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March 26, 2010

Mr. Larry Dacus
MBK Engineers
1771 Tribute Road
Sacramento, CA 95815

Dear Mr. Dacus:

Subject: Upper Yuba River Levee Improvement Project
March 11, 2010 Meeting of Board of Senior Consultants

In response to your March 3, 2010 letter, we attended the second meeting of the Board of Senior Consultants (BOSC) for the Three Rivers Levee Improvement Authority's (TRLIA) Upper Yuba River Levee Improvement Project (UYLIP) on March 11, 2010. The purpose of the meeting was to review project progress, to discuss TRLIA's responses to comments from our first meeting, and to discuss the 60% design submittals, which we received prior to the meeting, and address questions regarding the submittals.

During the meeting we received the following documents:

1. UYLIP BOSC Comments, Meeting No. 1 – Dec.16, 2009, TRLIA's Responses to Comments from the BOSC Meeting No. 1 Report
2. Yuba Basin Flood Plain Management Plan, November 2, 2009
3. The final Geotechnical Basis of Design Report

The meeting was held at MBK's office in Sacramento and was attended by members of the project team (MBK, Kleinfelder, and HDR), TRLIA, Handen Company, Reclamation District 784, and representatives of the Central Valley Flood Protection Board, and the California Department of Water Resources. The agenda and a list of attendees are attached to this letter.

Our comments in our letter report for the first meeting, oral comments during that meeting, comments by others, and the design team's responses to the BOSC comments were discussed in detail during this 2nd BOSC meeting. The following are closures to our comments, in the order of the numbers used in Document 1 (a copy of Document 1 is attached to this letter):

1. The BOSC understands that differences in the hydraulic models of the river system are mainly due to the different objectives of the analyses. For instance, the FEMA models objective requires scenarios of levee failures to maximize the regulatory flood plain, whereas a Corps of Engineers (COE) models objective looks at the possible and practical movement of the floodwaters to evaluate

possible actions. The BOSC is satisfied that TRLIA, through MBK's studies, has made a legitimate effort to get the COE "on-board" for the MBK hydraulic model. The BOSC is also satisfied that the assumptions made in the MBK hydraulic models are appropriate for design purposes.

2. During the 2nd BOSC meeting, topographic information at the upstream tip of the project levee at the Gold Fields was presented. This topography showed that the area for about a distance of 500 feet or more upstream of the levee has contiguous highpoints that were higher than the 100 year flood elevations. These locations also had sufficient base thickness such that they would withstand the pressures of floodwater against them as well as prevent floodwaters from going near the tip of the levee and possibly eroding the tip. Also, details of the upstream levee terminus showed adequate erosion protection.

3. At the meeting, the Tetra Tech report was presented. This report showed that no areas south of the levee were inundated by flow from the Yuba River, for the 100 year flood event. For the 200 year flood, there were areas that were inundated at shallow depths south of the levee from small flows from the Yuba River. However, much of that inundation was caused by groundwater and local drainage. Mr. Paul Brunner mentioned that he knows of only one reported instance that water flowed from the Yuba River through the Goldfields and that was in 1950 (?). This was caused by a man-made river obstruction that caused a backwater effect and overflowed into the Goldfields. The BOSC is convinced that there would not be any flow through the Goldfield to the south of the levee for up to the 100 year flood. There may be some flow for the 200 year flood but the primary cause of the shallow flooding is not from the Yuba River. This should be verified when the COE final report is provided.

4. TRLIA pointed out that several Federal, State and local regulatory agencies have vested interest in the activities within the Goldfield. These agencies have jurisdictional powers over the operations of the Goldfields whereas TRLIA does not. This makes it hard for TRLIA to get an agreement with the Goldfield operators. TRLIA is therefore, urged to contact these agencies (if it has not already done so) and be informed if activities in the Goldfield could affect the levee project.

5. See Item 4 above.

6. We concur with the design of the upstream south terminus of the levee that is shown on Sheet C-121.

7. The exploration completed to date is adequate for the designed of levee improvement and is consistent with the recommendations of the Corps of Engineers. As the document indicated, and further explanations during the

meeting brought out, borings drilled through the levee crest or near the levee toes were principally located where information was needed to evaluate the proposed design. Only a few borings were located in places like the waterside of the levee because the data obtained would not have changed the design of the planned levee improvements. For most of the proposed levee improvement, a cutoff wall is proposed, and analyses assumed that no blanket layers existed on the water side of the levee. It is our understanding that additional exploration is being considered to aid the bidding/construction process by better defining the depth of impervious foundation strata that the cutoff wall will tie into, and to better characterize the engineering properties of the existing levee so more economical use may be made of it.

