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Baker River Project License Implementation

Aquatic Resources Group
Article 107(c) Workshop

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PRESENT
Arnie Aspelund, Doug Bruland, Cary Feldmann, Paul Wetherbee, Jacob Venard, Nathanael Overman, Nick Verretto, Cory Ertel, and Mark Killgore (PSE); Brock Applegate (WDFW); Lorna Ellestad, Dan Berentson, Kara Symonds (Skagit County); Steve Fransen by phone (NOAA); Bob Helton (Citizen); Stan Walsh (SRSC); Jon-Paul Shannahan (Upper Skagit Tribe); Phil Hilgert (R2); Eron Berg (Sedro-Woolley); Blaine Chesterfield and Esco Bell (Mt. Vernon); Chal Martin (City of Burlington); Mayor Bud Norris (City of Mt. Vernon); Todd Carlson (WA DOT); Daryl Hamburg (Dike District 17); Malcolm Leytham (NW Hydraulics); Chuck Ebel by phone (USACOE) Lyn Wiltse and Jamie Riche (facilitators, PDSA Consulting).

ARTICLE 107(c) IMMINENT FLOOD TEAMLET WORKSHOP
The ARG adjourned and reconvened as an Article 107(c) workshop to review imminent flood protocols.

CONTEXT / BACKGROUND
Paul welcomed folks and briefly described Article 107(c) and ARG's activity to date. Settlement Agreement 4.1.1 created the requirement for PSE to use reasonable best efforts to draw down the reservoirs to target elevations ahead of an imminent flood event. Article 107(c) calls for PSE to consult with ARG members, the USACE and Skagit County to develop means and operational methods to operate the reservoirs in a way that is consistent with the license. This workshop provides an opportunity to gather input from the various stakeholders.

Cary walked the group through a stylized (sample) high water event, from general operations, through flood forecast, flood operations, and post-flood (back to general operations). PSE operates the project during normal operations; the Corps of Engineers takes control of project operations during flood events.

Article 106 of the license directs PSE's general operation actions. It establishes a number of constraints including maximum and minimum flows (outlined in Aquatics Table 1), flow triggers, reservoir rule curves, and down-ramping rates.

When a water event is approaching, the National Weather Service generally issues a warning several days in advance. 107(c) is focused on actions during this time period. At a point when a flood is declared, the Corps assumes control of the project with PSE's cooperation. The Water Control Manual describes when the Corps assumes control, includes minimum discharges, flood storage evacuation after the peak, drafting restrictions, and coordination descriptions.

Cary then described the relationship of the operational buffer to additional storage for an imminent flood. PSE typically uses operational buffers of 8 ft at the Upper Baker reservoir and 5 ft at the Lower Baker reservoir. The buffer is the difference between the highest operational elevation and the target elevation; this area is the space that can provide additional storage. Three variables influence whether those targets can be

achieved: starting elevation, the rate at which the reservoir can be evacuated, and the duration of the draft (evacuation). The buffers when available are intended to prevent incursions into the flood control storage zone at Upper Baker and prevent forced spill at Lower Baker.

Cary closed by reiterating that the essence of SA 107(c) is to identify constraints affecting "reasonable best efforts" to draw reservoir levels down to target elevations when a flood event is imminent. Reservoir drafting is influenced by three constraints: drafting rate (flow limits), duration of draft (flow triggers), and starting elevation (reservoir rate curve). SA 106 is not the only constraint; Corps operations, changing forecasts, safety of people and property, prudent utility practices are also factors. He noted that previous work by TetraTech shown to the ARG had discussed flood management outcomes (i.e. Water Control Manual issues) rather than flood preparation efforts (i.e., SA 107c) and may have confused the dialogue. This workshop is intended to refocus efforts on 107c alone, that is, things that can be done in advance of the imminent flood.

(Cary's Power Point is attached to these notes)

There were questions and clarifying answers from PSE and others that followed this presentation.

