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September 27, 2011

VIA EMAIL

DOCKET	
08-AFC-13C	
DATE	SEP 27 2011
RECD.	SEP 27 2011

Craig Hoffman
Compliance Project Manager
California Energy Commission
1516 Ninth Street, MS-2000
Sacramento, California 95814

Re: Calico Solar 08-AFC-13C - BNSF Preliminary Comments on Calico Solar Project Geomorphic and Hydraulic Analysis and Geomorphic and Biologic Analysis Report

Dear Mr. Hoffman:

We write on behalf of BNSF Railway Company ("BNSF") to provide the attached comments on the Geomorphic and Hydraulic Analysis and Geomorphic and Biologic Analysis Report ("Report") submitted by K Road Calico Solar, LLC on September 12, 2011, for the modified Calico Solar Project as described in the March 18, 2011 Petition to Amend. Our consultant, Environ, is unable to provide full comments on the Report until they receive input and output files, which were to be included with the Infiltration Report, upon which this Report is required to be based. In an effort, however, to assist Commission Staff in moving forward in their analysis, we are providing the attached initial comments. We would ask your assistance in having the input and output files docketed with the CEC and posted on the CEC website as quickly as possible, so that BNSF may augment the attached initial comments.

Finally, we do not believe any limitations on the CPM's obligation to consider BNSF's comments on the Report should begin to run until we have received the input and output files. Please let us know if you have any questions, or would like an opportunity to have a workshop to discuss BNSF's initial comments.

Sincerely,

Anne Alexander

AA:

Attachment

ENVIRON

September 27, 2011

Mr. Dustin Almaguer
BNSF Railway Company
2500 Lou Menk Drive
AOB-3
Fort Worth, Texas 76131

Re: Calico Solar Geomorphic Report

Dear Mr. Almaguer,

As you requested, ENVIRON has reviewed the Geomorphic and Hydraulic Analysis and Geomorphic and Biologic Analysis Report (the "Report") dated September 12, 2011 prepared by Tetra Tech referencing Soil & Water Condition 8 (S&W-8). The Report references the requirement to "determine the maximum design storm that can be routed through the site utilizing existing fluvial washes that will not result in significant damage to proposed site infrastructure and determine the ability of the proposed site infrastructure to withstand the storm at the proposed location of said site infrastructure." (S&W-8(4)(b)). The Report fails to comply with this and other requirements of Soil & Water 1, 3, 8, 13 and 15, parts of which are applicable to the Report. ENVIRON has summarized some of the most significant failures here:

- S&W-15 requires that all studies, reports and plans submitted pursuant to the Soil & Water Conditions "shall be based on and utilize consistent data and assumptions." S&W-15. Yet the Report is not factually consistent with the Geotechnical Engineering Report prepared by Terracon and submitted to the CPM on August 23, 2011. Consistent with good engineering practice and with S&W-15, the Report should be revised to incorporate the applicable data, conclusions and recommendations of the Geotechnical Report.

- S&W-1 and 8 require both the Infiltration Report and the current Report to be based upon and consistent with the report entitled Existing Condition Hydrologic Study for Solar One (Phase 1 and 2) Project Site prepared by Huitt-Zollars and dated April 3, 2009 (the "Huitt-Zollars Report"). Furthermore, the current Report is required to be based upon and consistent with the Infiltration Report. S&W-1, 8, 13, 15. Both the Infiltration Report and the current Report were prepared by Tetra Tech, and therefore their findings and conclusions are consistent. However, Tetra Tech does not appear to have based the Report upon the Huitt-Zollars Report in data, analytical methods, or overall approach. This failure results in Tetra Tech underestimating the Project impacts to the BNSF Right-of-Way and their conclusion, unsupported by scientific evidence, that the more than 600

acres of debris, detention and retention basins and other structural controls recommended in the Huitt-Zollars Report are unnecessary.

- In addition to not being based upon the Huitt-Zollars Report, the Report fails to comply with the basic requirement of Soil & Water-8(4)(b), cited above to consider the question of sediment transport through the site and the potential impacts to Project facilities. As discussed below, both for purposes of supporting the good faith of the Applicant in preparing the Soil & Water deliverables and for purposes of ensuring that the Project will result in no adverse impacts to the BNSF Right-of-Way, this analysis should be included.

We are concerned that this foundational study of the Soil & Water Conditions has not been adequately prepared to form the basis of subsequent studies, reports and plans, and therefore that neither BNSF nor the CPM will be able to "conduct a review of the proposed project and provide a written evaluation as to whether the proposed grading, drainage improvements, and flood management activities will comply with all requirements presented in [the Soil & Water Conditions]." S&W-1, para. 1.