8. We understand and concur that all available observations of levee performance have been obtained and considered.

9. The closed-form blanket theory seepage analysis was completed as we requested and produced results in close agreement with the finite element analyses, providing the validation that we recommended.

10. Additional sensitivity analyses have been conducted to assess the impact of the assumed permeabilities of the subsurface strata on the computed exit gradients and are reported in the final Geotechnical Basis of Design Report. We are satisfied with number and results of the analyses.

11. Appropriate review and consideration has been given by the project team to the permeability data developed for the SAFCA projects.

12. The error in unit weights on the geotechnical cross-sections has been corrected. The correct unit weights had been used in the analyses.

13. A comparison of rapid drawdown stability analysis between SLOPE/W and UTEXAS-4 was conducted and confirmed results from the former.

14. Kleinfelder explained that they used the lowest values in the range of strengths they considered to analyze the rapid drawdown stability at Station 183+00 for the 200 year + 3 feet water surface condition, so the they would have had to use a high strength to do the sensitivity analysis that we recommended and would have obtained a high factor of safety.

15. A better scale has been used to present the results of the stability analyses.

16. We concur with Kleinfelder that quantification of earthquake deformations is not necessary for the level of evaluation performed for their study. The relatively low

level of expected earthquake shaking and levee heights should not produce significant deformations.

17. The $^1/_2$ to $1^1/_2$ inches of computed levee settlement appear to be reasonable and should not prove to be troublesome.

18. The cost and benefit of extending the wall to a depth of 90 feet were discussed during the meeting. The project team will discuss the possibility of reducing the 90-foot depth slightly to better balance the costs and benefits. We consider this a reasonable approach.

19. The justification of the width of the seepage berm and the proposed overlap with the cutoff wall presented at the second meeting and in the final Geotechnical Basis of Design Report is logical and convincing.

20. We concur with the decision to have conversion factors between NGVD 29 and NAV 88 developed for the RD 84 levee system. We commend TRLIA for contracting for surveys to provide conversion factors from NGVD 29 to NAV 88 Datum at different parts of the RD 784 levee system. It should eliminate any possible confusion over datum conversions.

21. The design of the improvements, acquiring right-of-way, obtaining permits, etc. will not be completed before April 15th, so there is no need to develop the scheduling information, we recommended, which might have allowed early construction. Rather, construction progress will be closely watched and any necessary adjustments made to assure the levee system is fully functional by November 1st.

22. See our response to question 2 below.

23. The Flood Plain Management Plan (FPMP) for the Yuba Flood plains which we were given at the meeting satisfies our request to see the emergency action plan. The BOSC will comment on its adequacy, after it has been reviewed, at the next BOSC meeting.

24. The editing we recommended occurred as the final Geotechnical Basis of Design Report was prepared.

25. See 8 above.

26. We acknowledge that the vertical boundary problem at Station 183+50 seepage model has been corrected.

27. Kleinfelder explained that all seepage analyses performed for the Draft and Final GBODR were performed with a constant head boundary condition equal to the

design WSE applied to the vertical waterside of the models as we believe is appropriate.

28. We concur with the plan to develop a 500-year flood profile and compare it with the 200-year +3 feet profile, to provide some insight into the return period and level of conservatism of the latter.

Your letter posed two questions that were discussed and addressed during the meeting. The following is a summary of our responses and comments that we provided orally during the meeting.

Question 1. *Does the Board concur with the approach, method, and findings of the engineering analyses?*

We concur with the approach, methods and findings of the engineering analyses completed to date. The 90 percent design phase is just starting and additional exploration may be undertaken, so some revisions to the analyses should be anticipated as the design progresses.

Question 2. *Does the Board concur with the following design items:*

- *Proposed methods of repair in each design segment*
- *Depths and lateral extent of the cutoff wall and seepage berm*
- *Quality control procedure specified for cutoff wall construction*
- *Geometric arrangement of the cutoff wall within the levee cross-section*

We concur with the proposed methods of repair in each design segment, with the understanding reached during the meeting that the plans be revised to clearly show that sliver fills will not be permitted where levee slopes are flattened, berms are constructed, etc.

The 60% design plans appear to reflect refinements in depths and lateral extent of the cutoff walls since we wrote “The depth and lateral extent of the cutoff walls are appropriate.” in our January 10, 2010 letter. We understand that the refinements were to better connect the bottoms and ends of wall segments to impervious strata. The refinements resulted in a reduced length of seepage berm. We concur with the refinements.

We understand that the quality control procedures specified for cutoff wall construction are the same as those that have produced satisfactory results on other levee projects, as such, we concur with them.

