Attachment 1

Response to SRBA comments on TM-1 and TM-2 transmitted on 4 October 2016

GENERAL

Comment:

Should this draft go out before other draft documents are finalized? You reference those documents as if they were. Those documents will be referenced by many.

Response:

Comments following this statement appear to apply to TM-1, TM-2 and to Attachment A of TM -2. We believe the comment speaks to the question should TM-2 "go out" before TM-1 and Attachment A are finalized?

With respect to TM-1, we responded on 10 August 2016 to SRBA comments on the draft of that document. Having received no additional guidance, questions, or comments on our submittal, and needing to produce the results specified for TM-2 consistent with the overall TSP schedule and the approved Scope of Work, we proceeded with the modeling for TM-2 using the scenarios depicted in our revised version of TM-1. Since we had responded to SRBA comments, we considered TM-1 to have already been finalized. However, we are prepared to submit a "final" version at your direction.

We further believe that our intent to move forward with TM-2, absent formal closure on TM-1, was understood by SRBA. Our intent to complete TM-2 by the end of September, as close as possible to the schedule depicted in our Scope of Work, was communicated during numerous working level meetings with SRBA and was briefed at the 19 August 2016 JCPD meeting, which was attended by both the SRBA Board President and Consultant. Additionally, SRBA participated in a 5 September meeting with the modelers from the Espey/Corollo team wherein we briefed our preliminary results, and by this it should have been clear that we *had* proceeded with work on TM-2. SRBA also participated in a meeting with JCPD technical staff on 23 September wherein we discussed the effects of alternative operational scenarios on yield, and SBG indicated that the modeling for TM-2 had been completed and that memo drafting was underway. Based on this, there was never indication that we should stop work pending an action to finalize TM-1.

With respect to Attachment A, this is simply a Memorandum to the File developed by SBG to document technical aspects of work under subtask 1 of Task 1 in the Scope of Work and to facilitate future dialog with the Corps of Engineers regarding yield modeling for reallocation study purposes. It is not a deliverable under the contract. This document was never envisioned to be subject to any "finalization" process; it is marked "draft" only insofar as it is attached to TM 1-2, which is a draft document. We have, however, made adjustments to the document consistent with your current comments. Those adjustments are discussed further below.

Comment:

Should SBG consider all information to be prefaced with something indicating that this information is done at a planning level and not a permitting level?

Response:

The requested language has been added to both TM 1-1 and TM 1-2.

DRAFT ASSUMPTIONS 2016 (ATTACHMENT A)

Comment:

page 6 of 13, paragraph 2. Direction from our client should read direction from JCPD technical level.

Response:

Statement is correct as written. The Scope of Work from SRBA for Work Order Number One, dated 20 January 2015, under Task 1, directs SBG to evaluate the available water supply from a combination of Marvin Nichols and Wright Patman "with a Riverware software platform." The Scope of Work from SRBA for Work Order Number Two directs SBG to use the "most recent Sulphur Basin model developed by the USACE." That model, as is all Sulphur Basin models developed by the Corps, is a Riverware model.

Comment:

Page 7 of 13, paragraph 4 and 5. How do you include the updates needed (f)rom the 1997 survey and sedimentation into this document?

Response:

SBG is not clear what is being requested. Section 2.3 (page 7) of the document states that the 2010 TWDB update to the 1997 volumetric survey was used as input to the current modeling. For portions of the reservoir higher in elevation than the upper extent of the volumetric survey, we recommended using the same methodology as the Corps, that is extending the cross-sections using data from the original 1948 survey rather than from digitized ten foot contours or from the 1997 volumetric survey, which had been used in some of the previous modeling. As noted at the bottom of page 7 and extending on to page 8, we note that future reservoir sedimentation is not included in the current efforts but suggest that it would be beneficial once the preferred alternatives are identified.

Comment:

Page 8 of 13, paragraph 1 and 2. The 10 cfs is in the contract but there is nothing in writing from the Corps stating that they will exclude the 96 cfs. Should you seek the Corps 10 cfs operation in writing to make your information more accurate?

Response:

The Corps has repeatedly stated their intent to eliminate the additional 86 cfs releases when they move the operation of Patman to the Ultimate Rule Curve. Consistent with that intent, the Riverware model they provided to us in early 2016 has the 86 cfs release removed from Ultimate Rule Curve operations. Based on that information, our April Memo to File recommends retaining that approach in subsequent modeling. Prior to initiating model runs for TM-2, SBG requested concurrence on the baseline assumptions (including the 10/96 cfs issue) from the JCPD and SRBA and was directed by email dated July 26, 2016 to use only the 10 cfs release. SRBA was copied on this direction.