Questions and Answers:

- **What triggers an imminent flood draw-down?** Mark responded that each event is evaluated on a case-by-case basis, depending on weather conditions, forecasts, time of year and reservoir levels, etc. Chal concurred and referenced the "double pumper" event in Oct. 2003 as an example of successful drawdown ahead of a flood.
- **Is there a built-in discrepancy between 106 (protection for wildlife) and 107 (protection of people)?** Cary noted that the Settlement Agreement process was extraordinarily inclusive and detailed (noting the thousands of pages of modeling study results for 106) and included a significant amount of dialogue among stakeholders to address competing interests. The Settlement Agreement and License, reflect the agreed intent of all the signatories.
- **Is the drawdown period specifically defined by the Settlement Agreement and why did you use 4 days in the studies?** No. The license does not dictate any drawdown for imminent flood except is provided in the Corps operation agreement. TetraTech work was based on hypothetical warning period in advance of the event of three to four days, but there is not a specific period defined in the license.
- **What is the outflow capacity of the new generation facility?** It is approximately 6,000 cfs, consistent with the water right, including 4,500 cfs from the existing Lower Baker Unit 3 and 1,500 cfs from the new Lower Baker Unit 4.
- **What is the rationale behind the Interim Protection Plan (IPP)'s requirement for 115k acre feet of flood storage during autumn months?** Steve F. noted that the intent was to avoid big scours and keep Chinook redds from being deposited too high on the banks, where they'd be at risk of being de-watered. Cary added that the IPP, as configured, was necessary in the first instance because the Baker Project did not have the unit operational capability that the new Unit 4 will provide. So as an alternative way to provide fish protection, the IPP created space to store high events that would not otherwise be addressed by the Corps with their operational volume or season. After Unit 4 is operational, the need for that storage will no longer be necessary for the protection of listed species.
- **Are the constraints for fish based on specific actual flow volumes rather than forecasts?** Yes. General operations related to constraints are based on specific flow readings not based on forecasts.
- **Are there typical post flood-crest timelines for evacuating the reserved storage?** No. The Corps gives post-flood instructions entirely on a case-by-case basis.
- **107(c) specifically calls for consultation with ARG, Skagit County and the Corps. The Corps isn't here today. What consultation has happened to date and what is planned?** Paul responded

that there have not been any additional, one-on-one discussions with the Corps. Arnie confirmed that PSE invited the Corps to be here today. Note: Chuck Ebel of the Corps joined the meeting later by phone.