Figure 5-1 of the final Geotechnical Basis of Design Report shows a geometric arrangement of the impervious cap above the slurry wall that is improved over the one

shown in the 60% design drawings. It can accommodate some post construction settlement of the slurry wall. We concur with the revised design, with the understanding from the discussion during the meeting that an attempt will be made to optimize the design by reducing the amount of the imported clay cap material. We also understand that discussions are planned with the Corps of Engineers and other agencies about optimizing the use of materials excavated from the existing levee and borrow area to meet the intent of their regulations and guidelines, but possibly needing waivers from some specific requirements. We are open to considering the products of such discussions.

We appreciate the efforts of the project team in providing thoughtful responses to our earlier comments, the technical material and informative briefings. The participation of other meeting attendees was also appreciated.

Respectfully submitted,

Donald H. Babbitt, P.E.	Faiz I. Makdisi, P.E.	David T. Williams, P.E.
Board of Senior Consultants	Board of Senior Consultants	Board of Senior Consultants

Attachments:
- List of Attendees
- Meeting Agenda
- UYLIP BOSC Comments, Meeting No. 1 – Dec.16, 2009 (TRLIA's Responses to Comments from the BOSC Meeting No. 1 Report)

Attachment 1

UPPER YUBA LEVEE IMPROVEMENT PROJECT
BOSC Meeting No. 2
Attendance
March 11, 2010

NAME	ORGANIZATION	PHONE NO.
Faiz Makdisi	BOSC	(510) 663-4100
Donald Babbitt	BOSC	(916) 442-0990
David Williams	BOSC	(970) 282-3552
Claudio Avila	DWR – Urban Levee Evaluation	(916) 574-1423
Ray Costa	Kleinfelder	(916) 366-1701
Dan Fua	CVFPB	(916) 574-0698
Daniel Jabbour	HDR	(916) 817-4700
Charles Rabamad	DWR – EIP	(916) 574-2982
Doug Handen	Handen Co./TRLIA	(916) 635-5200
Paul Brunner	TRLIA	(530) 749-5679
Steve Fordice	RD 784	(530) 742-0520
Larry Dacus	MBK/TRLIA	(916) 456-4400
Byron Andersen	Kleinfelder	(916) 366-1701
Ric Reinhardt	MBK/TRLIA	(916) 456-4400
Johnnie Mack	HDR	(916) 817-4700

Attachment 2

Three Rivers Levee Improvement Authority
Upper Yuba Levee Improvement Project
Board of Senior Consultants, Second meeting
March 11, 2010

Agenda

1. Introduction and Administrative Details/Dacus
2. Upper Yuba River Hydraulic Analysis Update/Trieu (Dacus)
3. Responses to Comments from BOSC Meeting No. 1/Dacus
4. Project Description and Details/HDR and Kleinfelder
5. Questions/Feed Back from BOSC
6. Other Topics

Attachment 3

TRLIA's Responses to Comments from BOSC Meeting No. 1 Report

(Dated March 8, 2010)

UYLIP BOSC COMMENTS
MEETING NO. 1 – DEC. 16, 2009

COMMENTS FROM THE BOSC MEETING NO. 1 REPORT

1. A concern of the BOSC is that there are various hydraulic models of the system generated by various entities. It is understood that TRLIA/MBK have attempted to get the HEC-RAS model "accepted" by the USACE, but it would be prudent to get such a letter from them or at the least get them to say that the MBK HEC-RAS model can be used for the design of the project. (MBK)

RESPONSE: TRLIA requested the Corps to review and comment on the MBK HECRAS Model being used to design repair features for the Upper Yuba South Levee in December of 2008. TRLIA repeated this request as part of the Safety Assurance Review on February 17, 2010. The Corps has not provided a response to the February 17 request. TRLIA believes that the MBK HECRAS Model is the proper one to use for levee repair design. This model gives more conservative design water surface elevations along the Upper Yuba South Levee and there is reasonable probability that these elevations could occur along this reach of the levee. The most significant difference between the MBK and the Corps model in the Upper Yuba is how to address the high ground/training levee between the Yuba Mainstem Channel and the left bank Yuba River levee. MBK has investigated this area in the field and has obtained additional topographic surveys for the high ground/training levee reach. The topography gathered indicates that this reach actually consists of smaller interspersed reaches of high ground and low embankment. FEMA in the past accredited the reach of Training Levee for FEMA mapping purposes and has asked if any agency is willing to certify this levee to FEMA. Without certification FEMA will no longer accredit this levee reach and flood plain maps will be revised accordingly. So far no agency has agreed to provide certification information for the training levee. There is no information that indicates that this levee was built to current engineering standards with current standards of practice. This is not a Sacramento River Flood Control Project Levee and it is unlikely that it was constructed to proper levee standards. Without certification and accreditation of the training levee, FEMA criteria require that the levee reach be removed for purposes of developing base flood (100-year) elevations and flood plains. The MBK Model follows FEMA criteria and removes this levee for the 100-year event and consequently the 100-year event places flood waters against the Upper Yuba South Levee.