Comment:

Paragraph 5. Should any reference to the mini-WAM state it is not the official drought of record?

Response:

The mini-WAM is an application of the Water Rights Analysis Package (WRAP) and is used to quantify priority releases needed to comply with the hierarchy of senior water rights in the Sulphur Basin, using hydrologic data from the USACE Riverware model. It was not used to determine yields and thus does not address the Drought of Record, official or otherwise.

Comment:

Page 10 of 13, paragraph 1. Adoption? Is that the best word to use and what does it imply?

Response:

The word "adoption" has been deleted and the sentence reworded.

Comment:

Page 11 of 13, Table 4. Model -should apparent new drought of record read unofficial new drought of record?

Response:

Requested change made.

Comment:

Page 11 of 13, Table 4. WPL Low Flows – this statement seems to indicates a permitting process that SRBA has not discussed. It is not known who may pursue a permit.

Response:

Narrative has been modified to reflect uncertainty noted in the comment.

Comment:

Page 11 of 13, last paragraph. After consulting with JCPD technical representatives would be more accurate.

Response:

Referenced consultation was informal at best. SBG has deleted the reference to consultation and simply makes the recommendations.

Comment:

Page 12 of 13 Bullet 3. 10 cfs? Has it been established?

Response:

See response to page 8 comment above. However, "established" has been changed to "the Corps model reflects" in our memorandum.

Comment:

Page 13 of 13 paragraph 1. Adoption of 10 cfs

Response:

"Adoption" has been changed to "incorporation."

COMMENTS ON TM-1

Comment:

Address Bob's suggestions on Mike's comments.

Response:

The two general comments were addressed prior to our 10 August re-submittal. Comments 1 and 2 are concurrence with our revised draft. We have discussed his suggestions as identified in comments 3 and 4 and are in agreement with the approach contained in the 10 August submittal.

Comment:

SRBA may want to allow a period of review with local stakeholders before final approval.

Response:

It is our understanding that the comment period has been closed.

COMMENTS ON TM-2

Comment:

It is my opinion previous drafts should be final before this one went out.

Response:

Sequencing of document approval/distribution is SRBA's prerogative and is not under the control of SBG.

Attachment 2-1

Response to SRBA comments on TM 1-2 provided on 20 October

Comment: Comparison of old and new numbers. Cost Rollup Report 2014 and 2016 Yield TM 1.2

Response: The general basis of the difference in the new yield estimates contained in TM1-2 is discussed in the document and generally reflects refinements to the basin model and the incorporation of updated environmental flow estimates. Additional detail on the evolution of various yield estimates over the study progress is provided in Attachment 3.

Comment: Should 313 MN be included since state water plan has it for 2070.

Response: SBG's Scope of Work for 2016 Support Services (paragraph 7 b.) specifies the analysis to be performed at MN elevation 328. Paragraph 6 c. indicates that lower elevations may be considered if target yields can be obtained at those lower elevations. With the revised environmental flows incorporated into the model, this is not the case.

Comment: Instream streams/river does not include WOC in the diagram.

Response: Believed to refer to Attachment B of the TM. An explanation of why a White Oak Creek control point is not included in the "mini-WAM" has been added.

Comment: The unofficial new drought of record yield in WPL indicates existing water rights of 180,000 is actually above the URC to be complete.

Response: We are not sure exactly what portion of the document this comment references, but the TM has been checked so that it is clear that the estimated yield of any new storage above the Ultimate Rule Curve is in addition to the existing water right of 180,000 af per year.

Comment: What is the guideline qualification for a new drought of record? Suggest it be included.

Response: Upon review, we have concluded that the term "drought of record" is not accurate in this context. We have replaced it with "critical period" which is descriptive of how hydrology models calculate firm yield. An explanation of how the model identifies the critical period has been added to the memorandum.

Comment: 10 cfs vs 96 cfs (do we have anything from the OC to back it up?)

Response: The Corps has consistently communicated their intent in numerous team meetings and the version of Wright Patman Lake operations as contained in the current Riverware model is consistent with that intent. In addition, modeling assumptions, including the 10 vs. 96 cfs were confirmed by the JCPD, with SRBA participation, prior to the start of modeling efforts.

Comment: P. 5, MiniWAM and WRAP, look at the reference

Response: A definition of the acronym WRAP has been added to the memorandum.

