

MEMO FOR: Regional Forum Water Quality Team

FROM: Rudd Turner, Corps of Engineers, Northwestern Division

SUBJECT: Responses to agency comments on draft TDG report.

This memo provides Corps responses to comments by members of the regional forum Water Quality Team (WQT) on a December draft of the report: McGrath, K.E., E. Dawley, and D.R. Geist. January 18, 2006. Total Dissolved Gas Effects on Fishes of the Lower Columbia River. The work was completed by contract between the Corps' Portland District office and the Pacific Northwest National Laboratory (PNNL) in Richland, Washington.

Previously, the contractor responded to reviewers' comments and submitted those responses to the Corps along with the final report. The Corps found both final work products to be acceptable and consistent with the scope of work, and the contract has been completed. The final report and responses were forwarded to Mark Schneider, co-chairperson of the Regional Forum Water Quality Team (WQT), on January 20, 2006, for distribution to WQT participants.

Also, in response to WQT members' comments on the draft report and questions about the overall concept for total dissolved gas (TDG) management in the lower Columbia, Rudd Turner of the Corps' Northwestern Division office attended the WQT meeting on January 17, 2006. Turner explained discussions relative to lower Columbia TDG management and the Camas/Washougal gage held by a Federal policy group in 2005. This was the framework within which the TDG report was prepared and it explains why the report covered the subject matter in the way it did. His remarks to the WQT are summarized below.

The current concept of Lower Columbia TDG management was kicked off at a Federal policy level group meeting held in May 2005. This included representatives from NOAA Fisheries, BPA, USFWS, and the Corps. Additional meetings followed in the summer of 2005. The group made several determinations, including:

(1) The Camas/Washougal (C/W) gage issue has been going on for a long time without resolution. Recent discussions relative to this issue have not been very productive and a new approach is needed.

(2) There is a need to step back from the C/W debate in its current form and work to resolve the issue through a more holistic, ecosystem approach. Look at the important factors relative to TDG downstream of Bonneville Dam (BON). Key questions include:

(a) What are the main sources of TDG? How much do BON operations (spillway and second powerhouse corner collector) contribute to TDG?

- (b) What are the biological benefits for fish passage derived from these operations?
- (c) What are the river reaches and areas where TDG can occur at elevated levels of saturation that may cause biological impacts?
- (d) What are the impacts of TDG on critical habitats for fish and other aquatic species, especially shallow water habitats?
- (e) What are the impacts of TDG to ESA-listed salmon, especially sensitive life history stages?

(3) Additional information is needed to answer the key questions. This should be gathered and assessed, and from the information determine risks, the best balance of BON operations (benefit) versus TDG loading (risk) for an optimum operation for biological benefit, and the monitoring sites needed to assure protection of important aquatic habitats and uses.

The policy group further determined that there were three key areas where information should be gathered. These include:

- (a) Complete a synopsis of biological information on habitats downstream of BON, sensitivity to species and life history stages from elevated levels of TDG, and identify potential ecological impacts.
- (b) Conduct field investigations of chum salmon spawning, incubation, and emergence below BON which include TDG measurements at redds and biological effects on larval and juvenile fish.
- (c) Review operations for fish passage at Bonneville Dam, in consideration of recent survival results with the spillway flow deflectors in their current configuration and with the second powerhouse modified bypass and corner collector operating.

Since these discussions, the Corps has moved ahead to gather more information. Item (3)(a) was the subject of the PNNL report that is being completed now. When finalized, it will be the first of the information pieces of the puzzle to be provided. The report concludes that there are some biological risks downstream of BON, particularly at shallow water habitats. This is expected to occur if TDG exceeds the 115/120% limits of the CWA variances. There are also potential effects at levels at or below the variance limits, and shifts in community structure and diversity. Impacts are more of the sub-lethal chronic toxicity type rather than acute toxicity or lethal effects. This is one of the important pieces of information needed to determine monitoring needs below BON. In keeping with the policy group's concept, PNNL was not asked to assess the C/W gage directly but rather synopsise relevant biological information on shallow water habitat and TDG effects. Managers will then apply that information to help determine monitoring needs.

