ADAMS BROADWELL JOSEPH & CARDOZO
A PROFESSIONAL CORPORATION
ATTORNEYS AT LAW
601 GATEWAY BOULEVARD, SUITE 1000
SOUTH SAN FRANCISCO, CA 94080-7037
TEL: (650) 589-1660
FAX: (650) 589-5062
kfederman@adamsbroadwell.com

SACRAMENTO OFFICE
520 CAPITOL MALL, SUITE 350
SACRAMENTO, CA 95814-4721
TEL: (916) 444-6201
FAX: (916) 444-6209

KEVIN T. CARMICHAEL
CHRISTINA M. CARO
THOMAS A. ENSLOW
KELILAH D. FEDERMAN
ANDREW J. GRAF
TANYA A. GULESSERIAN
KENDRA D. HARTMANN*
DARIEN K. KEY
RACHAEL E. KOSS
AIDAN P. MARSHALL
TARA C. RENGIFO
MICHAEL R. SEVILLE

*Of Counsel*
MARC D. JOSEPH
DANIEL L. CARDOZO

*Not admitted in California.
Licensed in Colorado.*

January 12, 2022

***Via Email and Overnight Mail***

Trevor Pratt
Project Manager
California Public Utilities Commission
505 Van Ness Avenue
San Francisco, CA 94102
Email:
estrellaproject@horizonh2o.com;
trevor.pratt@cpuc.ca.gov

Tom Engels, PhD
Principal
Horizon Water and Environment, LLC
266 Grand Avenue, Suite 210
Oakland, CA 94610

Re: **Comments on Recirculated Draft Environmental Impact Report for Estrella Substation and Paso Robles Area Reinforcement Project**

Dear Mr. Pratt & Dr. Engels:

On behalf of California Unions for Reliable Energy ("CURE" or "Commenters"), we submit these comments on the Recirculated Draft Environmental Impact Report ("RDEIR") prepared by the California Public Utilities Commission ("CPUC") for the Estrella Substation and Paso Robles Area Reinforcement Project ("Project") pursuant to the California Environmental Quality Act ("CEQA").[1] CURE provided comments on the DEIR on February 19, 2021, identifying many egregious defects in the document.[2] The CPUC then revised and recirculated the document with some new analysis. Although the RDEIR addresses some of the errors we identified, there are still many more errors remaining, as well as new ones. Thus, the RDEIR fails to meet the requirements of CEQA.

[1] Pub. Resources Code ("PRC"), §§ 21000 et seq.
[2] Letter from Kelilah Federman, Adams Broadwell Joseph & Cardozo, to Robert Peterson, Project Manager, California Public Utilities Commission and Tom Engels, PhD, Horizon Water and Environment, LLC (Feb. 19, 2021) https://ia.cpuc.ca.gov/environment/info/horizonh2o/estrella/docs/rdeir/4_Adams%20Broadwell_2021_3287-016acp%20-%20Final%20Comments%20Estrella%20Substation%20and%20Exhibits%20A-D.pdf ("CURE DEIR Comments").

The Project is proposed by Horizon West Transmission ("HWT") (formerly NextEra Energy Transmission West, LLC) and Pacific Gas & Electric Company ("PG&E") (collectively referred to as "Applicants"). The Proposed Project would construct and operate a new 230 kilovolt (kV) /70 kV substation and a new 7-mile-long 70 kV power line, and replacement/reconductoring of approximately 3 miles of existing 70 kV power line interconnecting with the substation.[3] The Project would be located in unincorporated San Luis Obispo County and within the City of Paso Robles, approximately 9 miles southeast of the San Miguel community, and 8.5 miles northeast of Templeton.[4] The RDEIR estimates the Proposed Project will take 21 months to construct.[5] Proponent's environmental assessment estimated that the project would take 7 months to construct.[6] The distribution components are expected within 15 years.[7] The RDEIR indicates that the proposed Estrella Substation site was increasing in size from 15 acres to 20 acres.[8] The Project would result in the permanent conversion of 18.9 acres of Important Farmland to non-agricultural uses.[9]

We have reviewed the RDEIR, the DEIR, its technical appendices, and reference documents with assistance of Commenters' expert consultants, whose comments and qualifications are attached. Based on our review of the RDEIR, it is clear that the RDEIR still fails as an informational document under CEQA and lacks substantial evidence to support its conclusions that the Project's significant impacts would be mitigated to the greatest extent feasible.

