

## Glen Canyon Dam Maintenance & TCD Schedule.

### Questions/Answers:

Force: There is a concern that if we can't attain fall high flows, could the maintenance schedule be adjusted?

Rice: I think if we knew you were looking at something in September or January, we would go back and take a look at the maintenance schedule and see how everything fits in and determine whether they could move the contract and/or construction time frame around. There may be some flexibility in that area but the bottom line is that we have to take the unit down in that calendar year to do a generator rewind and to do the runner replacement. The time frame may be a little flexible.

Force: If we are looking at a high flow in September/October, what would you do where you've got a high flow (45,000 cfs) out there in the fall of 04?

Rice: A 45,000 flow would take all eight generators and the bypass. We would have to see if all eight generators were available at the time frame and then have to review the schedule again and see if adjustments could be made. When you get into the 4-6-8 month outages, it's going to be a little more difficult. The sooner we receive the information, the sooner we can adjust the maintenance schedule but it also impacts how we issue the schedule to the contractors and have the contractors come in and do the work.

Melis: We're looking at a high flow component of our current experiment in January 2005 and it looks like you have a major outage on unit 4 around January 1. If we do get the sediment inputs from the Paria River this summer and fall, and you're notified that we would like to have 45,000 cfs released for 60 hours during the first week in January, do you have enough latitude in there to start that contract a week or two late?

Rice: The only way that would happen is that if we get that information before we award the contract and until we bring the contractor on site. I would say we're looking at the next two months of getting the contract on the rewind and we'd have to have that within the next 2-3 months before we make an obligation.

Melis: This is probably a question for Randy Peterson. We have a current experiment that has a contingency for high flows and we know what happened in the first week of January of 05, even though we can't possibly know if we're going to get the inputs or not next summer and fall, can we give Ken and the folks at the Dam that information so they start that contract 10 days later just in case?

Peterson: The thing I noticed about this was those penstock rewinds take a long time and are purposely structured to keep the summer months free so that all the units are available. Since we're in low release conditions for the foreseeable future, 5-6 years, the conversation I had with Ken this morning maybe we should be thinking that we don't need all those units during the summer. We'll never use all eight units to make releases and releases tend to be low, at least an average of 15,000 cfs in summer. That being the case, maybe we can think of the repair work as shifting that open window for the January period or the October-January period for the next foreseeable future, 7-8-9 years.

Rice: It's not a matter of shifting that 10 days, you have to understand we start in September. Our guys will take about 2-4 weeks to put that on the ground and the contractor comes in so it's

a matter of shifting that whole schedule from September to mid-January and starting it then. It's a matter of shifting several months, not just a series of days here.

Peterson: The question to this group then is: In your experimental long-term design, when do you see that 3-month period during the year needing to be to have all eight units available? Either to have maximum powerplant release or some high flow test above powerplant which will require all eight units. Once the reservoir fills and we have water on the gates, then we could use 6 or 7 units plus the two, plus part of the spillway to make the 45,000 cfs release. That's okay but now the problem is we have 60 feet to go until we get to the gates.

Kubly: If the TCD is an external frame, to what extent do you see there being conflict in the construction of the TCD and the maintenance you have to do?

Rice: The powerplant is designed in a certain way and the buss is split for system stability. You have two different busses. You have a 230 buss and a 345 KB, different transmission systems and the way we bring power to all the generators is a little different. What we're asking is that once we get in there and decide to put the TCD on, we want to be involved as far as what units we think would be the best to put it on, whether to go 2, 4, 6, or 8. We think there are more reliability in some situations. On the 230 buss right now which is basically unit 7 and 8 which seems to be our most unstable buss if we could have one, if you put the TCD on 7 and 8 and those units are always the ones that are crashing because of system disturbances, then your TCD is always going to be shutting down. It's not going to be reliable. If you put the TCD on units that are scheduled for 9 months of outage, the TCD can't be fired up. There is just no way you can do that.

Peterson: If through the EA science process we can figure out what units make the most sense to sculpt the TCD on as a pilot project, can you alter the order of your maintenance schedule to tie in with the timing with the TCD or are you locked into number 4, 7, and 8 and then 3, etc.

Rice: The two units we are definitely concerned with, which I don't think the TCD is going to impact just because of the EA process and everything else we have to go through, are units 4 and 7. Units 4 and 7 according to our Denver Office are at a point of failure on those. If those fail, that means we're going to have additional down time because then you have core damage and you have to go in and unstuck the core. Those two are definitely going to go first. After that what we've done is monitor the cavitation and all the damage we have going on in the turbine runner right now. We have some things we would like to do first, 5 might be more important to us than 3 but I think there is some flexibility as far as the turbine runners but there is no flexibility in our minds on 4 and 7 which are going to take place over the next two years.

Davis: Do you have a feel for how your long-term maintenance schedule might change with the implementation of 8 TCD units? If you have TCDs on all the units, what would be your maintenance forecasted schedule? Would it change? Would you see any additional or more maintenance problems with the TCD than without the TCD?

Rice: There was some work done by the Denver Office and there is without a doubt a TCD on there is going to have more maintenance costs, more need for maintenance manpower, things like that to do that. Each TCD is a little different but the experience has been that most places which operate those have had pretty good luck and they haven't impacted their maintenance too much.

Davis: Where I was going was with the generator. There is warmer water on your generators and all your rewinds and everything else within the existing system, not the maintenance associated with the TCD itself.

Rice: I don't think that's going to change because this is a process we've probably used for 10 years at Glen Canyon. The only thing that may change on that is that there is some major maintenance associated with the generator and we have a TCD there. What we'll do is just try to tie it all in at the same time frame. You'll see this same process go on for a series of years. I don't think it will change our maintenance planning processes at all.

Davis: Not the process so much. Let's say you have a 40 year time for rewind, would it now become 35 years because of the TCD?

Rice: To the best of our knowledge with the research that is out there, the answer would be no. The TCD will not impact that.

Q: I sense the TCD warms the cooling water, what aspects of the generator then are impacted by warmer cooling water, bearings, etc.?

Rice: Bearings and transformer temp would be the big ones on those. Currently we in the power side of the house have gone back to Dennis and Denver and asked those same questions. The only real concern we have right now is we don't believe the bearings are going to be impacted. The only thing we are concerned with are the generator transformers and the cooling associated with those transformers and there has been some talk about modifying the whole cooling water system to have the ability to pull off some penstocks that are not tied into the TCD. So let's say we go fewer than 8, maybe 4, then we may re-arrange our cooling water system to tie the cooling water system off those 4 we do not have TCDs. That is all being looked at.

Ken said he wanted to remind the TWG that they can push generator maintenance out but to keep in mind that if they want 30,000 cfs out of the powerplant and 15,000 out of the bypass tubes, there has to be some level of maintenance done on them. They can't be run to failure because per unit would lose 3,500 to 4,000 cfs. They feel it is imperative to continue with the maintenance, try to tie in the schedule with the TCD, and then consider any flow regimes the TWG is considering.