For the 200-year event, the training levee reach is modeled differently than for the 100-year event. Because of the lack of construction information, geotechnical information and analysis on this training levee, the levee cannot be assumed reliable for the 200-year event. For levee design purposes, complete removal of a levee is too conservative. The levee is much more likely to breach rather than be completely removed. The MBK Model allows a breach to develop in the low levee reach when it is overtopped by the 200-year flood. This breach degrades to the elevation of the surrounding ground elevation. The Corps hydraulic model allows this low levee reach to overtop without failure. For purposes of reliable design on the UYLIP for the 100-year and 200-year

events, it is TRLIA's position that the breach scenario is the standard for levee design, is conservative and appropriate for the design of the UYLIP.

2. Low points at the Goldfields project levee connection should be filled in for a distance 500 feet upstream of the Goldfields project levee connection. (HDR, MBK)

RESPONSE: Agree. Verification of critical low points will occur and any required modifications of this area will be included in the 90% design package.

TRLIA investigated the presence of low points in the Goldfields near the levee connection. Additional topography was obtained in this area of the Goldfields during the UYLIP design. This topography is shown on Plan sheet C-121 of the 60% Plans. The 200-year water surface elevation at the upstream end of the UYLIP is 93 feet NGVD 29. It would require an elevation of 96 feet NGVD 29 to contain this water surface elevation with 3 feet of freeboard. Review of the topography at the end of the Goldfields on Sheet C-121 indicates one possible low point within 500 feet of the end of the levee. This low point is approximately 40 feet from the end of the levee, approximately 10 feet wide, and has an apparent low elevation of approximately 94 feet NGVD 29. However this low point is located in an area of dense vegetation and a field investigation did not indicate the 2 to 3 foot drop off shown by the aerial topography. Field survey verification will be necessary and accomplished to determine if this low spot actually exists.

3. Analyze and provide an assessment of the possibility for the Yuba River to be "captured" by the Goldfields and be re-routed through the Goldfields by a succession of head cuts such that it would flank the project levee. (MBK)

RESPONSE: Agree.

The Corps of Engineers has concluded that flows from the Goldfields area for a 100 year event will not flank the end of the UYLIP project. An evaluation of the Goldfields was accomplished in 2002 by Tetra Tech for the Corps, *Analysis of Yuba River Surface and Groundwater Flows in the Vicinity of Marysville, California, Tetra Tech Inc. for USACE Sacramento District, June 2002.* This report indicates that the 100 year event does not break out of the Goldfields. The Tetra Tech report indicates a small area of flooding from a 200 year event that needs to be verified. The Corps Yuba Basin General Reevaluation hydraulic evaluations, still in draft, reference the Tetra Tech report and draw similar conclusions. The Corps draft report indicates a 200 year flood area, based on conservative assumptions, that is larger than the area in the Tetra Tech Report. TRLIA has under taken an effort aimed at verifying the 100 year Tetra Tech conclusion for FEMA mapping purposes and to better define the 200 year problem, if there is one. The Corps final report and TRLIA evaluation are expected to be completed later this year.

It needs to be clarified that TRLIA is not the lead agency in the Goldfields evaluation. The Corps along with the Yuba County Water Agency as a local sponsor is evaluating the flood threat from the Goldfields. The UYLIP currently ends at the Goldfields because this is the extent of the RD784 levee system and no specific up river problem has been

identified by the Corps of Engineers. The Corps of Engineers has not identified a 100 year flood flow problem originating from the Goldfields area and has not yet completed their 200 year evaluation.

TRLIA recognizes that the Goldfields hydraulics and river interactions are complicated and stakeholders in the Goldfields are many. The UYLIP is designed to address levee deficiencies from 100 and 200 year flood flows against the Upper Yuba South Levee from Simpson lane to the Goldfields and to terminate at the Goldfields high ground in an effective manner. Correction of the levee deficiencies by the UYLIP remove current 100 year and 200 year flood threats in this reach of levee and improve flood protection to the RD 784 area. The UYLIP cannot address any yet to be identified 200 year flood flow deficiencies in the Goldfields.