Comment: Explanation needed. What constitutes a new drought of record?

Response: See above. "Drought of record" changed to "critical period" throughout the memorandum.

Comment: Page 7, 10 cfs and what is 3&4 at the bottom?

Response: See prior response on 10 cfs issue.

Comment: Page 8, Define subsistence, base low, base high

Response: We would defer to the Espey/Carollo team. The information portrayed on page 8 was provided by them and presumably explained in their document.

Comment: Page 14, what does Table 9 accomplish? Regional water planning without supply recipients consent? Would that be a normal process?

Response: Text in the memorandum has been revised to more fully explain how the information in Table 9 is used in this modeling exercise to and to clarify that it is simply a scenario of possible future demand.

Comment: Page 18, Why and who authorized it?

Response: Requirement to look at various priority and subordination scenarios and how operational parameters might affect International Paper operations is contained in the Scope of Work, task 1.6.

Comment: Page 21. The second sentence in paragraph 4 could be worded differently.

Response: Concur. Narrative has been substantially modified.

Comment: Page 22, Table 20 and Figure 2?

Response: SBG concurs that the subject table and figure were not self-explanatory and we have modified the text in this section to clarify results.

Comment: page 23, upstream reservoirs

Response: Concur. The word "project" has been changed to "reservoir."

Comment: Page 24, 10 cfs

Response: See previous response

Comment: Page 25 doesn't have a page #. Table 22 runs do not match Table 7 runs.

Response: Concur. A page number has been added and Table 7 has been corrected.

Comment: Introduction on Attachment A memorandum. 10 cfs

Response: See previous response

Comment: Attachment A, page 2, WPL low flows, 10 cfs

Response: See previous response

Comment: Attachment A, page 4, 10 cfs/96 cfs

Response: See previous response

Comment: Attachment A, page 5. Environmental flows by Lyons? May need to be clarified.

Response: Concur. Attachment A has been modified to indicate the referenced environmental flow estimates were derived using the Lyons method. These are the only environmental flow estimates available at the time that document was written.

Comment: Attachment A, page 6, new drought of record. Note it is not official. Not adopted by TCEQ.

Response: Concur. "Drought of record" has been changed to "critical period."

Comment: Attachment A, page 8. Difference between Mini WAM and SBG WAM

Response: Additional narrative has been provided.

Comment: Attachment A, page 13, 10 cfs

Response: See previous response.

Comment: Attachment A-1 page 7. Are the storage #'s unofficial new drought of record?

Response: The data shown on page 7 are the measured data that describe the relationship between storage, elevation and surface area for Wright Patman Lake. This is an input to the model, not an output of the model. Since it is a physical description these relationships not dependent on assumptions about drought of record.

Comment: Attachment A-1, page 12. WPL outflows, 10 cfs

Response: See previous response.

Comment: Description of SBG MiniWAM, what is SVSA?

Response: SVSA is an acronym used in WRAP coding which refers to the Storage Volume-Area relationship. Attachment A-1 has been changed to remove this terminology.

Comment: Page 3 and Page 6, 10 cfs

Response: See previous response.

Comment: Attachment C, page 1. Table C-1 does not match runs in Table 22

Response: Concur. Table C-1 has been corrected.

Comment: Can you put a summary together for Task 2 explaining the tool, where the data came from and how the Corps will use it?

Response: Yes. Requested summary is provided as Attachment 2-2.

Attachment 2-2

Summary – Task Two Spreadsheet

The spreadsheet submitted by SBG under Task Two is a collation of the data developed over the past two years of study intended to support a recommendation as to the appropriate scale of a combination project, i.e. what level of reallocation at Lake Wright Patman, in combination with what size reservoir at the Marvin Nichols site, reflects the "best" tradeoff between yield, cost, and environmental footprint.

The yields shown on the "Yields" worksheet come from the most recent yield analysis reflected in our 2016 TM 1-2, which includes the most current version of the RiverWare model, the fully-extended period of record for the hydrology, and the updated 2016 environmental flow requirements developed by the Carollo/Espey team.

The "Revised Costs" worksheet data is largely derived from the cost estimates documented in the SBG December 2014 *Final Cost Rollup* report with two exceptions:

- Because transmission costs are highly sensitive to the amount of water to be transmitted, and because estimated yields had changed substantially from those used to estimate transmission costs in the 2014 report, transmission costs for this spreadsheet were re-calculated in their entirety using the same cost model developed for the 2014 analysis updated with the revised yields.
- Mitigation costs for the 2014 report were based on a simplistic average of per-acre mitigation costs from a sample of available mitigation projects. For the 2016 spreadsheet, the mitigation costs were updated using current, fairly robust, unit costs for wetland, forest, and stream restoration at Riverby Ranch, which is the proposed mitigation site Lower Bois d' Arc reservoir located in Fannin County. This change is the result of a request from the project delivery team including the Corps, JCPD technical representatives and SRBA representation, during the September 2016 workshop.

