HYDROLOGY AND WATER QUALITY TECHNICAL WORKING GROUP
TERMS OF REFERENCE

Role of the Technical Working Group

Provide unbiased and useful technical advice to the Plenary Group on hydrology and water issues concerning the development of a Spring Rise proposal for the Missouri River. Present options to the Plenary Group for its consideration, but not make any final decisions for that group. Note: Members of the US Geological Survey have been requested to provide impartial technical assistance to this Technical Working Group.

Request from the Plenary – The Hydrology and Water Quality Technical Working Group Terms of Reference

General. The Plenary Group wants advice from the Hydrology and Water Quality Technical Working Group (Hydrology Group –"HG") to assist it in the development of a starting point for discussions on recommended criteria for a Spring Rise. The Plenary Group would like the HG to provide it with three or more possible approaches for conducting a Spring Rise, so that the Plenary can discuss and assess the advantages and disadvantages of each.

Because the Plenary Group schedule for June 1-2 was so tight, the Plenary did not have time to draft and review a detailed terms of reference for the HG. The CDR Team has reviewed Plenary Group comments and drafted this terms of reference. Later review by the full Plenary Group could result in changes.

Assumptions driving the Request.

The Plenary Group is making the following assumptions in this request:

- A Spring Rise to enhance habitat for the pallid sturgeon, an endangered species, is mandated by court order, and will be implemented by COE
- The mandate provides flexibility in how the Spring Rise is implemented, and does not require a Spring Rise in every year
- Adaptive management is an essential component of the mandate, and requires adjustment of the Spring Rise criteria as information is learned
- The COE will not implement over any long period of time any flow modifications that are found to be ineffective in achieving desired impacts on pallid sturgeon habitat or the species
- The Spring Rise proposal(s) are should provide criteria for the first pulse, post pulse flow reduction and the second pulse.
- The elements of the annual operating plan (for example, summer flows) are not part of this process.

The advice of the HTWG Group should be based on:

- Use of all three components of the Spring Rise (First Pulse, flow reduction and Second Pulse), although variations in the use of all three are possible to adjust to hydrologic conditions and/or other issues or interests of importance to Plenary Group members
- Comply with the detailed definitions in the 2003 Amended BiOp.

The HTWG may consider ways to adjust or cancel the First Rise as needed to adjust for hydrology (including dry, intermediate or wet conditions). The Group can consider, among others:

- Start dates (such as timing to coincide with navigation)
- Peak flow changes with changing hydrology/storage or winter releases
- Length of the elements of the peak (ascending, peak, descending)
- Cancellation the First Pulse due to hydrology

The HTWG may consider ways to adjust the release between Rises for hydrology (including dry, intermediate or wet conditions)including, among others:

- Start date
- Flow changes with changing hydrology/storage or changing winter releases
- End date
- Navigation service levels
- Variable rates (such as between full and minimum service)
- Development of guide curves to adjust flow

The Hydrology Group may consider ways to adjust or cancel the Second Rise as needed to adjust for hydrology (including dry, intermediate or wet conditions) including , among others:

- Start date
- Peak flow changes with changing hydrology/storage or changing winter releases
- Length of the elements of the peak (ascending, peak, descending)
- Cancellation due to hydrology (flood events)
- Stop protocols (downstream flooding and others)
- Cancellation due to drought.

Specific requests for advice.

- What criteria should be used to determine when "hydrologic conditions are suitable", as such is used in paragraph VII(1)(d) of the 2003 BiOp, page 233, for a Spring Rise?

- Based on information available and the above assumptions, what are three release hydrographs for the Spring Rise that would respond to (a) hydrologic variation, (b) satisfy the 2003 BiOp and (c) minimize adverse impacts to other interests of Plenary Group members?
- What are the most useful formats for describing and presenting Spring Rise concepts? Text, set of three or more hydrographs, charts, etc?
- Beyond wet, median and dry years, what other factors need to be considered in making adjustments? Such as downstream tributary contributions, ice levels, previous Spring Rises, etc.
- What are appropriate "stop" protocols, under which a Spring Rise would:
    - Be cancelled prior to its start in any given year?
    - Be terminated after initiation in any given year?
- What is your advice on how to minimize any potential adverse effects of a Spring Rise on*:

    - Flood control?
    - Infrastructure along the banks of the river?
    - Levies and interior drainage structures?
    - Water intakes?
    - Water quality (turbidity, exposure of mine tailings, etc.)?
    - Downstream agriculture?
    - Bank erosion?
    - Navigation?
    - Exposure of grave and cultural sites?
    - Reservoir levels and recreation?
    - Hydropower production?
    - Thermal impacts on water for power plants?
    - Ice flows?
    - Others concerns, as relevant?
    - How can a Spring Rise be undertaken so that any potential or actual negative impacts are shared among concerned stakeholders?
    - How can the highest level of independent science be utilized in making a final determination about a Spring Rise?

    *Not listed in order of priority

Needed advice on monitoring, evaluation and sustainability

What advice does the HG have for the Plenary Group about:

- How to best monitor the Spring Rise?
    - What indicators or proximal indicators should be used?
    - Can this monitoring program include stakeholder participation? How is this best done?
    - Over what time period would the monitoring and evaluation need to occur prior to making science supported conclusions?
    - Beyond hydrology and water issues, what other areas of monitoring are needed to provide a comprehensive monitoring program?

- What is needed to make the Spring Rise sustainable?
    - What definition of sustainable fits this need?
    - What support is needed for this sustainability?
- Can you also advise the Plenary Group on the following:
    - What did the historic rises look like?
    - What impacts have past releases from Gavins Point, prior to the ESA, had on downstream stakeholders in some of the categories listed above?