
BAKER RIVER PROJECT RELICENSE

Economics & Operations Working Group

April 10, 2002

1:00 p.m. – 4:30 p.m.

PSE's Mount Vernon Business Office
1700 E. College Way
Mount Vernon, WA 98273

AGENDA

- | | |
|---------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| 1. Lloyd Pernela
PSE | Review of group's history and mission |
| 2. Mark Killgore
Louis Berger associates | What FERC wants in models |
| 3. Joel Molander
PSE hydro manager | What are PSE objectives
Process used to search model
Results Hydrops : modifications to project facilities/ operations |
| 4. Charles Howard
Sr. Consultant | Why need for Hydrops
History Hydrops
Successful applications |
| 5. Tung Van Do
President CHAL | Calibration Baker Project
Flexibility in scenarios |

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FINAL MEETING NOTES

“To ensure that alternative project proposals, operations and emergency plans for the Baker River Project and its components provide for:

- 1. Public health and safety; and*
- 2. Thorough analysis and evaluation of the economic costs and benefits (including non-market and economic impacts.”*

Team Leader: Lloyd Pernela (PSE), 425-462-3507; lperne@puget.com

Note: Please let the team leader know if you are unable to attend a meeting. If something comes up at the last minute, please call Lyn the day of the meeting. Lyn's new cell phone number is 425-890-3613.

PRESENT

Lloyd Pernela, Bob Barnes, Joel Molander, Nick Verreto, (PSE), Bob Helton (Private Citizen), Chris Hansen - Murray (U.S. Forest Service), Mark Killgore (Louis Berger Group), Jim Sinclair (Hydro power consultant), Tom Spicher (Hydro Y.E.S.), Gary Sprague (WA Dept. Fish & Wildlife), Don Wick (Skagit Co. Economic Development Assoc.), Sue Madsen (R-2), Xiaoqing Zeng and Martin Liu (Stetson Engineers, Inc), Chuck Howard, (Senior Consultant and former president of CHAL), Tung Van Do (President, Powel Ltd.), Lyn Wiltse, facilitator (PDSA Consulting Inc.)

NEW ACTION ITEMS

- ALL: Review list of Hydrops Model outputs you receive from Lloyd to look for holes.
- Tung: Email draft of a form that Working Groups would use to submit scenarios. Send to Lloyd to distribute to members to review.
- Tung: Send list of current Hydrops Model outputs to Lloyd to distribute for review.
- Lloyd: Reserve PSE training room for June 12 workshop and include driving directions with the agenda.

DATES OF FUTURE MEETING DATES/LOCATION

Preference of group is to have a morning meeting starting at 9:00 to 12:00 (noon).

No meeting in May 2002

OUR NEXT MEETING, JUNE 12TH 9:00 AM TO 4:00 PM WILL BE AN ALL-DAY WORKSHOP IN PSE'S BELLEVUE OFFICE, 411 108TH AVENUE NE, FIFTH FLOOR. The "hands-on" workshop is designed for participants to gain familiarity with the Hydrops model.

June 12 (9:00 - 4:00), September 11 (from 9:00 to noon), at the PSE Office in Mt. Vernon.

AGENDA

April 10, 2002 at PSE Office in Mt. Vernon, WA

1:30 to 4:30

- | | |
|---------------------------------------------|-------------------------------------------------------------------------------------------------------|
| 1. Lloyd Pernela
PSE, Team Leader | Review of group's history and mission |
| 2. Mark Killgore
Louis Berger Associates | What FERC wants in models |
| 3. Joel Molander
PSE Hydro Manager | PSE objectives, initial focus operations model. Process used to search model. Results Hydrops. |
| 4. Charles Howard
Sr. Consultant | Model development. Why need for Hydrops
History Hydrops, Successful applications |
| 5. Tung Van Do
President CHAL | Simulation versus Stochastic approach
Calibration of Baker Project Model. Flexibility in Scenarios |

ANNOUNCEMENTS AND WORKING GROUP HISTORY

Lloyd Pernela announced a calendar of coming events:

May 20 is the date of a FERC/PSE public tour of the Baker River Project from 10:00 AM to 3:00 PM. Relicensing public meetings to review the Initial Scoping Document (ICD) and Scoping Document #1 and gather public input are on May 21 at concrete High School multi-purpose room and 22nd at Cottontree Inn in Mt. Vernon from 9 AM to 3 PM. PSE expects to release the Scoping Document #1 the week of April 15th. FERC allows for a 60-day comment period following the public meeting(s). Comments on both documents are due July 22nd.

He then reviewed the history of the Economics Working Group. June 7, 2000 was our first meeting.

The Economics Working Group Mission Statement:

"To ensure that alternative project proposals, operations and emergency plans for the Baker River Project and its components provide for:

- 1. Public health and safety; and*
- 2. Thorough analysis and evaluation of the economic costs and benefits (including non-market) And economic impacts."*

Since June 2000, the Working Group has had the following presentations/activities:

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- Utility Economics (Ed Schild and Joel Molander of PSE)
 - Skagit River Flows (Sue Madsen of R2)
 - Emergency Action Plan for the project (Chris Drechsel of PSE)
 - Swinomish Tribal Values (Larry Campbell of the Swinomish Tribe)
 - Army Corps of Engineers, Flood Control (Wayne Wagner of the Corps)
 - Hydro 101, (Bob Barnes PSE hydrologist)
 - Review of PSE's environment in Annual reports (Bob Helton, interested citizen)
 - Tour of the Baker Project
 - Development of relevant issues/interests
 - Working group operating norms

HISTORY AND SUBSTANCE OF THE CHARLES HOWARD HYDRO OPERATIONS MODEL

Joel Molander explained that PSE underwent a very rigorous model selection process. The original focus of PSE was to secure a model that optimized their hour by hour operations. He expressed great confidence in the optimization model selected. This Working Group will be using the Study Model, which is essentially the same as the Operations Model. Explained the importance of using the same model for planning and operations. The primary difference in the two models is that the planning model has a static database whereas the operations model uses real time data and is automatically updated for dispatchers.