ENVIRON provided comments on Tetra Tech's technical approach in its June 29, 2011 letter to Mr. Craig Hoffman following the Calico Solar workshop chaired by the CEC on June 28, 2011. In general, ENVIRON's comments have not been addressed in the Report. For example, ENVIRON recommended examining the effects of rainfall concentration and potential channelization of runoff and consequent effects on sediment transport due to the PV arrays. Tetra Tech has not followed this recommendation and other recommendations. Therefore, some of ENVIRON's comments here are similar to those made previously.

Despite previous requests, ENVIRON has not been provided the input and output files for Tetra Tech's modeling. Neither have we been provided with Tetra Tech's scope of work, which would include the objectives of the Report, sampling plans, and rationales for the sampling locations and depths. In addition, BNSF has made numerous other requests for information which have not been answered, the need for which is explained in detail below. In addition, we found Tetra Tech's report to be surprisingly brief, spanning only 65 pages (a portion of which appears to be simply a restatement of the similarly superficial Infiltration Report), and insufficiently detailed for purposes of review. For example, Tetra Tech does not explain how the PV arrays and SunCatchers are represented in the proposed conditions model (p. 3.7). In general, the figures and tables also do not provide enough detail for review purposes. For example, Tetra Tech does not provide a table summarizing predicted sediment loads or figures showing sub-basin boundaries, elevation contours, areas, and flowlines. By way of contrast, Huitt-Zollar's report Existing Condition Hydrologic and Hydraulic Study, discussed further below, is more than 900 pages in length and includes detailed figures (including a figure showing the sub-basin boundaries, elevation contours, areas, and flowlines) and extensive tables (including predicted sediment loads). Without more detailed reporting as well as the detailed backup such as input and output files and scopes of work, ENVIRON's review of Tetra Tech's brief report will necessarily be limited. On behalf of BNSF, we therefore reserve the right to supplement these comments after we have had an opportunity to review these additional materials.

Specific comments and observations on the Report are as follows:

The inconsistencies in approach found in the Infiltration Report should be corrected, and the corrected approach should be carried through to the current Report.

- The Report is based on the results of Tetra Tech's Calico Solar Project Infiltration Report (Infiltration Report), dated September 6, 2011. The calculation of rainfall runoff in the Infiltration Report is the foundation for calculating scouring and sediment behavior in the Report. However, as stated in ENVIRON's comments on the Infiltration Report, there are several fundamental shortcomings of the Infiltration Report which impact the analyses contained in the Report.

  First, Soil & Water-13 requires the Infiltration Report to "include a calculation of the amount of storm water runoff for 1) the existing soil conditions, 2) the temporarily disturbed conditions resulting from construction, and 3) the final conditions after the installation of the solar technology and the construction of roads and buildings is completed." S&W-13, para. 1. The Infiltration Report fails to present any analysis of scenario 2, and as will be discussed, uses inconsistent approaches to the analyses of scenarios 1 and 3.

  Second, the Infiltration Report emphasizes the "conservative" nature of the analysis of existing conditions, scenario 1, noting that conservative parameter values were selected to overestimate runoff flow rates. Such conservativism is common in engineering practice. However, as ENVIRON noted in its comments on the Infiltration Report, this approach yields unrealistic results, most notably the overtopping of the BNSF railroad tracks by the 10-year storm event. Given that the BNSF railroad in this area has not been flooded in its nearly 100-year history, this result is clearly unrealistic. Without using consistent assumptions for scenarios 2 and 3, this appears to be an attempt by the Applicant to establish a high baseline of existing conditions that would relieve Applicant of mitigating and controlling Project impacts through the incorporation of debris, detention and retention basis and other structural controls and of future liability should flooding occur during the life of the project.

  As discussed in my comments concerning the Infiltration Report, when analyzing scenario 3, the final conditions after completion of the project, Tetra Tech does *not* consistently take a conservative approach. As a result, analyses for scenario 3 do not appear to be conservative in the same manner as the analyses for scenario 1. This is inconsistent with the requirement that "the amount of impervious surface created by each project feature shall be estimated by considering worst-case conditions." S&W-13. This requirement means considering such factors as the following: 1) the impact when the SunCatchers are fully open to their maximum diameter; 2) the long-term compaction caused by construction and maintenance vehicles (in the case of untreated dirt roads); 3) the permeability that results from application of the selected treatment; and 4) worst-case vegetation conditions. S&W-13. These worst-case conditions have not been considered,

and storm water and sedimentation impacts are therefore understated. For example, it is likely that runoff (and, as a consequence, sediment transport) downslope of the solar installations will increase as a result of the construction of impervious surfaces such as PV panels and roadways. The previous design, as stated in the Commission Decision, has over 295 miles of roadways to and among the hundreds of rows of solar technologies (Commission Decision, Project Description, p. 3). The PV panels and roadways will concentrate runoff, likely resulting in the formation of new channels. In addition, scour will be created around the more than 1.9 million poles of the PV modules proposed to be installed, further contributing to the sediment transport from the Project site (Petition to Amend, p. 2-6). The Infiltration Report and the current Report should be revised to include the required analysis of these factors.