4. It is recommended that an agreement be made with the operators of the Goldfields to work outside a defined setback such that any activities would not affect the integrity and efficiency of the project. (MBK)

RESPONSE: See response to number 3. These potential alterations will be the subject of any future Goldfields Project.

5. At a minimum, an "ultimate" modification of the Goldfields should be determined through discussions with the operators and an assessment of this condition on the project should be made. (MBK)

RESPONSE: See response to number 3. These potential alterations will be the subject of any future Goldfields Project.

6. Provide details of the upstream south levee terminus to the BOSC when they are available. (HDR, MBK)

RESPONSE: See Sheet C-121 of the plan set.

7. Exploration appears to be less than recommended by the Corps of Engineers. To rectify it is suggested that in the reach of the levee where a cutoff wall is planned, additional borings could be drilled or, if feasible, CPT's conducted to verify the depth of the impervious stratum. When CPT's are performed, a minimum number should be coupled with drilled borings to provide enough samples to validate the results of the CPT probes. (Kleinfelder)

RESPONSE: Subsurface conditions along the YRSL have been explored during multiple investigations between 1988 and 2009. These investigations have generally resulted in advancement of 110 borings along the 20,159-foot levee alignment. The following table shows the number of borings and their location along the levee.

Distribution of Borings

Boring Location	Number of Borings	Reason for Boring
Levee Crown	47	Levee composition, foundation and subsurface conditions beneath levee
Landside Levee Toe	24	Composition of blanket a levee toe and subsurface conditions adjacent to levee
Waterside of Levee	7	Composition of blanket on waterside
Landside Field – 300 feet from Levee Toe	14	Composition of blanket away from levee
Landside Field – 100 feet from Levee Toe	18	Advanced in area of seepage berm to further investigate blanket composition beneath seepage berm

Boring locations were selected to provide sufficient characterization for project design and to meet the maximum recommended boring spacing of 1,000 feet contained in the USACE, Sacramento District SOP for levee evaluations. Field explorations for the current project were performed in three phases. The first phase of exploration consisted of advancing crown and toe borings for the PIR and occurred in December of 2008 and January of 2009. The second phase consisted of field borings and waterside borings for the GBODR and was performed in July and August of 2009. Since the portion of the project from Station 102+00 to 135+00 was found to not be deficient for slope stability, through seepage, and/or underseepage during the PIR evaluation, field borings were not advanced in this portion of the project. The third phase consisted of sonic borings in the crest and shallow borings in the field to supplement exploration for the GBODR and gather specific subsurface information for design of the cutoff wall and seepage berm elements of the project and was performed in September and October of 2009.

Review of site geologic maps, HEM data, historical mapping, levee geometry and topography, existing borings, and minimum spacing requirements was performed to select the location of each boring. The following steps were used for boring location selection.

1. Geologic mapping review. As discussed in Section 3, geologic mapping focused on identifying elements that may result in seepage pathways beneath the levee such as old channels and buried channels. Where these elements were identified in the geologic mapping, a boring was placed in the area.

2. HEM data. The warmer colors (reds and purples) of the HEM data generally represent coarse-grained sediments (i.e., sand and gravel). And colors between blue and purple (yellow and orange) generally represent intermediate graded materials (i.e., silts and silty/clayey sands). Where so called "hot spots" (red and purple zones) were observed in the HEM data, a boring was placed in the area.

3. Historical mapping. Historical mapping was used to further identify old channel and levee locations. If this mapping indicated an old channel, a boring was placed in the area.

4. Levee geometry and topography. This review was performed to identify areas of likely improvements to correct geometry deficiencies and topographic features that may affect levee performance (i.e. ditches, low areas, and ponds). Since these areas would likely need analysis, borings were placed in these areas to provide subsurface information for the analysis.

5. Existing borings. Existing borings were reviews for applicability to the current project. If a boring did not contain sufficient information (i.e. boring not drilled deep enough, laboratory testing of significantly layers missing) a replacement borings was located.

6. Minimum spacing requirements. After placement of borings to address the above issues, the boring number was checked for minimum USACE criteria. Borings were added as needed to meet this criterion. The exception to this was the location of waterside borings. The purpose of waterside borings is to gather information on the waterside blanket for use in modeling. However, the waterside of the levee was very well characterized by the geologic mapping as containing numerous old channels with the overall appearance of a braided stream environment. It was decided that borings on the waterside would be highly variable and potentially mislead the investigation if a boring encountered fine grained blanket material when the appropriate waterside material should be abandoned channel infilled with coarse grained material. Therefore, waterside borings were advanced in only selected locations.

Based on the above points, it is Kleinfelder's opinion that sufficient information has been gathered for the project design. The discussion presented above and the details relative to the scope of the field investigation have been added to Section 1.1 of the Final GBODR.