Charles Howard & Associates, Ltd. (CHAL) has been providing hydrologic and water resource consulting and modeling services since the mid-1970s and has conducted over one hundred twenty analyses and modeling efforts specific to hydroelectric-related projects. HYDROPS™ represents the culmination of CHAL's experience in hydroelectric planning, project optimization and operations modeling and provides a flexible, reliable tool for incorporating real-time operational data into the optimization of the Baker River Project.

WHAT FERC LOOKS FOR IN MODELS

Mark Killgore, consultant (Louis Berger Group) hired by PSE to assist in implementing the Charles Howard Model to ensure it meets FERC requirements. He gave a comprehensive presentation about the application of models and economics to FERC Relicensing. He covered how models are used in relicensing, models that are currently available, characteristics of good models, and an overview of FERC's Economic Evaluation Methodology. He discussed how results from operations models can be linked to other models used in evaluating different resource areas. His presentation is posted on the PSE website at <http://www.pse.com/hydro/baker/meetings/2002/economic20020410presentation.pdf>. He also distributed relevant FERC regulations from the Section 18.Code of Federal Regulations (CFR) part 4.51 on the contents of a license application. Material on relicensing and links to the CFR are available on the FERC website at www.ferc.gov. The Mead decision, which implemented the current FERC policy on economic analysis, is also on this website under CIPS. Search on Project P-2506 year 1995 for a copy.

HYDROPS HISTORY, APPLICATIONS

- Chuck Howard (retired a year ago from CHAL and is now consulting (clients include BPA, China) and serving on National Academy of Sciences and ASCE committees. He explained that Charles Howard and Associates, LTD has been in the water resources systems analysis business since the

1960's. They started out doing non-point source analysis of water quality issues for the Great Lakes, urban water distribution and drainage, and water management planning studies. In 1986 they put into practice their first hydro operations optimization models and this is still being used to operate two reservoirs in British Columbia. Subsequently these models have been applied to relicensing and planning issues. They have worked on over 150 hydroelectric projects, 129 of which have been modeling assignments. The current Hydrops Model optimizes while incorporating hydrologic uncertainties in long term (seasonal) hydroelectric operations and also provides a deterministic optimization of short term (weekly) operations. He briefly discussed a paper (see handouts) by Beth Faber and Jerry Stedinger that reviews the HYDROPS modeling approach to forecasting, see <http://www.pse.com/hydro/baker/meetings/2002/economic20020410handout.pdf>.

WATER RESOURCES SYSTEMS PLANNING (CALIBRATION AND FLEXIBILITY)

Tung Van Do walked us through the purposes, limitations, and procedures involved in water resources systems planning. He explained requisite features of a state-of-the-art planning and studies model. Outlined the differences between optimization and simulation models. HYDROPS will be both Puget's real-time operations model and Puget's planning and studies model. Tung presented an overview of the functional interactions in HYDROPS. HYDROPS uses a probabilistic approach to determine ideal reservoir levels and releases for the next seven days and a deterministic method to define hourly schedules. His presentation is posted on the PSE relicensing website at <http://www.pse.com/hydro/baker/meetings/2002/economic20020410presentation2.pdf>

HANDOUTS

- *Hydro-power Stochastic Forecasting and Optimization* (Tung Van Do and Charles D. D. Howard, M. ASCE)
- *SSDP Reservoir Models Using Ensemble Streamflow Prediction (ESP) Forecasts*. Beth Faber and Jerry Stedinger.
- Mark Killgore, PowerPoint presentation: *The Application of Models and Economics to FERC Relicensing*
- Tung Van Do's PowerPoint presentation: *Water Resources Systems Planning*
- CD: International Workshop on *Sustainable Riverine Fish Habitat* (April 21-24, 1999, Victoria, BC, Canada) (MP3 format)

PARKING LOT

- US Forest Service Watershed Analysis (Jon Vanderheyden)
- Consider who will be the number cruncher for this team: PSE? Other?
- GANNT chart with due dates, etc.
- Presentations:
 - Wild and scenic river 101
 - Flood Plain Values 101
 - Fisheries/Hydraulics 102

EVALUATION OF THE MEETING

Well-Dones:

- Presentations
- Great handouts (will be posted on Web)

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- Good participation
 - Team Leader on time!

Need to Improve

- Ran out of time
- Warm, stuffy room
- Software still in flux (other than main features)
- Missing some key players
- Some handouts had small print (difficult to read)

TENTATIVE AGENDA FOR NEXT MEETING

**June 12, 2002 at PSE Office (One Bellevue Center) in Bellevue, WA
9:00 to 4:00**

*****NOTE THAT THIS WILL BE AN ALL-DAY WORKSHOP*****

1. Review/revise minutes and agenda
2. Action items
3. HYDROPS WORKSHOP:
 - Training in AM.
 - “Play” with model in p.m.
 - Discussion
4. Set agenda for next meeting (September 11 at PSE Office in Mt. Vernon)
5. Evaluate meeting