To address item (3)(b), physical TDG measurements will be made at chum redds downstream of BON in 2006. Chum incubation and emergence studies were considered but will not be conducted this year. A phased approach was agreed upon – physical measurements this year with biological studies later if the observed TDG levels are a cause for concern. *[Modified after the January WQT meeting, based on feedback from David Wills and Portland District.]*

In addition, to address question (2)(b), the RCC Water Quality Team and Mike Schneider have worked on an analysis of TDG data to determine the footprint, or area where elevated TDG can occur below BON.

BON fish passage is being reviewed technically by the Corps in coordination with the region through discussions at FFDRWG and the AFEP's SRWG research review group. The Corps is updating the BON Decision Document to reflect the latest survival information. That Document may include information on downstream TDG effects as a factor to consider in deciding on the best project operation for fish.

In summary, the approach the policy group adopted is to gather information on factors relative to TDG and potential impacts below BON. Once gathered, managers will compile the

information and view it from habitat, water quality, and project fish passage perspectives. From the resulting evaluation, determine where the risks are and how/where to monitor TDG to manage risk.

There are several needs to be met in order to move forward. First, the concept needs regional support and a willingness to prioritize the needed data reviews and studies. It needs program management to assure that all the pieces are being looked at and come together in a timely manner. Program management would be done by the agency funding the work, perhaps the Corps. It needs funding to support appropriate research, monitoring, and evaluations. Finally, the concept needs an interdisciplinary review group to evaluate the biological, water quality, and project operations information that will be gathered. The group would use the information to determine the best balance between good passage survival at BON and protection of aquatic species downstream, then determine monitoring needs to assure the protection is being provided. This group does not now exist, and none of the existing regional forum or technical coordination groups meets the need fully. It could be either a synthesis of a couple of groups, or an expert panel established by IT or other regional oversight group that emerges from the BiOp remand process. The process of determining monitoring needs and agreeing on a monitoring plan solves the C/W issue. If C/W is sufficient to represent areas that need protection, it stays. If another site or sites are more suitable, C/W is discontinued, or added to, and C/W and/or the new sites are used to help manage spill at BON.

This responds to reviewer comments on the scope of the report and the relationship to issues surrounding the Camas/Washougal fixed monitoring site. Additional responses to other comments are provided below:

Letter from David Wills (USFWS), Tom Lorz (CRITFC), and Margaret Filardo (FPC) dated 15 December 2005:

Page 1: The letter expresses disappointment that the report does not address the Camas/Washougal gage directly, and provides no further insight into this question.

Response: As explained above, the report deals with TDG effects on habitats, including impacts on fish and other aquatic species. It was not intended to comment directly on the C/W gage. The report is intended to be used by managers, in combination with other environmental information, to determine TDG monitoring needs below Bonneville Dam. We disagree that the report provides no further insight into the C/W question. The report identifies potential impacts from elevated TDG levels and habitats most at risk. This will help determine measurement locations and parameters for studies, evaluations, and monitoring activities in the future, and prioritize those efforts.

Page 2: Goals are unclear and the topics do not need to be further discussed.

Response: As explained above, the goal of the report was to provide a synopsis of information on TDG effects that would be relevant to the lower Columbia River. Given the conclusions of the report based on recent literature, the potential for TDG impacts especially in shallow water habitats which are part of the recovery planning, and potential for effects at the chronic toxicity level, it does appear to be a topic which would benefit from further regional discussion and prioritization.

Page 2: The report should be redrafted and reviewed again before being finalized.

Response: The Corps has followed the same procedure used in its other contract research studies and reports. A review period is provided, after which the authors finalize the report and submit it. Corps biologists interface with the contractor to make sure comments are dealt with satisfactorily. In the case of the TDG report, the final report deadline was extended by several weeks to give the authors adequate time to fully consider reviewer comments, respond to those comments, check references, and revise the report.

Email from Agnes Lut (ODEQ) dated 16 December 2005:

Several technical comments were made in regards to specificity in defining the 115% / 120% waiver limits and consistent reporting of significant figures.

