Revised 11/4/04

Minutes
Hydrogeneration Optimization Team – Corps of Engineers/BPA
The Dalles Dam
October 28, 2004

Attendees:

Scott Bennett	COE-CHJ	509-686-2254
Gabrielle Foulkes	BPA	503-230-4217
Allen Lewey	COE-HDC-AT	503-808-5160
Ed Miska	COE-HDC	503-808-4294
Tom Murphy, **co-chair**	BPA	503-230-5527
Gerald Sauve	COE-NWW	509-527-7117
Jeff Sedgwick	COE-NWW	509-527-7250
Lee Sheldon	COE-HDC	503-808-4298
David Smith	COE-BON	541-374-4567
Wayne Todd	COE-HDC	503-808-4278
Robert van der Borg, **co-chair**	COE-NWP	503-808-4331

Introductions and agenda ***(Exhibit 1)***
Tom Murphy led the introductions and reviewed the agenda.

Review of action items ***(Exhibit 2, updated)***
The action items were reviewed at this meeting, and an updated copy is attached. Tom commented that the system has documented over 80 aMW of additional generation due to machine adjustments, head sensing, and new index testing.

Tom noted that the NRTO computer program will help analyze benefits and document improvements. However, members of the team noted the accuracy of the calculations will suffer because it is not yet possible to measure flows, and therefore it is necessary to rely on flow tables.

Flow sensors
There was some discussion about whether additional flow meters should be installed at Chief Joe, beyond the ones currently on units 11 and 15. The equipment is installed and ready for testing at LWG.

Follow-up actions:
- Bob van der Borg needs cost information from the LWG flow sensor installation to prepare a cost estimate for flow sensors at BON. He will start preparing contract documents assuming that acoustic flow meters will be installed at BON.
- Scott Bennett will gather flow sensor installation costs for CHJ and explore options for the next meeting.

Discussion of HOT charter ***(Exhibit 3)***

The team discussed the future and direction of the HOT - specifically how long will this group be needed and what will be its main functions. The team reached consensus that there is much work left to do and confirmed that the HOT is critical to successful completion of this remaining work. Specifically, type 1 and type 2 optimization still have to be implemented, in addition to equipment upgrades and improvements.

Tom Murphy explained that BPA anticipates long-term funding for optimization activities through subagreements. The Corps would like to close out the existing subagreement (it's now on the 9th amendment), and might prefer three separate subagreements for ease of management. However, they recognize that with a single subagreement, it is easier to move funds around to address need. The discussion of the subagreement was referred to administrative teams outside the HOT.

In the future, some optimization activities may require expense components as well as capital, so the charter may be expanded to include that scope. However, most of the work that will be undertaken (including expense) will be through subagreements that are approved through the capital investment program process.

Testing

Lower Granite – this project is to determine how to measure flows in a short bay. It has been funded and is on schedule, with testing scheduled for December. The tests will establish velocity profiles, using both vertical and horizontal acoustic transducers. The goal is to come up with an affordable method for determining flow at each unit so that unit-specific performance curves could be developed. The initial findings show that each turbine could be losing up to 1% of available power, which could be costing the entire FCRPS up to $25M/year.

The project hopes to permanently install 10 sets of transducers, which will be cheaper than temporary installation of scintillation frames. The scintillation review peer group concluded that scintillation undermeasures flow and is sensitive to turbulence. Scintillation works ok for relative flow indexing, but is not good for the absolute flow needed for T2, since it is unpredictable and has a large error band. Also, headgates need to be removed before scintillation frames can be installed.

Jeff Sedgwick noted that flows are affected by fish screens, so they will need to measure flows both with and without the screens. The cost is about $75k per unit, installed. At the moment it does not appear that CEA will fund the testing, even though the goal of the project is to measure flow using different methods, and eventually to codify the appropriate method for installing flow meters into national standards.

The team recommends that Ice Harbor start planning now for the installation of acoustic flow meters in the fall of 2005 (i.e., they can develop contracting specs, prepare a BCOE, and order parts), with testing scheduled for December 2006. The specs should also be prepared now for Bonneville.

