a tabulation or determination of water rights or actual uses. Total depletions exclude New Mexico's share of reservoir evaporation from the major reservoirs constructed under the Colorado River Storage Project (CRSP) Act that are used principally to regulate compact deliveries at Lee Ferry and generate CRSP hydroelectric power. These include Lake Powell, Flaming Gorge Reservoir and the Aspinall Unit.  
(5) This depletion schedule does not attempt to interpret the Colorado River Compact, the Upper Colorado River Basin Compact, or any other element of the "Law of the River." This schedule should not be construed as an acceptance of any assumption that limits the Upper Colorado River Basin's depletion or New Mexico's depletion. Of the water available to the Upper Basin at Lee Ferry, the allocation for use by New Mexico is listed in this schedule, for planning purposes, as 642,400 acre-feet. This amount does not include New Mexico's share of CRSP reservoir evaporation other than Navajo Reservoir evaporation.  
(6) Reserved.

**APPENDIX E**

**Upper Colorado River Commission  
Resolution**

RESOLUTION OF THE  
UPPER COLORADO RIVER COMMISSION

Regarding the Availability of Water from Navajo Reservoir for Navajo Nation Uses  
within the State of New Mexico

WHEREAS, the State of New Mexico has proposed the Navajo-Gallup Water Supply Project to provide a needed renewable water supply from the San Juan River for municipal and domestic uses for Indian and non-Indian communities located within New Mexico in both the Upper Basin and the Lower Basin; and

WHEREAS, the State of New Mexico and the Navajo Nation on April 19, 2005, executed the San Juan River Basin in New Mexico Navajo Nation Water Rights Settlement Agreement (the "Settlement Agreement"), which is conditioned upon, among other things, the implementation of the Navajo Nation components of the Navajo-Gallup Water Supply Project within New Mexico; and

WHEREAS, the source of water supply for the proposed Navajo-Gallup Water Supply Project would be Navajo Reservoir and the San Juan River in New Mexico; and

WHEREAS, water from Navajo Reservoir and the San Juan River would be delivered to the proposed Navajo-Gallup Water Supply Project to meet the water demands of Navajo Nation communities in New Mexico through a proposed Settlement Contract between the United States, acting through the Secretary of the Interior, and the Navajo Nation (Appendix 4 to the Settlement Agreement); and

WHEREAS, Public Law 87-483 at section 11(a) requires that no new long-term contracts "... shall be entered into for the delivery of water stored in Navajo Reservoir or any other waters of the San Juan River and its tributaries, as aforesaid, until the Secretary has determined by hydrologic investigations that sufficient water to fulfill said contract is reasonably likely to be available for use in the State of New Mexico during the term thereof under the allocations made in articles III and XIV of the Upper Colorado River Basin compact, and has submitted such determination to the Congress of the United States and the Congress has approved such contracts"; and

WHEREAS, pursuant to Public Law 87-483, and in furtherance of the Jicarilla Apache Tribe Water Rights Settlement Act of 1992 and the Navajo Reservoir water supply contract approved by said Act, the Secretary of the Interior on February 2, 1989, approved the report on "Hydrologic Determination, 1988, Water Availability from Navajo Reservoir and the Upper Colorado River Basin for Use in New Mexico" (the "1988 Hydrologic Determination"); and



WHEREAS, the 1988 Hydrologic Determination evaluated the availability of water from the Navajo Reservoir supply for uses in New Mexico through the 2040 planning horizon; and

WHEREAS, an update and extension to the 1988 Hydrologic Determination is needed to evaluate the availability of water from the Navajo Reservoir supply through a 2060 planning horizon under the allocation of water made to the State of New Mexico by the Upper Colorado River Basin Compact for the purpose of furthering Congressional legislative approval of the Settlement Agreement, the authorization of the proposed Navajo-Gallup Water Supply Project, and the legislative approval of the proposed Settlement Contract for the Navajo Nation's project uses in New Mexico; and

WHEREAS, the proposed Settlement Contract between the United States and the Navajo Nation would provide water supplies for Navajo Nation uses in New Mexico under both the Navajo-Gallup Water Supply Project and the Navajo Indian Irrigation Project which was authorized by Public Law 87-483, and would supersede the existing Navajo Reservoir water supply contract for the Navajo Indian Irrigation Project; and

WHEREAS, the US Bureau of Reclamation has presented to the Upper Colorado River Commission for its consideration a draft hydrologic determination, dated May 2006, that evaluates the availability of water from the Navajo Reservoir supply through 2060 and shows: (1) at least 5.76 million acre-feet of water is reasonably available annually for use by the Upper Basin, exclusive of reservoir evaporation at Lake Powell, Flaming Gorge Reservoir and the Aspinall Unit reservoirs of the Colorado River Storage Project; and (2) sufficient water is reasonably likely to be available from the Navajo Reservoir supply to fulfill the proposed Settlement Contract for the Navajo Nation's uses in New Mexico under the Navajo-Gallup Water Supply Project and the Navajo Indian Irrigation Project, in addition to existing Navajo Reservoir water supply contracts for other uses, under the allocations made to New Mexico in Articles III and XIV of the Upper Colorado River Basin Compact; and