8. An attempt should be made to obtain records of the observed levee performance during these earlier flood events that preceded the Oroville Dam/New Bullards Bar Dam construction. The DWR urban levee program may be a ready source of information. (MBK)

RESPONSE: The DWR urban levee program recently completed a Draft Technical Review Memorandum (TRM) for the RD 784 levee system. TRLIA reviewed this report. The TRM accomplished a detailed review of DWR levee integrity records for this reach of levee and included a section on past recorded historical levee problems. None were

noted for the Upper Yuba South Levee. This is to be expected since historically this levee has not had water against it. The high ground/training levee on the south bank of the main stem Yuba River has prevented flows from reaching this stretch of levee. As discussed in the hydraulic analysis, the current analysis makes assumptions that include breaches where they have not historically occurred. These breaches increase the hydraulic loading on the Upper Yuba South Levee which would create seepage problems in this levee should high water reach the levee.

9. A closed form blanket theory analysis should be performed on a cross-section, with the necessary continuous blanket, to verify the finite seepage analyses. (Kleinfelder)

RESPONSE: A closed form blanket theory seepage analysis was performed for the existing conditions represented by the model cross-section at Station 183+50. The model at this location includes a silt levee and a continuous, relatively uniform silt blanket. The results of the seepage analyses indicated the average vertical gradient through the blanket layer (for both the 100-year and 200-year WSEs, respectively) computed by the blanket theory analysis (0.34/0.45) and the SEEP/W analyses (0.39/0.52) correlate well. The respective SEEP/W analyses and results are presented on Plates G-1 and H-1 of the Final GBODR.

10. Sensitivity analyses should be performed to assess the impact of the assumed permeabilities of the subsurface strata on the computed exit gradients reported from the analyses. (Kleinfelder)

RESPONSE: Parametric analyses have been performed for several of the models to assess the sensitivity of the modeled results and computed exit gradients to the input hydraulic properties of the model materials. Selected parametric analyses were presented in the Draft GBODR. Additional parametric analyses are presented in Appendix O of the Final GBDOR. Also refer to additional discussion of parametric modeling added to Section 5 of the Final GBODR.

11. Examine the permeability values determined for the SAFCA Natomas Levee Improvement Project and compare to values used for the UYLIP and use engineering judgment whether the Natomas values are applicable to the UYLIP. (Kleinfelder)

RESPONSE: Between December 2009 and January 2010 the Board of Senior Consultants (BOSC) for the Natomas Levee Improvement Program in consultation with the Kleinfelder design team developed a tabulation of recommended initial permeability values for seepage analyses of levees in the Natomas basin (Draft, dated 01-10-10). This is a modification of a table Kleinfelder had developed for use in early BOD reports for the Natomas program. The main difference between the tables is the Kleinfelder table includes a target value and a typical range; the BOSC table does not include a typical range. Kleinfelder used a previous version of our table for TRLIA. Permeability values used in the seepage modeling performed for the PIR evaluation of the UYLIP were reviewed and partially revised for the Draft and Final GBODR. This included examining the age of the deposits and the grain-size distributions of critical materials using results of hydrometer testing. This is similar to the process that the SAFCA Natomas project is

using to update and revise permeability values. Therefore, it is our opinion permeability values used for the GBODR differ from the NLIP table and are appropriate for the UYLIP project. Additional discussion of the values of permeability selected for the project is presented in the revised Section 5 of the Final GBODR.

12. Based on information in the "geotechnical "cross-sections", it is indicated that the stability analysis used the same unit weights for dry and saturated conditions. This was unexpected, please explain. (Kleinfelder)

RESPONSE: The values of dry unit weights were presented on the model cross-section plates in error and have been deleted from the revised Plates (4-2 through 4-8) included in the Final GBODR. The stability analyses were performed using saturated unit weights as presented on the plates.

13. Normally rapid drawdown analyses are done using UTEXAS-4. Compare the results of the SLOPE/W analysis with a UTEXAS-4 analysis for at least one rapid drawdown analysis at one section. (Kleinfelder)

RESPONSE: Comparison of SLOPE/W (2007 version) models to UTEXAS-4 models is no longer required by USACE. However, as requested, we have run one model with UTEXAS-4 for the Final GBODR and found the results comparable. The factor of safety computed by SLOPE/W for the model at Station 183+50 under rapid drawdown conditions was 1.04 (see Plate K-2/K-2A in the Final GBODR), while the factor of safety computed by UTEXAS-4 for the same model and conditions was 1.10. The results of the UTEXAS-4 modeling are presented in Appendix O (O-25) of the Final GBDOR.

