August 26, 2007

Corps Hydro-Optimization Team Meeting
Minutes
August 14, 2007
TheDalles Dam, Oregon

| Name | Organization | Telephone |
|---|---|---|
| Murphy, Tom – co chair | BPA | 503-230-5527 |
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| Robert VanderBorg – co chair | CENWP | 503-808-4331 |
| Lee Sheldon | HDC | 503-808-4298 |
| Ed Miska | HDC | 503-808-4294 |
| Travis Togo | BPA | 503-230-3094 |
| Eve James | BPA | 503-230-5558 |
| Gerry Sauve | Corps | On phone |
| Dan Ramirez | HDC | 503-808-4271 |

**Gate Blade Optimization**

Ed Miska reported on the Gate Blade Optimization "stand alone" system. The GBO uses MW, blade, gate TW and Forebay values from GDACS to collect steady-state data necessary develop individual unit performance data (type I optimization). The blades are perturbated and readings taken, and the values are used to determine the optimum gate/blade relationship for a given head. Cam curve development is done off-line, i.e. the GBO is not a self-optimizing system. Ed also showed screen shots that illustrated the operations of the GBO. The first unit (single-unit data collection) is to be implemented by the end of September at McNary. Expansion (software programming) of GBO for multi-unit data collection is FY08 activity.

**Automatic Flushing System (2 attachments)**

Dan Ramirez presented a conceptual schematic of GBO and W-K flushing system and how these interface with existing GDACS equipment (T1 concept diagram.xls). Although identified as different tasks in sub-agreement, W-K flushing system and GBO are closely inter-related as W-K flushing is controlled by the GBO. Dan reported prototype W-K flushing system was installed at McNary Unit 9 on schedule, to provide relative flow data to GBO during field testing. Additional units will be installed in FY08 to support expansion of GBO for multi-unit (4 unit demo) data collection.

Dan presented overall schedule (Type 1 Optimization (KAPLAN) Sched.mpp) addressing Type 1 Optimization elements: Winter-Kennedy flushing system (prototype & propagation), GBO (prototype & propagation), Gate-Blade Controller and Blade Angle Measurement Demonstration at John Day.

Robert Van de borg proposed having separate subagreements for Portland, Seattle, and Walla Walla for the Flushing System Program.

**Blade Angle Measurement**

Dan Ramirez reported that unit 16 at John Day is still out of service for repairs. Currently, waiting for ordered parts to come in. The measurement hardware is installed and HDC is now starting to work on data acquisition elements. Project will have the complete unit back in service by mid-December. Data acquisition programming effort currently focused on ensuring data is collected when unit first rolls. If time allows, real-time data reduction will be incorporate into data acquisition. There will be an end report prepared evaluating 1) prototype proof of concept, i.e. can direct blade angle measurements be taken on prototype scale?, and 2) is there benefit in direct measurement versus indirect (oil head rotation) measurements?

**Software Rewrite**

Dick Nelson discussed the software rewrite for Blade-Gate Controller (3D Cam) for Snake and McNary . He discussed the main purposes of the software rewrite which include: 1) to correct and improve operations for 3D cams program. 2) removal from GDACs and completed as a "stand alone" system, and 3) rewritten for a PLC platform and with eventual installation in new digital governors in mind . He mentioned that NWP had expressed reluctance to have their existing NWP version 3-D cams replaced until this new system was completed and tested on the Lower Snake.. Costs are between $80k and $120k per unit.

***Action:*** *Dick Nelson will follow-up on having an electrical engineer review and revise the Blade-Gate controller block diagram.*

**Benefits Report**

Tom Murphy reported on the Benefit report that he is preparing for general distribution. The report will cover the entire efficiencies program, and will include what's been accomplished to date, baseline information about the hydro projects, calculations and use of efficiency curves in optimization, operational changes, related benefits and details and future tasks. Tom mentioned the importance of unit and system operations and how they overlap.