There is also substantial evidence demonstrating that the Project's potentially significant environmental impacts are far more extensive than disclosed in the RDEIR. We prepared these comments with the assistance of Commenters' air quality expert Phyllis Fox Ph.D. Dr. Fox found that Project construction emissions will exceed applicable significance thresholds, the risk of Valley Fever is still significant and unmitigated, health risk impacts are not analyzed or mitigated, and Greenhouse Gas ("GHG") emissions from Project construction and operation are

[3]Horizon Water and Environment, Estrella Substation and Paso Robles Area Reinforcement Project – *Recirculated Draft Environmental Impact Report* ("DEIR"), November 2021, p. ES-1.
[4] DEIR, p. 2-15.
[5] RDEIR, p. 1-12.
[6] Proponent's Environmental Assessment Estrella Substation and Paso Robles Area Reinforcement Project ("PEA"), p. 2-59.
[7] DEIR, p. 2-16.
[8] RDEIR, p. 1-2.
[9] RDEIR, p. 1-13.

underestimated.[10] The RDEIR fails to accurately disclose the severity of these impacts, and fails to effectively mitigate them.

Commenters' expert agricultural consultant Gregory House concludes that Project construction will have significant permanent and temporary impacts to Important Agricultural areas that were not adequately analyzed or mitigated in the RDEIR. As discussed herein, and in CURE's prior comments on the DEIR, the mitigation measures proposed to offset the permanent loss of agricultural lands are inadequate because they do not create new Important farmland. Additionally, replacement, de-compaction, and replanting measures were not adequately analyzed and may be potentially significant and unmitigated.[11] Mr. House concluded that the RDEIR's discussion regarding additional conversion of Important Farmland fails to adequately disclose and mitigate the full extent of the impact.

Commenters' expert biologist Scott Cashen, M.S. concluded that the Project may have potentially significant and unmitigated impacts to wildlife and sensitive natural communities including Blue Oak Woodland, and special-status wildlife including Golden Eagle and other special status birds, amphibians, and bumble bees.[12] These issues were not addressed or mitigated in the RDEIR and Mr. Cashen's comments have been reattached here for reference.

Commenters' expert utility consultant David Marcus concluded that the DEIR failed to accurately describe the Project's environmental setting. Mr. Marcus explains that the Estrella substation is not needed to meet Paso Robles Distribution Planning Area ("DPA") peak loads, to improve distribution system reliability by reducing outages, or to mitigate the impacts of an outage of the Templeton-Paso Robles 70 kV transmission line, to mitigate the impacts of an outage of the Templeton 230/70 kV transformer, to mitigate the impacts of an N-2 (Category C) outage of both 230 kV lines that connect to the Templeton 230/70 kV

[10] See **Exhibit A,** Phyllis Fox, Ph.D., P.E., Comments on the Recirculated Draft Environmental Impact Report for the Estrella Substation and Paso Robles Area Reinforcement Project (January 12, 2022) ("Fox Comments").
[11] See **Exhibit B,** Gregory House, Estrella Substation and Paso Robles Area Reinforcement Project Revised DEIR Review of Mitigation Measures Proposed for Agriculture and Forestry Resources (January 10, 2022) ("House Comments").
[12] See **Exhibit C,** Scott Cashen, M.S., Comments on the Draft Environmental Impact Report for the Estrella Substation and Paso Robles Area Reinforcement Project (January 22, 2021) ("Cashen Comments").

transformer.[13] Further, the DEIR failed to reference the additional transmission line to Cholame Substation to create a looped circuit referred in the Updated Appendix G of Proponent's Environmental Assessment. The failure to address this "likely" element of the Project is impermissible piecemealing under CEQA.[14] These issues have not been addressed in the RDEIR and Mr. Marcus's comments have been attached here for reference.

## I. STATEMENT OF INTEREST

CURE is a coalition of labor organizations whose members encourage sustainable development of California's energy and natural resources. CURE's members help solve the State's energy problems by building, maintaining, and operating conventional and renewable energy power plants and transmission facilities. Since its founding in 1997, CURE has been committed to building a strong economy and a healthier environment. CURE has helped cut smog-forming pollutants in half, reduced toxic emissions, increased the use of recycled water for cooling systems, and pushed for groundbreaking pollution control equipment as the standard for all new power plants, all while helping to ensure that new power plants and transmission facilities are built with highly trained, professional workers who live and raise families in nearby communities.

Individual members of CURE and its member organizations include Todd Kadota, Evan Lincer, Jonathon Montoya, Jeff Branson, and Thomas Grennan. These individuals live, work, recreate, and raise their families in Paso Robles, in the vicinity of the Project. Accordingly, they will be directly affected by the Project's environmental and health and safety impacts. Individual members may also work on the Project itself. They will be the first in line to be exposed to any health and safety hazards that exist onsite.