By not taking an evenhanded, consistent approach in analyzing these scenarios, the overestimate of flooding potential and storm water runoff under existing conditions will tend to mask actual increases due to the Project. Thus it is not surprising that Tetra Tech concludes that differences in flooding potential and storm water runoff between existing conditions and final conditions are insignificant. Tetra Tech's approach is also inconsistent with the S&W-1 requirement that Calico's "plan shall demonstrate no increase in off-site flooding potential and no increase in storm water runoff or sediment transport off the project site and onto the BNSF right-of-way." S&W-1, para. 1. As stated in ENVIRON's comments on the Infiltration Report, in order to be consistent with good engineering practice and the requirements of the Soil & Water Conditions, Tetra Tech should revise the Infiltration Report to carry its "conservative" approach through to its analysis of Scenarios 2 and 3. The results of the revised Infiltration Report should then be incorporated into a revision to the current Report, such that all potential impacts from the Project can be fully identified and mitigated.

Because it is based on the flawed Infiltration Report, Tetra Tech again concludes in the current Report that the Project's impacts are insignificant, this time with respect to sediment transport. This conclusion is driven largely by the inconsistent approach taken in the Infiltration Report, since sediment transport calculations rely directly on the results of the Infiltration Report.

Regardless of the cause of the inconsistency, the results of the sediment transport analysis appear to be implausible. As noted above, the Report does not include a table summarizing the results of the sediment transport analyses. However, the text reports the "total quantity of sediment entering the Project site from the north" to be 13 metric tons per kilometer per year for an area of 28 square kilometers. Using appropriate conversion factors, we calculated that Tetra Tech's estimate of annual sediment yield for the portions of the basin upstream of the Project is roughly 330 cubic yards per year. In contrast, Huitt-Zollars estimated the sediment yield for subbasins "upstream of the north project boundary" to be 33,619 cubic yards per year for a basin area of 24.3 square kilometers

(Table 1), resulting in the recommendation by Huitt-Zollars for over 600 acres of debris, detention and retention basins. **The difference between the two estimates, about 100-fold, is inexplicable.** Tetra Tech does not acknowledge this large difference, nor provide scientific support for its assumption that no debris, detention and retention basins are necessary. Tetra Tech should revise the Report to incorporate the data, analysis, conclusions and recommendations of the Huitt-Zollars Report, as required by Soil & Water-1, including the estimate of sediment yield. Furthermore, Soil & Water-15 requires consistency among all studies, reports and plans submitted pursuant to the Soil & Water Conditions, and Soil & Water-1 requires the studies, reports and plans to be based upon the Huitt-Zollars Report, as well as the Initial Drainage Report prepared by Stantec Consulting dated October 2008.

As recommended previously, Tetra Tech's use of conservative parameters should be carried through the modeling and analysis of all three scenarios. Additionally, as previously recommended and discussed in the most recent workshop, sensitivity analyses should be performed to evaluate the impacts of particular parameter values and assess the degree of conservatism inherent in each analysis. We have not been able to find any such sensitivity analysis in the Report. Standard practice requires the development of sensitivity analyses under circumstances such as those present here.

The Report is inconsistent with the Huitt-Zollars Report in many significant respects.

- Because the Infiltration Report is not based on the Huitt-Zollars Report as required, the current Report's analyses and conclusions also differ from those of Huitt-Zollars in several key respects. First, as noted previously, Huitt-Zollars focuses on evaluating potential impacts to the Project whereas the Report purports to focus on evaluating potential impacts to the BNSF railroad tracks, although the quality and completeness of any such analysis is in question. In effect, the Report does not evaluate potential impacts to the Project. Because broken PV modules and other debris from damaged Project facilities could be washed downstream to the BNSF Right-of-Way in a severe storm event, an analysis of the sedimentation impacts to the Project facilities is necessary for a complete analysis of impacts to the BNSF Right-of-Way.

  In contrast to the current Report, the Huitt-Zollars Report considers scour, flood flow, and debris flow impacts on project facilities. As a result, the Huitt-Zollars Report arrives at strikingly different conclusions. Huitt-Zollars indicates that "During extreme storm events, such as the 100-year event, significant erosion and deposition will occur at various locations across the fan as a result of natural alluvial fan processes. The location at which these will naturally occur is not predictable. The magnitude of these forces and the associated risk they entail should not be underestimated" and that "All SunCatcher units placed within the alluvial fan are at risk of experiencing significant erosion and scour." (Huitt-Zollars, Binder 2, p. 12) In response, Huitt-Zollars makes a number of

recommendations to mitigate that risk, including construction of basins to intercept and retain debris, sediments, and runoff, indicating that "Intercepting potential debris flow prior to its arrival on the project site is likely the surest way of reducing the risk of damage to SunCatcher units by the devastating power inherent in debris flow." (Huitt-Zollars, Binder 2, p. 9) Yet the current Report assumes, without scientific basis, that such control measures are unnecessary.