14. The results of the rapid drawdown analysis for the cross-section at Station 183+50 for the 200-year + 3 feet water surface elevation indicate a factor of safety close to one (1.04). While the shear strength parameters used in the analyses may be conservative, it is prudent to perform a parametric analysis to asses the level of confidence in the computed factor of safety for this section. (Kleinfelder)

RESPONSE: In performing this analysis, a range of strength values were considered. The analysis was performed using the lower of the considered values. A parametric analysis would use higher strength values than those used in the model. Therefore, although the result of the analysis is close to 1.0, which is the allowable value, it is our opinion the analysis for this extreme case is conservative and shows the levee still meets rapid drawdown stability criteria.

15. It is recommended that results of the stability analyses be presented at a better scale to show details of the slip surfaces analyzed. (Kleinfelder)

RESPONSE: Concur. Additional stability analysis Plates have been provided in Appendices I and K to present the SLOPE/W stability analyses at more legible scales.

16. At Station 243+50, post earthquake stability analyses were performed for this section by assigning residual strength for zones that were estimated to have liquefied. The reported yield acceleration for a landside potential sliding surface is 0.06g, which is

less that the PGA value of 0.14g, indicating the potential for some earthquake-induced permanent deformations that need to be estimated. (Kleinfelder)

RESPONSE: We agree that there is a potential for some earthquake-induced permanent deformations. However, our analyses were focused on only qualitative assessments and no effort was done to quantify the deformations. Since the yield acceleration is greater than 15% of the PGA, the section at Station 243+50 will probably not experience large deformations during the design seismic event. For significant deformation to occur, the calculated yield accelerations should be lower than the threshold value of 15% of the PGA. For this site, the PGA varies between 0.13g and 0.14g. Therefore the threshold yield accelerations are 0.0195g and 0.0225g, which are below the yield accelerations calculated for the GBODR. Therefore, it is our opinion that quantification of deformations is not necessary for the level of evaluation performed for this study.

17. Settlement analyses should be conducted to determine the potential for the weight of the seepage berm to further compress existing levee material and the underlying softer foundation layers, causing longitudinal cracking of the levee crest. (Kleinfelder)

RESPONSE: Settlement analyses have been performed for the Final GBODR and are presented in Appendix N of the Final GBDOR. The calculated amount of settlement typically ranged from about $^1/_2$ to $1^1/_2$ inches. This amount of settlement is not significant and not expected to cause significant deformation at the levee seepage berm interface. Please refer to additional discussion of potential post-construction settlement presented in Section 5 of the Final GBODR.

18. The BOSC concurs with the use of a "hanging wall" from stations 189+00 to 221+00 but understands that the wall be constructed to maximum depth obtainable by a backhoe as suggested by the Corps of Engineers representative at the meeting. (Kleinfelder)

RESPONSE: Concur. The Final GBODR and Project has been changed to reflect an 80 foot wall depth.

19. A comprehensive justification of the width of the seepage berm and the proposed overlap with the cutoff wall is needed in the GBODR. (Kleinfelder)

RESPONSE: Please refer to revised discussion of seepage analysis results presented in Section 5.2 of Final GBODR.

20. The current datum used in the basis of design report is the NGVD 29 Datum. It is our understanding that surveys are currently planned to develop conversion factors to the NAV 88 Datum. (MBK)

RESPONSE: TRLIA has contracted for studies to provide conversion factors from NGVD 29 to NAV 88 Datum at different parts of the RD 784 levee system. These factors will be used during the FEMA Certification process for the levee system. These

factors will also be included in the O&M Addendum. TRLIA intends to complete plans and specifications using the NGVD 29 Datum.

21. The schedule for degrading the levee for the cutoff wall construction should be drafted in the next few weeks and reviewed by all project participants. Historic river flows and stages, available upstream reservoir storage, and any other pertinent factors should be analyzed to determine the safe starting date for the degrading. The analysis can be updated as runoff evaluations are made in late winter and early spring. (MBK)

RESPONSE: TRLIA will abide by the no work during the flood season restrictions (November 1 to April 15) set forth by the CVFPB Permit. This construction season is established based on the Central Valley climate and historic rain periods. TRLIA will not be able to begin work as early as April 15 in 2010. As the time approaches for TRLIA to award the construction contract, close attention will be paid to the time remaining to the beginning of flood season and excessive levee degradation will not occur. TRLIA will not degrade any more of the levee than can be restored prior to November 1.

