### Questions

1. **How to deal with “projected” Mead elevation/storage (calculate or input)? If calculated, should mead and demands below be modeled explicitly from the beginning (i.e. start with the expanded 24 month study)?**

Rick: My guess is that the expanded 24-month study model should be the source for the demands for the mid-term model and that these demands would be static for all traces. If the mid-term model runs out beyond the 24-month study then averages should be used and LC would provide those inputs.

Cameron: In that case, the Powell rules should be built directly on the Expanded 24-Month study. This will give us access to a Mead object directly instead of a data object.

1. **In Equalization, if both targets allow for > 8.23, is releasing more or less preferred?**

Rick: In Equalization, we release the minimum annual volume that will satisfy Equalization. I am not sure what you mean by both targets because under Equalization, there is only one Equalization objective that will control in any given Equalization year (i.e Powell elevation 20 feet below Eq level at EOWY, Mead elevation at 1105 at EOWY, Powell elevation at Eq level at EOWY, Powell and Mead having equal storage at EOWY.)

Cameron: I am referring to the first two conditions to check, Powell EDWY Elevation at Eq level or equalize storage. If, for example, both conditions resolved to a release that was greater than 8.23 and Mead was not less than 1105.

1. **Confirm OND release, Does an 8.23 year mean steady releases every month?**

Rick: No when 8.23 maf is projected for release the monthly volume patterning is roughly as follows:

Oct 476 kaf (????) Steady

Nov 700 kaf

Dec 800 kaf

Jan 800 kaf

Feb 600 kaf

Mar 600 kaf

Apr 600 kaf

May 600 kaf

Jun 800 kaf

Jul 900 kaf

Aug 862 kaf

Sep 492 kaf (Steady)

**TOT 8,230 kaf**

The steady flow experiment (for 3 more years and possibly more) targets 8000 cfs steady in September if 8.23 maf or 9.0 maf is released. If more than 9.0 maf released then target a higher steady flow in 2000 cfs increments (10 maf = 10,000 cfs, 11 maf = 12,000 cfs, 12 maf = 16,000 cfs, 13 maf = 18,000 cfs, 14 maf = 22,000 cfs, above 15 maf = 25, 000 cfs. So the previous year to an 8.23 maf year can impact this monthly volume patterning. If previous year was 11 maf then October volume would be 738 kaf (for 12,000 cfs to match Sep) and NOT be 476 kaf as above. This would require reductions in June, July and August to get back to 8.23 maf and the pattern would look somewhat different.

Oct 738 kaf (????) Steady

Nov 700 kaf

Dec 800 kaf

Jan 800 kaf

Feb 600 kaf

Mar 600 kaf

Apr 600 kaf

May 600 kaf

Jun 600 kaf

Jul 870 kaf

Aug 830 kaf

Sep 492 kaf (Steady)

**TOT 8,230 kaf**

After steady flow experiment completed, September and October volumes would be 650 and 600 kaf respectively with adjustments made in June, July and August to achieve 8230 kaf for the annual release . Should attempt to maintain 800 kaf in July and August and atleast 600 kaf in Jun.

Cameron: In summary, If we are in a steady flow experiment year, then September and October releases are both steady. In this case release 8000 cfs unless > 9 MAF is required then release according to the steady release table.

In an non steady flow year then always release 650 and 600 for September and October respectively. (YES)

Is there a specific way the reductions are determined in June, July and August?

Lower july and august to 800, them move to june to 800 then move to 600, then move to april below 600 to 500 then move may to 500.

1. **Discuss/Explain OND release especially Upper Elevation Balancing Equalization > 8.23?**

Rick: It should be assumed that the minimum release in October is 492 kaf during steady flow experiment years and 600 kaf in non steady flow experiment years. The minimum release in November is 700 kaf and the minimum release in December is 800 kaf. If in Upper Elevation Balancing and no projection of Equalization then these are the volumes to be release during OND. If probability of EQ is high (i.e. 30% or greater) and projected EQ annual volume is greater than 10.0 maf then November and December volumes should be increased to 800 kaf and 900 kaf respectively. If the projected EQ annual volume is greater than 10.5 maf then November and December volumes should be increased to 800 kaf and 950 kaf respectively.

There is a great deal of uncertainty during these months, with regard to whether Equalization will be triggered in April or not. If EQ is not triggered then the difference between the minimum volumes and the actual volumes would have to be paid back by lowering post April volumes in order to get back to 8.23 maf. Typically this would involve lowering July to 800 kaf, Aug to 800 kaf and then lowering Jun to 600 kaf. If additional reductions are necessary then we start in April reducing below 600 kaf to 500 kaf then May if necessary from 600 kaf to 500 kaf. This should be enough space to get back to 8.23 maf. If not then we released too much water in OND and over committed to the uncertain EQ trigger in April.

Cameron: Does the OND release get reevaluated each month as the forecast of equalization gets updated?

No. Anticipate equalization, and get prepared. Anticipatory equalization volume. Reevaluate in February

1. **How is total release for WY projected in Lower Balancing Tier?**

Rick: If the lower Balancing Tier has been selected for the water year based on the August AOP determination from the previous year then balancing releases should be made within the range from 7.0 to 9.5 maf. So the annual release volume would be the volume that gets Lake Powell and Lake Mead storage to a state of equality at the EOWY.

If Powell storage is sufficiently higher than Mead storage and 9.5 maf of release from Lake Powell will not balance the storage contents of Powell and Mead at EOWY then the annual release volume will be set to 9.5 maf (no higher).

If Mead storage is sufficiently higher than Powell storage and 7.0 maf of release from Lake Powell will not balance the storage contents of Powell and Mead at EOWY then the annual release volume will be set to 7.0 maf (no lower).

Cameron: How would the monthly volumes be distibuted? (This question also applies to Mid-Elevation 7.48 years)

Rick: See the Table of monthly distributions

1. **How to deal with projected Powell elevation/storage? Discuss how this is done in CRSS currently.**

Rick: Not sure how this happens in CRSS. Ask Katrina about that. As far as projected Powell elevation/storage in the 24-month study, we used the projected Powell elevation/storage for December 31st from the August run of the 24-month study (MOST PROBABLE INFLOW SCENARIO) to set the operating tier for the upcoming water year. This sets the operational path for the water year (i.e. Lower Elevation Balancing, Mid-Elevation Release, Upper Elevation Balancing or Equalization). For 3 of the 4 tiers the objectives are clear for the water year. But for Upper Elevation Balancing, there is an opportunity for Equalization, 8.23 maf or Balancing between 8.23 and 9.0 maf to become the objective after April. This is the most complicated operational tier due to the uncertainty of which of these 3 opportunities will become the objective for the water year based on conditions in April and what the April 24-month study will project for the EOWY in terms of projected Powell and Mead elevation/storage.

During other months of the water year, the objective for the chosen tier is used to set the remaining projected volume to be released from GCD to achieve the objective

Cameron: This logic seems circular to me, The 24 month study determines the projected elevation which determines the operating tier, but what determines the operations that are put into the 24-month study?

Rick: Assume 8.23 to set release.