Second, the Report fails to comply with S&W-1, which requires the analysis to be consistent with FEMA's National Flood Insurance Program (NFIP) Appendix G. Specifically, "the project design shall be based on the assumption that the primary flow from the apex of the alluvial fan may flow to any single location within the site." 44 C.F.R. 65.13; S&W-1(4); S&W-8(2)(iv). In contrast, the Report is based on the unsupported assumptions that: (1) storm water flow under existing conditions is properly characterized as sheet flow; and (2) neither the disturbance caused during the construction phase nor during operational phase of the Project will have any impact on the sheet flow of water across the Project site.

Tetra Tech neither acknowledges the S&W-1 requirement nor cites FEMA. We could not find a reference to the "assumption that the primary flow from the apex of the alluvial fan may flow to any single location within the site." *Id.* Instead, Tetra Tech applies a sediment transport analysis that is based on analytical expressions obtained from a report prepared for the Southern Sandoval County Arroyo Flood Control Authority, New Mexico entitled Sediment and Erosion Design Guide ("New Mexico Guide"), prepared by Mussetter Engineering and dated November 2008. Tetra Tech provides no explanation for use of this analysis in the context of an alluvial fan in California. Moreover, we could not find any reference to FEMA's NFIP in the New Mexico Guide, nor could we find references to the equations used by Huitt-Zollars, namely the Renard and the U.S. Bureau of Reclamation equations. We can only conclude that there is no relation between the approach taken by Tetra Tech and Huitt-Zollars. Again, this is inconsistent with the requirements of the Soil & Water Conditions.

We have had a brief opportunity to review the New Mexico Guide. Based on this brief review, it appears the New Mexico Guide focuses on the evaluation of arroyos, "ephemeral flow stream channels characterized by steeply sloping or vertical banks of fine sedimentary material and flat, generally sandy beds." (p. 1.2) Although the New Mexico Guide acknowledges the potential instability of arroyos, the emphasis appears to be on evaluating discrete channel formation and stability rather than the ensemble of unstable channels characteristic of alluvial fans that is of critical importance here.

Third, and perhaps most striking from a technical standpoint, is with respect to the instability and unpredictability of flowpaths on the active alluvial fans upon which the Project will be located. The Huitt-Zollars report emphasizes the instability of the washes

and unpredictability of flowpaths on the active alluvial fan upon which the Project will be located, citing the regulations of FEMA's National Flood Insurance Program (NFIP). Huitt-Zollars concludes that "It is this unpredictability of flowpath that is key" to the analysis because it implies that solar installations located on the alluvial fan will be "hit" by flood flows with 100% certainty and that the probabilistic nature of the FEMA methodology is insufficiently conservative to account for this 100% certainty. Therefore, Huitt-Zollars applies the FEMA methodology but assumes that impacts will occur with 100% certainty (Huitt-Zollars, Binder 2, pp. 2-3).

In sharp contrast to this emphasis, we could find no discussion whatsoever of the unpredictability of flowpaths in the Report. Whereas Huitt-Zollars regards the issue as key to the analysis, resulting in Huitt-Zollars' recommendation of over 600 acres of retention, detention and debris basins along the northern edge of the Project site, Tetra Tech appears to regard the issue as insignificant, and therefore proposes no control measures for storm water and sediment transport. The most extended discussion of channel instability we could find in the Report is a reference to "some local scour [that] could be induced by the abrupt transition between compacted and uncompacted areas, such as the secondary access roads and the drainage structures through the main access road. These local instabilities are not expected to cause systematic instability of the existing washes nor will they change the overall sediment balance within the site unless they are allowed to develop over multiple storms." Report, section 4, p. 4.7. Tetra Tech provides no basis for the conclusion that local instabilities will not cause systematic instability or change the overall sediment balance within the site, nor does it acknowledge Huitt-Zollars' previous approach emphasizing the instability and unpredictability of flowpaths. To be consistent with good engineering practice and the requirement of Soil & Water-13 that worst-case conditions be analyzed, the Huitt-Zollars approach should be acknowledged and incorporated, and the potential for systematic instability should be evaluated in the Report. This instability may be further impacted by the scour that is likely to occur around the poles of the PV modules. Therefore, when the results of the Scour Analysis required by Soil & Water-3 become available, the Report should be revised to incorporate the findings, conclusions and recommendations of that report.