Response: The final report has been modified to address those comments.

Letter from Mark Schneider (NOAA Fisheries) dated 21 December 2005:

Page 1, paragraph 3: The report is a departure from WQT sub-group discussions.

Response: This paragraph contains some misconceptions. First, the WQT sub-group did not call for the preparation of the TDG report. As described above, this study was conducted to implement guidance from the policy group. The WQT sub-group met with the contractor in summer 2005 and commented on the draft scope of work. The reference to a statement by “a scientist with many years of experience...”, that effects of 120% TDG from Bonneville Dam spill are negligible, is incomplete. That senior scientist, Earl Dawley, was one of the report’s authors. He attended a meeting with the WQT sub-group on 9 December 2005 where the draft report was discussed. At that meeting he retracted his earlier statements and said that, after reviewing the recent literature, his conclusion was that TDG levels of 120% below Bonneville do pose a biological risk. This paragraph further implies that the purpose of the report was to document conclusions already made about TDG below Bonneville Dam. This was not the purpose of the report. The contractors were asked to review recent TDG effects studies and describe what the literature is now saying about the potential for biological effects in the lower river below Bonneville Dam. The authors’ conclusions are based on their review, as is appropriate for a scientific investigation, even if those conclusions vary from what some may have expected.

Page 2, comment 1: The report attempts to establish an extensive and unnecessary research program.

Response: The report was organized into five sections based on potential biological effects, with the reviewed literature grouped into those categories. Areas where there is uncertainty or a lack of knowledge were identified and in some cases general suggestions were made regarding further agency review or research. This is a reasonable approach and is appropriate for this synopsis of information. It is now up to managers to take the information and determine (a) whether additional studies are warranted, (b) locations and extent of needed studies, and (c) prioritization of studies. It is premature to conclude that a research program of some form is not necessary. Also, the fact that topics are difficult to study or involve subtle effects does not preclude further research. As one example, biological testing procedures to determine sublethal effects or chronic toxicity in water and sediments have been adopted through extensive research and development activities. This is because effects at this level can impact growth, fecundity, habitat utilization, and community structure, and can cause mortality indirectly. Regulatory agencies now focus on biological effects at this level when evaluating proposed inwater actions. It would seem to be consistent to evaluate TDG impacts at the sublethal effects level as well, especially where it involves species listed under the Endangered Species Act (ESA).

Page 2, comment 3 and page 6, comment 4: The report fails to link conditions to actual occurrences in the study area.

Response: Few studies have been published on TDG effects on biota in the lower Columbia River. This is not the fault of the report; rather, it is the current state of knowledge, or lack thereof. This would seem to be a good reason to support additional studies, given the information and conclusions of the study. Also, this comment contradicts comment 1 on page 2. The reviewer criticizes the report for not having a large number of site-specific studies from which to draw conclusions, but also states that additional study is not necessary. Where problems are identified, managers should work to develop solutions. If more information or knowledge is needed, relevant studies should be proposed and supported.

Page 6, last paragraph: Need to develop a management plan and monitoring strategy for the lower Columbia River, from Bonneville Dam to river mile 46.

Response: The Corps supports a holistic, ecosystem based approach to managing water quality, including TDG, in the Columbia River below Bonneville Dam. Chum salmon studies are one component of that approach. Additional components include increasing the understanding of effects on aquatic species in shallow water habitats, and operating the Bonneville project for safe, efficient fish passage while protecting critical habitats, sensitive species, and vulnerable life history stages downstream of the project. The Corps will work with the region to develop an acceptable plan that sustains environmental quality while complying with both the Clean Water Act and Endangered Species Act.

The Corps further notes that additional issues exist with monitoring downstream of Bonneville Dam and is working to resolve those issues for the 2006 spill season. The interpretation of TDG readings at the Cascades Island gage as a function of spill

discharge levels, and what constitutes compliance with Washington and Oregon rules, need to be resolved before 2006 spill operations begin. The Corps is working with the WQT to resolve these issues. Also additional TDG measurements at shallow water habitats may be made in 2006, contingent on regional support and funding availability.