Follow-up actions:

- Al Lewey will estimate typical costs for a 5 path system of acoustic transducers, and develop a schedule.
- Robert van der Borg will plan the HDC specs for acoustics testing at BON, and estimate costs.

Index test kits – Al Lewey reported that tools to maintain and calibrate index testing equipment have been ordered for LGS, LWG, and ALF.

Follow-up actions:

- A small team of Jerry Sauve, Ed Miska, Robert van der Borg, Dan Ramirez, and Tom Murphy will investigate issues of long-term maintenance of index testing equipment, and consider presenting something to the operations managers.
- Wayne Todd will provide guidance on maintenance for 3-D cams that should be included in routine O&M (e.g., testing and calibration check).

Type 1 optimization

Ed Miska indicated that he is coordinating Type 1 optimization with GDACS at the projects. The team is developing a single prototype proof of concept for MCN unit 5, with the option of developing similar consoles for the rest of the system for about $10k each. At this time, the access point is not clear – they may be able to use the GDACS signal directly rather than obtaining it separately. Eventually the Type 1 optimization will need to coordinate with the digital governors and integrate with GDACS. There was some discussion about where to put the next index test box and the license involved.

Type 2 optimization

Lee Sheldon reported on the load sharing computer optimization program. The program is being tested; the next phase would upgrade it to an operational program. Ultimately for T2 optimization to be effective, BPA will need to improve its generation projections. T2 will have its first phase working by January 2005.

PPEI

Robert van der Borg indicated that amendment #8 is signed. It includes gross head sensing in the Portland and WW districts. The 3-D cams work in WW is nearly done.

Amendment #9 will be prepared – should it be expanded to other projects such as acoustic flow sensing?

NRTO ***(Exhibit 4)***

Tom Murphy described how computers have been taken out to some of the Corps projects, and the training of operators has begun. The operators are using the program after they receive basepoints from BPA schedulers, which helps to determine when they should start and stop units. Eventually the program will include the costs of starting and stopping units to help the operators in making their decisions. It is a stand-alone optimizer that uses live data from the projects, and is not a control program.

BPA schedulers understand that they need to send accurate generation/load forecasts for this system to work properly. The information from the projects will feed back to BPA iteratively, with the feedback loop through AGC.

BPA, Reclamation, and the Corps will start analyzing the costs of operations at Chief Joe and Grand Coulee, using the NRTO.

PT/CT testing

Robert van der Borg indicated that the PTs and CTs at Bonneville have been removed and tested, and HDC is evaluating whether to buy new ones. The schedule of installation could last several years, potentially coordinated with the outages scheduled for the main unit breaker contract.

At John Day, it is not as easy to pull out the metering equipment for testing, so the question was raised as to whether it is possible to test the meters in place, but that is likely to be too expensive. It may be easier to simply replace the meters when the main unit breaker work is scheduled.

It was noted that the meters are not revenue grade, and maybe they won't need to be changed out if actual flow measurements can be obtained.

Ed Miska recommends a study to look at the flow measurement delta, which could be used to help notify operators when a unit needs maintenance.

Blade measurement sensors

Robert described a proposal to install sensors in the discharge ring at LWG or BON to measure blade angle. This effort would need to be approved by the fisheries staff at the Corps to verify that there would be limited impacts to fish. (This activity would most likely be an expense item.) Installation costs are unknown at this time.

Head sensing

Robert indicated that the district is nearly ready to award the contract. The first step will be to fabricate brackets, and installation will start late winter. The work in WW is done.

Plant head measurement ***(Exhibit 5)***

Tom Murphy reviewed the proposal described by Steve Davis of BPA on how to measure head, because of the effect on BPA dispatching for reservoir elevation control in the forebay. The 3-D cams cause constant change. Dave Smith noted that all data is available from upriver gauges.

Follow-up actions:

- Tom Murphy will check with Don Faulkner about the presence of upriver gauges at the projects.
- Tom Murphy will check into possible solutions to the problem of plant head measurement and report at next meeting.

Next Meeting

The next quarterly meeting is scheduled for January 19 at Bonneville Project.

LIST OF FOLLOW-UP ACTIONS

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