Tom mentioned the project will likely require more funding and that the new capital process will impact projects costing over $3M. The benefit report should help this process

*Action: Tom will be sending the report out for review in the next 3 to 4 months as he finalizes the report.*

**TYPE 2 Optimization**

Ed Miska gave a presentation on Type 2 Optimization and design concepts that shows what the operators see on the screen for each unit and gave examples of various scenarios and how to respond. The contract with ACSI should be nearly completed by the end of the FY

Ed reported basically no major changes from the last meeting. Progress has happened and almost all commitments are complete. The contract was sent out for review and deliverables should be finalized by the end of the year. The team asked questions about deployment plans. Ed stated that the deployment schedule coincides with the ICCP. Basically, bench testing has occurred through August 27 and real testing will start 9/7/07 with ICCP deployment. Questions were raised about debugging funding and if it's included in the contract. The contract includes some on-call time designated for that purpose.

Dick Nelson asked how much more development is needed on T2? Dick wants this information for resource planning next year and whether or not a contractor needs to be hired.

*Action: Ed will work on a T2 project schedule with Tom Murphy and distribute to team.*

*Action: A meeting between HDC and BPA will be held to discuss feed forward and basepoint forecasting (Tom to coordinate).*

**Smoothing Curves/Redo Flow Tables**

Dan Ramirez reported HDC has been coordinating this effort with Eve James (BPA). Bonneville, John Day, and McNary curve/flow tables have been sent to BPA for evaluation in NRTO. HDC expects to complete Chief Joseph and Walla Walla flow tables by end of FY and will forward as completed. Travis Togo (BPA) asked questions about when Albeni falls will be done because it's needed for Columbia Vista.

*Action: Dan Ramirez will follow up on Albeni Falls curves/flow tables.*

**Index Texting for FY08 & FY09**

Dan Ramirez reported on the verification test for GBO which is under the T1 program. John Day moved to FY09 and may not need verification once the system is in place.

**3D Cam Operational Survey (1 attachment)**

Dan handed out an abbreviated 3D Cam survey report for McNary. It was noted forebay sensor failure affected gross head input to 4 units (11-14). Discussed need for redundancy in system, e.g. hardware additions to restore plant head indication or software revisions to allow for obtaining head input from different unit.

Surveys of Portland District plants were completed by HDC. Plan for surveys of Walla Walla plants needs to be developed.

Robert Van der borg asked if future charts will be developed in the Health check?

*Action: Follow-up with Walla Walla on design issues for McNary nethead (Nelson).*

**Preliminary Case Study on the Effects of Having Absolute Flow Data Run of the River Kaplan Turbines (1 attachment)**

Lee Sheldon briefed the team on absolute flow data of river Kaplan turbines. The presentation used current meter performance curves derived for The Dalles, plus economic dispatch and unit commitment scenarios to calculate benefits. A case study was included to show best and worst case unit commitments. Questions were raised about the sensitivity of head changes on the T2 optimization. Questions were also asked about constrained loading and end unit loading for fish operations and how that effected T2 optimization

*Action: Expand Absolute Flow Benefits Study to include following additional elements to (Sheldon):*

- *Kaplans: 83' head data set (from TD Units 1-14 current meter report)*
- *Kaplans: constrained case (TD Units 1-14, constrained per FPP)*
- *Francis unit benefits (using CJ 17-27)*

**Absolute Flow Presentation (1 attachment)**

Dan Ramirez presented a proposal to calibrate the W/K taps on Francis units at CJ and verify using the acoustic time of flight metering installed on 2 units (Abs Flow Disc.ppt). If valid, wide scale testing would be conducted at Chief Joseph to develop individual unit performance information for Type 2 optimization.

Applicability for Kaplan units was also discussed as methodology appears appropriate for use without screens installed. An assumption was presented that ranking of units could be developed without screens installed and deployment of screens will affect all units similarly; i.e., ranking of units remain largely unchanged when screens are deployed. By ranking Kaplan units at a given plant, bulk of benefits from Type 2 optimization can be realized.

If assumptions on Kaplan units are valid, we will look to apply on the Kaplan units on the lower river, a separate sub-agreement would be developed for wide-scale testing.

*Action: Dan Ramirez will rewrite alternative #2 in the Absolute Flow presentation to include cost changes*

*Action: Ken Earlywine tasked with setting up working group meeting for absolute flow plan of action. Team to include: Tom Murphy, Rod Wittinger, Dan Ramirez, Ken Earlywine, and Jim Kerr*