22. Consideration should be given to placing the material from degrading the levee directly into the seepage berm and using material from the borrow area to reconstruct the levee. The process would greatly reduce the need for stockpile areas and provide simpler construction, hence should save valuable time and possibly money. (HDR, Kleinfelder)

RESPONSE: Concur. TRLIA will coordinate with the selected contractor to consider this process when developing the construction program.

23. The BOSC would like to see the status of the Emergency Action Plan (EAP) as well as a list of the participating agencies and their involvement in the EAP. (MBK)

RESPONSE: TRLIA prepared a Flood Plain Management Plan (FPMP) for the Yuba Floodplains as part of the Section 408 approval Process for the Feather Setback Levee. This FPMP was based on the numerous Flood Emergency Plans already developed and adopted by Yuba County. A copy of this FPMP is attached.

24. The Drat GBODR could benefit from a thorough review and editing of a number of inconsistencies. (Kleinfelder)

RESPONSE: Concur. Independent Technical and QC reviews have been performed prior to submittal of Final GBODR.

COMMENTS DURING THE BOSC MEETING

25. TRLIA should develop more information on the duration of flooding against the Upper Yuba South Levee. It should also see what velocity information can be used. The Board cautioned TRLIA to be aware of vertical datum issues. (MBK)

RESPONSE: Hydraulic evaluations are concluding with the new topographic information and a response has not yet been prepared.

26. Kleinfelder will adjust vertical boundary at section 183+50. (Kleinfelder)

RESPONSE: Vertical model boundary conditions for seepage models representing existing and proposed new conditions for model at Station 183+50 have been reviewed and found to be correct. Vertical (elevation) scales on the model cross-section drawing (Plate 4-2) and the seepage/stability analyses have been reviewed and corrected.

27. BOSC suggested that there be a full head boundary on the waterside of the models and based on groundwater levels shown in the borings it was likely that the foundation was saturated. (Kleinfelder)

RESPONSE: Previous seepage analysis was performed for some models during the PIR-level evaluation with the vertical waterside boundary of the models set as a no-flow boundary and a fixed-head boundary condition set to the design WSE was used along the waterside slope of the levee and the waterside ground surface. However, after review of the PIR modeling, all seepage analysis performed for the Draft and Final GBODR was performed with a constant head boundary condition equal to the design WSE applied to the vertical waterside of the models.

28. BOSC suggested additional hydraulic runs to determine approximate frequency of the 200-year +3 foot event. (MBK)

RESPONSE: Hydraulic evaluations are concluding with the new topographic information and a response has not yet been prepared.

COMMENTS FROM DWR

29. (Feb. 2, 2010 email from CR) It appears that the change from the seepage berm to cutoff wall upstream of Station 221+00 is based on tieing the wall into a silt/clay later between elev 20 and 35. Based on their logs, this layer pinches out downstream of the dairy but appears to be continuous in the upstream direction. I suspect that seepage analyses with the cutoff wall will bring the exit gradient at Station 243 to acceptable criteria. I would think, however, they they should take a closer look at Station 221 where the wall raises from elev 0 to elev 25 as this is where the silt/clay layer is less than 10 feet and pinches out immediately downstream. I know they are planning some add'l CPTs but don't know if they plan any at the point where the wall transitions. It may make sense to confirm the silt/clay or extend the deeper wall further upstream to ensure that it ties in.

RESPONSE: Geotechnical borings KB-08-18 (Station 221+00) and KB-08-19 (Station 224+20) both indicate an acceptable silt/clay layer to tie the reduced depth wall into. During construction of the wall, field geologist will verify that the wall is tieing into an appropriate layer and the wall will be deepened in the upstream direction if required.

30. (Feb. 2, 2010 email from CR) I also believe this transition is near the dairy which has a waste ditch directly adjacent to the levee. I seem to recall that under the previous design with seepage berms, they were planning on relocating the ponds. I'm assuming they would still want to relocate the pond.

RESPONSE: Geotechnical evaluation based on field topographic cross sections found that the ponds do not present an excess gradient problem, exit gradients are less than criteria. TRLIA does not plan on touching or relocating the Dairy Waste Ponds.

31. (DOE Feb. 2, 2010 Comment) From Sta.215+00 to Sta 304+00, HEM Differential Resistivity indicates foundation consists of coarse material with high resistivity, while the borings, KB-08-21,26,29,31 encountered fine grained less resistive material. Is that the reason the proposed cutoff wall was terminated at Sta. 215+00?

RESPONSE: After additional evaluation, the TRLIA Project Team selected to extend the slurry wall feature further upstream. The slurry wall now extends to Station 288+00 as reflected in the 60% Plans. Only the final 1700 feet of levee now has a seepage berm. A seepage berm was used in this reach due to the depth of gravels and sands in the foundation.