The Report is also inconsistent with the Huitt-Zollars Report in its cited values of precipitation depths for various storm durations and frequencies. In Table 5.4-1, the Huitt-Zollars Report lists precipitation depths for several combinations of storm durations and frequencies. In Table 2.1, the Report lists comparable values. Although the same National Oceanic and Atmospheric Administration (NOAA) website is cited, the values are different: the values listed in the Report are consistently lower than the values listed in the Huitt-Zollars Report. For example, the Huitt-Zollars Report lists the 100-year 24-hour design storm precipitation depth as 3.54 inches whereas the Report lists the corresponding precipitation depth of 2.99 inches. Since precipitation depths are critical parameters for purposes of analyzing flood flows and sediment transport, this difference

should be corrected, consistent with good engineering practice and the requirements of Soil & Water-1. Such a revision is particularly appropriate given the widely acknowledged fact noted at p. 2.6 of the Report that precipitation rates are increasing. Such an increase could cause further increased flood flows and sediment transport over the life of the Project

Construction activities will result in disturbance of effectively the entire Project site.

- The significance of construction activities to the geomorphology and hydraulic impacts of the Project cannot be overstated. Under existing conditions, the ground surface is armored with a thin crust of hardpan soil comprised of relatively coarse soil from which finer-grained materials have been removed over the years by the effects of water and wind erosion. The thin crust is underlain by loose, relatively fine-grained materials that have been protected from erosion by the presence of the crust.

  During project construction, this thin crust will be disrupted, if not destroyed entirely, across the project site by the operation of heavy equipment such as trucks, pile drivers and drill rigs. Once the crust has been destroyed, the underlying loose, fine-grained materials will be exposed to water and wind. As a result, not only will the hydrologic behavior change, but erosion rates will increase significantly across the entire 4500-acre Project area. Erosion rates will remain higher than current erosion rates until the thin crust of hardpan is re-established, a process that could take years to complete, potentially far beyond the 30-year life of the Project. These effects will be exacerbated by the grading for the roads and other recommendations in the Geotechnical Engineering Report intended to ensure the stability of roads for purposes of supporting vehicles but which will impact runoff characteristics. These factors should be incorporated into the analyses of sediment transport during both construction and operations, as the crust will not be re-established for many years.

  We find no modeling of the significant disruption of the desert crust likely to occur under the construction scenario in the Report. This is inconsistent with the requirement of Soil & Water-13 that the analysis of Project impacts consider worst-case conditions. The Report's conclusion that sediment yields during periods of construction will not change significantly with respect to those under existing conditions is unrealistic, particularly in the absence of any supporting rationale or analysis. In the absence of any analysis, how can Tetra Tech arrive at any conclusion, much less a significant and counterintuitive one such as this? Tetra Tech should acknowledge the disruption of the thin crust, estimate the length of time required for crust reformation, and discuss sediment control measures to be put in place to minimize erosion and sediment transport in the interim.

Because it is based on assumptions which are unrealistic and inconsistent with existing reports, the Report understates the Project's impacts to sediment transport during the operational phase of the Project.

- The Report's treatment of site access and maintenance roads at p. 3.7 appears to be inconsistent with Terracon's recommendations concerning road construction in the Geotechnical Report, and therefore significantly understates the degree of disturbance to the site from the proposed roads. We understand roads are proposed to be constructed between every other row of PV modules, which will be spaced at a distance of approximately 10 feet. The Report does not provide sufficient information to make a more precise determination, but it appears that roads will occupy several hundred acres of the approximately 4500-acre Project footprint. Thus, the total area of the site to be used for roads is significant. Although Terracon recommends constructing the roads in such a manner as to induce positive drainage and building up shoulders and grading with an outward slope of 10% to minimize wear and prevent ponding, the Report treats such roads as being constructed at grade so as to have negligible impact on runoff. Moreover, Terracon acknowledges that the unsurfaced roadways will exhibit varying levels of wear and deterioration and that shallow washboarding or rills will form over time. Since roadways cover such a large portion of the site, the impact of roadways and roadway-induced erosion is potentially significant. The Report should be revised to include these facts, conclusions and recommendations of the Geotechnical Report. We believe that incorporation of Terracon's recommendations as modeling assumptions in the Report would yield very different results with respect to the amount of storm water runoff and sediment transport across the Project site, with the strong potential for adverse impacts to the BNSF Right-of-Way.

- For purposes of interpreting the results of its analysis, the Report relies, in part, on the results of a United States Geological Survey publication by Griffiths, et al. (2006). As seen in Figure 4.3, taken from Griffiths, et al., the Report considers a basin two orders of magnitude larger than the basins considered by Griffiths, et al. As a result, the Report must extrapolate from the results of Griffiths, et al. Moreover, Griffiths, et al. emphasize differences in natural processes such as rainfall rates and basin geometry rather than manmade disturbances. Given this high degree of extrapolation and the lack of emphasis on disturbed conditions, the Report's conclusion that its results are "very consistent" with the results of Griffiths, et al. is not scientifically supportable.