CURE has an interest in enforcing environmental laws that encourage sustainable development and ensure a safe working environment for the members that they represent. Environmental degradation destroys cultural and wildlife areas, consumes limited fresh surface and ground water resources, causes water pollution, and imposes other stresses on the environmental carrying capacity of the

[13] See **Exhibit D,** David Marcus, M.S., Comments on the Draft Environmental Impact Report for the Estrella Substation and Paso Robles Area Reinforcement Project (January 22, 2021) ("Marcus Comments").
[14] 14 Cal. Code Regs. ("CEQA Guidelines") § 15165.

state. This in turn jeopardizes future development by causing construction moratoriums and otherwise reducing future employment opportunities for CURE's members. CURE therefore has a direct interest in enforcing environmental laws to minimize the adverse impacts of projects that would otherwise degrade the environment.

Finally, CURE members are concerned about projects that risk serious environmental harm without providing countervailing economic benefits. For these reasons, CURE's mission includes improving California's economy and the environment by ensuring that new conventional and renewable power plants and their related transmission facilities use the best practices to protect our clean air, land and water and to minimize their environmental impacts and footprint.

## II. THE CPUC LACKS SUBSTANTIAL EVIDENCE TO SUPPORT ITS CONCLUSIONS IN THE RDEIR REGARDING THE PROJECT'S SIGNIFICANT IMPACTS AND FAILS TO INCORPORATE ALL FEASIBLE MITIGATION MEASURES NECESSARY TO REDUCE IMPACTS TO A LESS THAN SIGNIFICANT LEVEL

CEQA has two basic purposes, neither of which the RDEIR satisfies. First, CEQA is designed to inform decision makers and the public about the potential, significant environmental impacts of a Project before harm is done to the environment.[15] The EIR is the "heart" of this requirement.[16] The EIR has been described as "an environmental 'alarm bell' whose purpose it is to alert the public and its responsible officials to environmental changes before they have reached ecological points of no return."[17]

To fulfill this function, the discussion of impacts in an EIR must be detailed, complete, and "reflect a good faith effort at full disclosure."[18] An adequate EIR must contain facts and analysis, not just an agency's conclusions.[19] CEQA requires

[15] CEQA Guidelines § 15002(a)(1); *Berkeley Keep Jets Over the Bay v. Bd. of Port Comm'rs.* (2001) 91 Cal.App.4th 1344, 1354 ("*Berkeley Jets*"); *County of Inyo v. Yorty* (1973) 32 Cal.App.3d 795, 810.
[16] *No Oil, Inc. v. City of Los Angeles* (1974) 13 Cal.3d 68, 84.
[17] *County of Inyo v. Yorty* (1973) 32 Cal.App.3d 795, 810.
[18] CEQA Guidelines § 15151; *San Joaquin Raptor/Wildlife Rescue Center v. County of Stanislaus* (1994) 27 Cal.App.4th 713, 721-722.
[19] *See Citizens of Goleta Valley v. Board of Supervisors* (1990) 52 Cal.3d 553, 568.

an EIR to disclose all potential direct and indirect, significant environmental impacts of a project.[20]

Second, CEQA directs public agencies to avoid or reduce environmental damage when possible by requiring imposition of mitigation measures and by requiring the consideration of environmentally superior alternatives.[21] If an EIR identifies potentially significant impacts, it must then propose and evaluate mitigation measures to minimize these impacts.[22] CEQA imposes an affirmative obligation on agencies to avoid or reduce environmental harm by adopting feasible project alternatives or mitigation measures.[23] Without an adequate analysis and description of feasible mitigation measures, it would be impossible for agencies relying upon the EIR to meet this obligation.

Under CEQA, an EIR must not only discuss measures to avoid or minimize adverse impacts, but must ensure that mitigation conditions are fully enforceable through permit conditions, agreements or other legally binding instruments.[24] A CEQA lead agency is precluded from making the required CEQA findings unless the record shows that all uncertainties regarding the mitigation of impacts have been resolved; an agency may not rely on mitigation measures of uncertain efficacy or feasibility.[25] This approach helps "insure the integrity of the process of decision by precluding stubborn problems or serious criticism from being swept under the rug."[26]

CEQA prohibits a lead agency from approving a project if feasible alternatives or mitigation measures exist which would substantially lessen a project's significant environmental effects.[27] As discussed in CURE's Comments on the DEIR, there is substantial evidence demonstrating that adoption of Alternative PLR-3A and PLR-3B is feasible, and would substantially lessen the Project's