WHEREAS, the Settlement Agreement would provide at subparagraph 9.3.1: "The Navajo Nation and the United States agree that the State of New Mexico may administer in priority water rights in the San Juan River Basin in New Mexico, including rights of the Navajo Nation, as may be necessary for New Mexico to comply with its obligations under interstate compacts and other applicable law"; and

WHEREAS, the Upper Colorado River Commission supports water resource development in the Upper Colorado River Basin to enable the Upper Division States to fully develop their compact apportionments of Colorado River water while meeting compact obligations relating to the flow of the Colorado River at Lee Ferry; and

WHEREAS, it is the position of the Upper Colorado River Commission and the Upper Division States that, with the delivery at Lee Ferry of 75 million acre-feet of water in each period of ten consecutive years, the water supply available in the Colorado River

System below Lee Ferry is sufficient to meet the apportionments to the Lower Basin provided for in Articles III (a) and III (b) of the Colorado River Compact; and

WHEREAS, it is the position of the Upper Colorado River Commission and the Upper Division States that the obligation of the Upper Basin under Article III(c) of the Colorado River Compact to deliver water toward the Mexican Treaty obligation does not require the delivery at Lee Ferry of 0.75 million acre-feet of water annually; and

WHEREAS, the Upper Colorado River Commission anticipates that the Upper Division States will take all actions necessary to ensure that all Upper Basin States have access to their respective apportionments as specified in the Upper Colorado River Basin Compact; and

WHEREAS, the Upper Colorado River Commission on June 19, 2003, resolved that: (1) "the States of Colorado, New Mexico, Utah and Wyoming, support and to the extent necessary consent to the diversion of water from the Upper Basin for use in the Lower Basin solely within New Mexico via the proposed Navajo-Gallup Water Supply Project; provided, that any water so diverted by said project to the Lower Basin portion of New Mexico, being a depletion of water at Lee Ferry, shall be a part of the consumptive use apportionment made to the State of New Mexico by Article III (a) of the Upper Colorado River Compact;" and (2) "the Upper Colorado River Commission supports such Congressional action as may be necessary to authorize the Navajo-Gallup Water Supply Project."

NOW, THEREFORE, BE IT RESOLVED by the Upper Colorado River Commission, that the Commission supports Congressional action to: (1) approve the Settlement Agreement; (2) authorize the proposed Navajo-Gallup Water Supply Project; and (3) approve the proposed Settlement Contract for the Navajo Nation's uses in New Mexico from the Navajo Reservoir supply under the Navajo-Gallup Water Supply Project and the Navajo Indian Irrigation Project.

BE IT FURTHER RESOLVED, that while the Upper Colorado River Commission does not endorse all of the study assumptions used by the Bureau of Reclamation in its May 2006 draft hydrologic determination, including an assumption of a 6 percent allowable overall shortage, and specifically disagrees with the modeling assumption of a minimum Upper Basin delivery of 8.25 million acre-feet annually at Lee Ferry, the Commission supports a determination by the Secretary of the Interior that at least 5.76 million acre-feet of water is available annually for use by the Upper Basin, exclusive of reservoir evaporation at Lake Powell, Flaming Gorge Reservoir and the Aspinall Unit reservoirs of the Colorado River Storage Project.

BE IT FURTHER RESOLVED, that the Upper Colorado River Commission supports a determination by the Secretary of the Interior that sufficient water is reasonably likely to be available to fulfill the proposed Settlement Contract for the Navajo Nation's uses in New Mexico from the Navajo Reservoir supply under the Navajo-Gallup Water Supply Project and the Navajo Indian Irrigation Project, in addition

to existing Navajo Reservoir water supply contracts for other uses, under the allocations made to New Mexico in Articles III and XIV of the Upper Colorado River Basin Compact.


BE IT FURTHER RESOLVED, that nothing in this Resolution, or resulting from the adoption of this Resolution, shall limit the right or ability of any Upper Basin State to develop the full apportionment made to it under the Colorado River Compact and the Upper Colorado River Basin Compact.

BE IT FURTHER RESOLVED, that a copy of this resolution be transmitted to the Regional Director, Upper Colorado Region, Bureau of Reclamation, Salt Lake City, Utah.

#### CERTIFICATE

I, Don A. Ostler, Executive Director and Secretary of the Upper Colorado River Commission, do hereby certify that the Upper Colorado River Commission adopted the above Resolution at its regular meeting held in Jackson Hole, Wyoming, on June 5, 2006.

WITNESS my hand this 9th day of June 2006.



DON A. OSTLER  
Executive Director and Secretary