- In Section 2.2, for purposes of developing model parameter values, it appears that Tetra Tech relied upon a total of 11 soil samples. When collecting a small number of samples from a large population, as is the case here, it is important to take measures to ensure the representativeness of the samples. If Tetra Tech did take such measures, they have not been reported here. It is possible Tetra Tech discusses this issue in its sampling plan, but, as noted above, we have not been provided any sampling plans, and they are critical to

our analysis. It is worth noting that for purposes of performing its geotechnical analysis, Terracon relied upon more than 50 borings, with multiple observations made of soils at each boring. For these reasons, we are concerned that the 11 soil samples upon which Tetra Tech relies are not representative of the entire Project area (including uplands) of well over 4500 acres. Consistent with good engineering practice and with the requirements of Soil & Water-15, the Report should also have included any applicable findings from the borings of the Geotechnical Report.

- At p. 3.9 the Report refers to "0.01 inches of runoff spread uniformly over the basin during the 2-year storm, and about 1.2 inches of runoff for the 100-year storm." However, the assumption that runoff will be spread uniformly even under undisturbed conditions is not realistic due to topographical effects. As Huitt-Zollars notes, the more appropriate term, one that accounts for the irregular topography of the alluvial fan, is "shallow concentrated flow" (Huitt-Zollars, Binder 2, p. 8). Moreover, the Report does not consider or analyze the significant scour that is likely to occur around the poles of the PV and SunCatcher modules, and therefore the direction, quantity and velocity of the runoff cannot be known at this time. Once the Scour Analysis required by Soil & Water-3 has been conducted, and the resulting report is available, the Report should be revised to incorporate the relevant data, conclusions and recommendations.

- In addition to the foregoing, we note a number of concerns with respect to the tables and figures. The central equation used by Tetra Tech to estimate sediment transport is referred to as the Zeller-Fullerton equation. Tetra Tech provides the equation and indicates the parameter values are listed in Table 4.1. We could not find Table 4.1 in the report and so could not evaluate Tetra Tech's parameter values. However, as noted previously, this equation was developed for use in a different setting, in New Mexico, and Tetra Tech has not presented any justification for deviating from the precedents established in Huitt-Zollars or the requirements of Soil & Water-1 and 8.

  Tables 3.4 and 3.5 list the FLO-2D results for the 6-hour and 24-hour storm events. Figures 3.5a and Figures 3.6a show predicted maximum depths during the 100-year, 24-hour storm for existing and proposed conditions, respectively. Tables 3.4 and 3.5 show the results, including velocities, depths, and flow rates for existing and proposed conditions, to be almost equivalent. Given the topography and the scale of the proposed Project, this outcome is highly implausible. Moreover, given the near equivalency in Tables 3.4 and 3.5, we expected Figures 3.5a and 3.6a to be practically indistinguishable (as is the case for Figures 3.5b and 3.6b, which show corresponding maximum velocities). However, differences are clearly visible. Thus, there appears to be an inconsistency in Tetra Tech's results.

- The loss of vegetation is a critical input to the sediment transport model, and can yield significant differences in results as to the amount of storm water runoff and sediment

transport. Without scientific analysis, the Report assumes vegetation conditions will be essentially unchanged by the Project. This assumption is implausible and inconsistent with the Commission Decision. The Commission Decision for the Project found: "Construction of the Calico Solar Project and associated facilities would result in the permanent loss of native vegetation from the construction of new access roads, SunCatcher footings, stormwater facilities, and various appurtenant structures to support the project. In addition, the project would result in disturbance to vegetation from mowing." Commission Decision, Section VI.A., Biological Resources, p. 30. Tetra Tech provides no justification for such simplistic and unrealistic treatment of vegetation as a parameter in the model, and the failure to abide by the findings in the Commission Decision.

- At p. 4.4, the Report discusses the results of sediment transport modeling at 6 locations. Surprisingly, Tetra Tech reports that, although the differences between model results for the existing and final project scenarios are "relatively insignificant," "the model results indicate that the average annual sediment load actually decreases under project conditions at all locations except AP 77." Judging by the language in the Report, Tetra Tech is surprised by this result as well. If Tetra Tech obtains this result even after correcting the modeling assumptions to be consistent with Huitt-Zollars and the requirements of the Soil & Water Conditions, Tetra Tech should reconsider this counterintuitive result and, at a minimum, provide a more detailed explanation. In addition, we would expect as part of good engineering practice that Tetra Tech discuss the results of sediment transport modeling at more than only 6 locations, on a site as large and geomorphically complex as that of the proposed Project.