- **FYI -** Chal commented that a study Skagit County commissioned several years ago had identified 140k acre-feet as necessary storage at Baker to capture a 100-year flood event. In order to achieve this in advance of a flood event, the County estimated that the project would need to spill in advance at a rate of 10k cfs. (1,000 cfs = 2,000 acre-feet per day. Cary acknowledged that people were aware of the County's study but that the discharge was not consistent with the license until constraints were lifted once Lower Baker Unit 4 is operational.
- **What is the goal of a pre-flood draw-down – to minimize the project's addition to the flood or to capture rain and actually minimize the flood event itself?** PSE is required to use reasonable best efforts to create the capacity ("the hole") in response to an imminent flood. In a flood event, it is the Corps' job to decide how best to utilize that space.
- **Is PSE compensated for the draw-down regardless of the duration?** Imminent draw-down (regardless of duration) is specifically excluded from compensation. It is the ongoing reservation of space (such as that by the Corps storage agreement) and thus lost opportunity to generate power that qualifies for compensation.
- **Under the provisions of the Water Control Manual, can the Corps direct the Lower Baker outflow to go to zero?** The Corps' Water Control Manual includes the direction to avoid exacerbating the flood event. However, because it is a federally-developed document and has its own process for development, it is beyond the scope of our control today.
- **Skagit County looks at flood control in terms of regulated flow vs. unregulated flow; when they look at flood storage, they are considering the regulated flow. Lorna stated that the FERC license constraints are out of sync with the Water Control Manual and asked what document takes precedence for PSE's operations?** PSE operates according to its license and agreement with the Corps. The license and PSE / Corps contract are consistent. The Water Control Manual doesn't apply to pre-flood operations; it isn't triggered until the Corps takes control of the project during a flood event. Lorna added that there is flexibility in the manual to allow the Corps to respond to the specific conditions in each event.
- **What studies would be necessary to change the flow regime?** Stan described the collaborative nature of the ARG and noted that ARG would be involved in identifying the intent and scope of the study as well as identifying an appropriate, neutral group to conduct the study.
- **There have been some studies completed already, looking at a range of possible actions related to the impact of various flows. Are those studies applicable?** Stan noted that the studies relative to maximum discharge cfs were intended to identify the limits at which chum salmon get stranded or lose spawning habitat to scour. One would only want to deviate from those cfs limits when really necessary and only for as long as needed.
- **What is the time between a forecast trigger point (where discharge constraints could be lifted) and the point at which the Corps takes control of the Project?** PSE has seen anywhere from 4 to 100+ hours between forecast and flood as shared with the ARG at previous meetings. A time of 18 hours was used as a representative case example for the purposes of studies.
- **Can a process for managing imminent flood events be developed without requiring an amendment of the license?** Cary clarified that PSE's goal is to operate consistent with the license. The Water Control Manual does not come into play until the Corps takes control. The focus of this workshop is PSE's operations before the Corps take over. Setting new specific triggers would be outside the scope of the license as written and would require an amendment. Stan agreed and indicated that PSE would have to file a license violation with FERC if they were to deviate from the limits outlined as license operation.

- **How would the 2003 event be different if it had happened under the limits of the current license?** Paul responded that we don't know; it would depend on where we would have been relative to the buffer. Steve added his thought that, with the hindsight of knowing what happened and how it came out, he thinks we'd try to do the same thing again. He went on to say that it's speculative to think that the same event would happen again with the exact same factors. He commented that we can't exclude the value of having been lucky as well as good.
- **Specifically reflecting on the 2003 event for reference, are we getting more flood protection, less flood protection, or the same flood protection under the new license?** Malcolm pointed out that the current license allows for an early draw-down during a flood event. Paul added that it is important to communicate well with down-river communities. He believes that there is more flood protection in the current license, for several reasons:
    - It extended the Corps' flood control earlier into the flood season.
    - There is also a provision for Corps' recommendations to be inserted into the license without going through the amendment process.
    - The current license also allows for imminent draw-down (so this is a new tool for PSE to use as it applies reasonable best efforts to create capacity in advance of an event).
    - Cary added that the new license calls for PSE to draw down the reservoir in a consistent manner over a longer period of time, which is also good for flood management.
    - Mark added that Lower Baker Unit 4 would add 1,500 cfs more discharge capacity at Lower Baker.
- **Are there any thoughts to changing the USGS's flood frequency analysis related to climate change? *(Bob asked Chuck)*** Chuck affirmed that the Corps has officially acknowledged the validity of climate change and they are working on this; he couldn't speak to USGS activities.
- **FYI –** Chuck was asked about the USACE's plans to update / correct the Water Control Manual. He will look into this and respond to Arnie for distribution to the ARG by May 17. [Chuck responded via email after this workshop, reporting that the Corps is not planning on updating the Water Control Manual]
- **What would it take for the Corps' Water Resource folks to join the conversation?** Chuck answered that it would just take an invitation. At this point, we'll target the July ARG meeting (there won't be time at the June meeting and the Baker Lodge does not have good conference calling options).
- **Does an outage affect the imminent draw-down policy?** If there is a forced outage (because something is broken), that would become one more factor to consider in the situation-specific response. Voluntary outages (for maintenance, for example) are scheduled at times when the reservoir is being refilled rather than at times when the reservoir needs to be drawn down.
- **Will the TetraTech report be made available to the ARG?** TetraTech is a PSE contractor selected to conduct studies to inform the development of draw-down protocols as required in 107(c). The focus of dialogue at the last Tetra-Tech presentation was veering off toward the "during flood" actions that are at the direction of the Corps, and PSE needs stakeholder input related specifically to its operational scope (drawdown to "create the hole") in advance of an imminent flood. That is why the focus of this meeting changed and the Tetra-Tech presentation was removed from today's agenda. They remain available to conduct additional analysis as needed.
- **What is the incremental difference of increased flows over time?** Stan responded that fish spawn at different times across the time periods and there is not a provision in the license for ongoing monitoring of the presence / absence of fish. We do not have access to specific real-time data re: the actual existence of fish in the river at the time of the event, and therefore do not have specific real-time data about how many fish will be impacted by any given decision in the midst of an event.