Habitat Unit (HU) impacts ("HU Impacts" Worksheet) were extracted from the Corps' July 2016 report documenting the results of the Ecological Functions Modeling (EFM) performed by USACE.

The Summary worksheet, and subsequent graphs, synopsizes the data on the prior three worksheets, organized in an incremental output format similar to that used by the Corps to determine the most efficient project scale when they conduct their planning. It shows the marginal increase in benefit (yield), cost, and impact that results from each incremental increase in the scale of reallocation. That is, the increase in value, cost, and impact that one gets if one makes the decision to expand project scale that isn't available if that choice is not made. This way of organizing the data isolates the implications of each scale choice in a way that makes explicit the key differences between any two given project increments as an aid to plan selection.

Attachment 3

Response to SRBA Comments of 25 October

Comment 1: Requests a summary of the changes in yield estimates over the life of the project and expresses concern "vanishing" yield.

Response: A summary describing the evolution of key project parameters over the course of the Sulphur River Basin Feasibility Study is not a requirement of the Scope of Work. However, a brief chronology is included below. SBG notes that yield estimates are just that, estimates. *Actual project yields are almost entirely dependent on how much it rains and how much evaporation occurs* during the project's life. These factors are impossible to predict with any accuracy; hydrologic models used to predict project yields fundamentally depend on a basic assumption that future weather patterns will largely mimic historical weather patterns. When a model is updated to include additional years of historical data, better storage information, or more sophisticated estimates of environmental flow requirements, the predicted yields may change, in some cases significantly.

Brief chronology of Yield Estimates for WP 242.5/MN328 Combination

December 2014 Cost Rollup Report. Yield estimate is **996,500** acre-feet per year as noted in the comment. This estimate was derived using the TCEQ WAM/WRAP model modified to include Lake Ralph Hall and the updated sediment condition for Wright Patman as reflected in the most recent TWDB volumetric survey. The period of record for the hydrology in this version of the state model is 1940-1996. Consistent with our scope, this estimate does not include any reductions to yield associated with environmental flow requirements.

2015 Yield Estimates, SBG Technical Memorandum dated October 26,2015. Yield estimate is **623,000** acre-feet per year[1]. (Table 2-3). This estimate was derived using the first version of the RiverWare model provided by the Corps, which included hydrology updated through 2014. It also incorporates the Lyons-method environmental flow estimates provided by the RPS Espey Team and the summer release of 96 cfs from Wright Patman Lake.

2016 Yield Estimates, SBG Technical Memorandum 1-2. Yield estimate is **606,042** acre-feet per year. This estimate was developed using the revised RiverWare model provided by the Corps of Engineers. Differences between the versions of the Corps' RiverWare model are documented in the April 2016 SBG memorandum attached to TM 1.2. This estimate includes the updated SB3-method environmental flow provided by the RPS Espey/Carollo team and includes only the constant 10 cfs release from Wright Patman Lake.

[1] The yield of this combination with only a 10 cfs release is 650,828 acre-feet per year. This is the value reported in Table 8 of TM 1-2.

Comment 2: Requests an appendix to TM 1-2 comparing the official WAM historical yields to current yield estimates.

Response: To our knowledge, WAM runs for a combination Wright Patman/MN project have not ever been made using the same set of assumptions used by SBG for the 2016 yields. This is not included in our current scope of work and would represent a significant amount of additional work activity.

Comment 3: Requests a narrative explaining how the project described in Run#9 of TM1-2 relates to the State Water Plan.

Response: Our Scope of Work calls for a Technical Memorandum describing a specified set of model runs. A comparison to the projects in the State Water Plan is not included in our current scope.

Comment 4: Requests a series of model runs for combination projects with Marvin Nichols at a 313.5 elevation.

Response: This request is not included in our current scope and would represent a significant amount of additional work activity.

Comment 5: Notes that Attachment B to the draft TM includes a diagram which omits White Oak Creek and requests clarification.

Response: See previous response in Attachment 2. The text has been revised to explain why a White Oak Creek control point is not included in the "mini-WAM."