- In the recently published Solar Energy Development Draft Programmatic EIS jointly prepared by DOE and BLM, BLM excluded from consideration for solar development those areas with a slope of 5% or greater, and identified as priority areas for solar development only areas with a slope of 1-2% or less. Figure 2.2 purports to show the grade of slopes in the Project vicinity. Based on Figure 2.2, which shows the slopes of the Project site as well as upstream watersheds, it is clear that the slope across much of the Project site exceeds the 5% criterion. However, a precise determination of the acceptability of slopes in the Project area cannot be made based on the figures and other information included in the Report. The Report should be revised to illustrate with specificity the areas of the site with slopes in the ranges of 0-1%, 1-2%, and 3-5%. In any event, topographic information provided in the Report does not support the location of a PV solar plant at this location. In addition, Figures 2.1 and 2.2 do not cite a source.

The Report is not sufficient to permit evaluation of the Project's conformance with the performance standards of Soil & Water-8.

Due to the overall approach to the preparation of the Report, we do not believe that it can be verified that the performance standards of Soil & Water-8 are capable of being achieved by this Project. For example, it is not scientifically credible that performance standards such as:

> "Post development sediment transport through the project site shall be equal to predevelopment sediment transport" and
>
> "The project shall not increase erosion of the desert soils or divert storm water from its current path, including at site boundaries"

can be achieved without the installation of engineering controls. None have been proposed. Moreover, it is patently clear from the Applicant's site plans and the regular north/south orientation of the PV modules that the performance standard:

> "The project owner's installation grid of SunCatchers shall not result in diverting storm water across existing watershed or subwatershed boundaries"

is being neither addressed, nor met.

Just as with the solar technology, the Applicant appears to have made no effort to construct and align the maintenance and access roads "with existing storm water conveyance channels to ensure the maintenance of current channelization of storm water runoff patterns," as required by performance standard (g).

The appropriate location of the solar technology cannot be ascertained until the Scour Analysis and Pole Foundation Stability Report have been completed. Until the Scour Analysis and Pole Foundation Stability Report have been performed, site plans should be required to be considered preliminary. Once the design is finalized, it is likely to be necessary to re-run portions of the Report consistent with the final design.

The Report fails to include substantive information required by the Soil & Water Conditions, which information is necessary for a complete analysis.

Under Soil & Water-1(2), the report fails to include a site delineation map at a scale of 1" = 50' depicting major geographic features as well as all project elements. Under Soil & Water-1(3)(d), the Report fails to include the required hydraulic calculations to support the selection and sizing of the onsite drainage network, diversion facilities and Best Management Practices preventing impacts to project features and the BNSF Right-of-Way. The Report also fails to include grading plans and a delineation of areas in which vegetation will be disturbed Soil & Water-1(5). It also fails to address exposed soil treatments to be used during construction and operations, and other BMPs to prevent wind and water erosion as required under Soil & Water -1(6) and Soil & Water-11 relating to the Industrial Facility SWPPP. It also fails to

include a Project schedule as required under Soil & Water -1(7), Best Management Practices (BMPs) to prevent impacts to the BNSF Right-of-Way under Soil & Water-1(8), erosion control drawings as required under Soil & Water -1(9), comments under Soil & Water-1(10), and the monitoring plan under Soil & Water-1(11).

Background information necessary for evaluating the Report and the other Soil & Water deliverables has not been provided.

In addition to the foregoing comments, we note that certain information requested in BNSF's First Set of Data Requests to Calico Solar, served on August 10, 2011, would have facilitated my review of both the Infiltration Report and the current Report, but nonetheless was not provided in Calico Solar's responses. In its August 30, 2011 letter responding to BNSF's Data Requests, Calico indicated that the hydrologic model input and output files predicting peak flows would be included in the Infiltration Report. However, these input and output files are not included in the report. On behalf of BNSF, we hereby reiterate the request for the information requested in its Data Requests, and provide the following explanations for the need for the requested information:

Request 1. The requested AUTOCAD files are needed to understand the layout of the Project, as well as to understand the inputs to and outputs from all hydrology models.

Request 7. To the extent that the Applicant's consultants have relied on materials provided by the Applicant, such studies, designs and reports are necessary for full evaluation of the consultants' analyses.

Request 73. The requested information on time of concentration and basin lag was not addressed in the Infiltration Report or the current Report. This should be readily available and could be extracted from the model output files, but these files were not provided (see Request 74 below).

Request 74. Both the Infiltration Report and the current Report contain graphical and mapped output files, displaying certain aspects of the hydrological modeling, but the actual electronic input and output files were not included in either report. This information is needed, among other purposes, to confirm the consistency of the model simulation to that reported in the two reports, and also to support the separate hydrologic analyses that BNSF is entitled to perform at the Applicant's expense pursuant to Soil & Water-12.

Request 75. The requested analysis, including the related input/output files, is an important input to the analysis that is required to be the subject of the Report, and therefore is necessary to fully review and comment on the Report.

Request 76. The requested hydrologic modeling data is an important input to the analysis that is required to be the subject of the Report, and therefore is necessary to fully review and comment on the Report.