- **Are there triggers to determine when an imminent drawdown is appropriate?** The focus of this workshop is to identify the ARG's, the County's, and the Corps' interests and concerns related to PSE's development of protocols to create the capacity (dig the hole).
- **What flood control potential is available outside the license?** Cary noted that actions within the bounds of the license are easy to implement and do not require amendment. For options outside the license, Cary believes it would be necessary to amend the FERC license, 401 Water Quality Certification from the Dept. of Ecology, and Settlement Agreement by all parties to the settlement.
- **Dialogue:** There was considerable dialogue related to whether it would or would not be necessary to go through the license amendment process if the intention is to deviate from the prescribed flows only during extreme, infrequent flood events. PSE's intention is to operate the project within the bounds of the license and settlement agreement. It was noted that the process filing an amendment takes time and the outcome is uncertain. The argument was made that the prescribed flows in the license would continue to apply during the course of normal operations and smaller flood events and that if a deviation from normal operations were necessary they would happen infrequently and PSE could submit a deviation report to FERC in those rare instances. Cary commented that PSE attorneys might have a different view of that rationale and repeated that PSE doesn't intend to violate its license and that 107c states that options must be consistent with the license.

Following a break the group reconvened to consider options that might be available to address imminent flood drawdown. For comprehensive thinking, all options, whether consistent with the license or not, were recorded. It will be up to PSE and the ARG, Corps and Skagit County to determine which are available.

STAKEHOLDER INPUT – OPTIONS FOR CONSIDERATION

1. Reconsider maximum outflow constraints in anticipation of extreme, infrequent flood events.
    - This would entail collaboratively identifying appropriate triggers for what would be defined as an extreme, infrequent flood event.
    - Are there options of higher flow for longer duration or much higher flows for a shorter duration? (Consider trade-offs.)
    - What are the Skagit flow thresholds that impact the potential benefits of early evacuation to preserve existing off-channel attenuation of peak flows?
2. Whose forecast do we follow? Can we better understand forecast reliability?
3. Consider zero outflow at Lower Baker during flood peak.
4. Possible protocol: convene the ARG when a flood is first forecast to communicate about options.
    - Follow up as needed (perhaps daily) as the conditions develop to discuss what options might make sense, i.e., initiate storage evacuation or change flow regime to increase evacuation.
5. Conduct additional studies. What studies would be necessary to support changing the flow regime? (ARG would need to be involved with study development.)
    - How reliable are forecasts? How often do forecasts miss bigger events?
    - What would the 2003 flood event and other historic events look like if it were to happen under today's license constraints?
6. How do outages influence drawdown protocol?
7. Do we need to "violate" license-defined maximum flows to get to the targets?
    - Depends on starting conditions
8. Determine needed base information to inform the conversations at the time of a forecasted event.
    - Predicted precipitation
    - Predicted flooding
    - Reservoir levels
    - Seasonal issues (saturation, temperature, biological considerations, refill capacity, etc.)
    - Baseline conditions (Article 106)

NEXT STEPS

- PSE will consider the information and input from today
    - What data already exist?
    - What data are needed?
    - How do we better understand forecast reliability?
- Work on communication protocol.
- Provide update (next steps, schedule) to ARG at June 14 meeting