Request 85. The results of the flood routing calculations performed with the FLO-2D model are described in the final Infiltration Report, but the actual model files and calculations were not provided in the document, nor in the current Report. This information is needed to confirm the consistency of the model simulation to that reported in the Infiltration Report and the current Report, and also to support the separate hydrologic analyses that BNSF is entitled to perform at the Applicant's expense pursuant to Soil & Water-12.

Request 86. The requested base hydrographs are an important input to the analysis that is required to be the subject of the Report, and therefore are necessary to fully review and comment on the Report.

Request 87. Certain biological surveys of the site, specifically, surveys of site vegetation and habitat analyses of the Mojave Fringe-Toed Lizard, are important inputs to the analysis that is required to be the subject of the Report, and therefore are necessary to fully review and comment on the Report.

Request 88. The requested DESCP data is an important input to the analysis that is required to be the subject of the Report, and therefore is necessary to fully review and comment on the Report.

Request 92. Although some analyses of subsurface soil, rock and water conditions have been provided, we do not know if they are comprehensive.

Request 97. The requested soil survey and land cover maps are important inputs to the analysis that is required to be the subject of the Report, and therefore are necessary to fully review and comment on the Report.

Request 98. Although we have received a conceptual site plan, it is not sufficiently detailed to provide the information necessary to review the Report.

Request 99. The requested rainfall histograms are presented in a graphical form in the Infiltration Report and the current Report, but not in a digital format that allow more detailed review of their construction and utility.

Request 100. The requested mapping of spatial distribution and estimates of area of proposed impervious surfaces has not been provided. This is a critical piece of information for meaningful review and evaluation of the Report.

Request 101. No site grading plan has been provided. This plan is directly related to the anticipated hydrologic and sediment transport impacts from the Project, and is therefore necessary for meaningful review and evaluation of the Report.

Request 102. The watershed boundary maps included in the Infiltration Report and the current Report are only in graphical form and are at too small of a scale to allow for detailed review as compared to the detailed topographical data that was reported to be used in their construction. A digital form of these maps and the underlying data is needed to complete a full review of this information.

Request 103. The requested infiltration/runoff calculations have not been provided, and are a fundamental element of both the Infiltration Report and this Report.

In addition to the above data requests, BNSF also requested permission to serve additional data requests which the CEC did not allow us to propound. BNSF waited to receive the first of the Soil & Water deliverables to determine which requested information was necessary to fully understand those reports. Based upon our review of the Infiltration Report, the Geotechnical Engineering Report, and the current Report, we again request on behalf of BNSF that the CEC order the Applicant to provide the information in the data requests referenced below. The following are brief explanations of the applicability of the requested information to ENVIRON's review of the Report.

Request 3. The requests for proposal for performance of the Soil & Water deliverables are necessary to understand the nature of any analyses that were performed in connection with the Project, and the nature of any analyses that may not have been performed.

Request 4. The contracts for performance of the Soil & Water deliverables are necessary to understand the nature of any analyses that were performed in connection with the Project, and the nature of any analyses that may not have been performed.

Request 5. The scopes of work for the Soil & Water deliverables are necessary to understand the nature of any analyses that were performed in connection with the Project, and the nature of any analyses that may not have been performed.

Request 8. The current Report is required to be based upon the referenced Stantec Report, among other reports. Therefore, input and output files for the Stantec Report are necessary to fully evaluate and comment on the current Report.

Request 9. The current Report is required to be based upon the DESCP prepared by Huitt-Zollars and dated August 25, 2009, among other reports. Therefore, input and output files for the Huitt-Zollars DESCP are necessary to fully evaluate and comment on the current Report.

Request 10. The current Report is required to be based upon the Huitt-Zollars Report, among other reports. Therefore, input and output files for the Huitt-Zollars Report are necessary to fully evaluate and comment on the current Report.

Request 24. The requested contracts, documents and communications are necessary to understand the nature of any analyses that were performed in connection with the Project, and the nature of any analyses that may not have been performed.

Request 71. The requested reports, data analyses, models and studies are important inputs to the analysis that is required to be the subject of the Report, and therefore are necessary to fully review and comment on the Report.

Request 72. The requested infiltration/runoff calculations are important inputs to the analysis that is required to be the subject of the Report, and therefore are necessary to fully review and comment on the Report.

Request 82. The requested reports, data analyses, models and studies are important inputs to the analysis that is required to be the subject of the Report, and therefore are necessary to fully review and comment on the Report.

Request 89. Site specific investigations of individual basin sites were not included in the Geotechnical Report, but would be important inputs to the analysis that is required to be the subject of the Report, and therefore are necessary to fully review and comment on the Report.

Request 90. Although the Report purports to set forth the requested hydrologic modeling and flood routing analysis, we do not have adequate reporting of TetraTech's analysis to fully evaluate and comment on it.

Please call if you would like to discuss my observations further.

Very Truly Yours,

Robert L. Powell, PhD, P.E.
Principal