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[20] PRC § 21100(b)(1); CEQA Guidelines § 15126.2(a).
[21] CEQA Guidelines § 15002(a)(2) and (3); *Berkeley Jets,* 91 Cal.App.4th at 1354; *Laurel Heights Improvement Ass'n v. Regents of the University of Cal.* (1998) 47 Cal.3d 376, 400.
[22] PRC §§ 21002.1(a), 21100(b)(3).
[23] *Id*., §§ 21002-21002.1.
[24] CEQA Guidelines, § 15126.4(a)(2).
[25] *Kings County Farm Bur. v. County of Hanford* (1990) 221 Cal.App.3d 692, 727-28 (a groundwater purchase agreement found to be inadequate mitigation because there was no record evidence that replacement water was available).
[26] *Concerned Citizens of Costa Mesa, Inc. v. 32nd Dist. Agricultural Assn.* (1986) 42 Cal.3d 929, 935.
[27] PRC §21002; *Cal. Clean Energy Comm. v. City of Woodland* (2014) 225 Cal.App.4th 173, 203; CEQA Guidelines §15126.6.

previously disclosed significant environmental effects, and would meet all Project objectives. Commenters' experts present additional substantial evidence demonstrating that additional mitigation measures are necessary to mitigate the Project's numerous potentially significant environmental effects.

The RDEIR fails to satisfy the basic purposes of CEQA. The RDEIR's conclusions regarding air quality, health risk, hazards, agricultural, and biological impacts are not supported by substantial evidence. In preparing the RDEIR, the City: (1) failed to provide sufficient information to inform the public and decision-makers about potential environmental impacts; (2) failed to accurately identify and adequately analyze all potentially significant environmental impacts; and (3) failed to incorporate feasible measures to mitigate environmental impacts to a less than significant level; and (4) failed to analyze all feasible alternatives to reduce impacts to a less than significant level. The City must correct these shortcomings and recirculate a revised EIR for public review and comment.

The CPUC is tasked with ensuring that Californians receive safe, reliable utility service and infrastructure at reasonable rates, with a *commitment to environmental quality* and a prosperous California economy.[28] In order to comply with this mandate, and the mandates of CEQA, the RDEIR must be further revised to resolve its inadequacies and recirculated for public review and comment.

## III. LACK OF TIMELY INFORMATION AND POTENTIAL NEED TO SUBMIT ADDITIONAL COMMENTS

The CPUC was required, but failed, to make all documents referenced or relied on in the RDEIR available for the duration of the public comment period.[29] Access to these materials was essential to our review and evaluation of the CPUC's findings. Despite our efforts to obtain immediate access to all materials referenced in the RDEIR, the CPUC only granted us access to some of these materials. The CPUC failed to provide access to the 129 letters received during the public review period for the DEIR.[30]

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[28] California Public Utilities Commission Annual Report, January 26, 2016, Cover letter to Honorable Edmund G. Brown Jr., Governor of the State of California, and distinguished members of the California State Legislature, *available at*: http://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/About_Us/Annual_Reports/2015%20CPUC%20Performance%20and%20Accountability%20Annual%20Report_v004.pdf.

[29] *See* PRC, § 21092(b)(1); CEQA Guidelines § 15087(c)(5).

[30] RDEIR, p. 1-2.

On November 19, 2021, we requested that the CPUC provide immediate access to any and all documents referenced, incorporated by reference, and relied upon in the RDEIR.[31] The CPUC provided some of the documents referenced in the RDEIR. Based on the CPUC's failure to provide all documents referenced in the RDEIR, including the approximately 129 letters received by the CPUC, we provide these initial comments on the RDEIR and reserve our right to submit supplemental comments on the RDEIR at a future date.

## IV. THE CPUC ARBITRARILY INCREASED THE TIMELINE FOR PROJECT CONSTRUCTION, ARTIFICALLY REDUCING POTENTIALLY SIGNIFICANT IMPACTS

The RDEIR assumes, without explanation, that the revised Project would take 21 months to construct, three months longer than the original 18-month Project construction schedule that was estimated in the DEIR.[32] As a result of this change, the Project's construction emissions are spread over a longer period, which may result in fewer average daily emissions. The arbitrary change in the length of the construction period is unsupported by evidence. The RDEIR fails to support this change and does not provide an analysis of the impacts associated with the change. The CPUC may, based on the lower average daily emissions, estimate that Project construction emissions will be less than those analyzed in the DEIR, which would be improper without the opportunity for public participation and analysis.

An HRA is required given that the Project construction will last 21 months. Because Project construction will last more than six months, the OEHHA guidance specifies that cancer exposure from Project construction "should be evaluated for the duration of the project." Therefore, CPUC must revise and recirculate the RDEIR to include an HRA that quantifies and evaluates the health risks from the 21-month Project construction.

[31] Letter from Sheila Sannadan, Adams Broadwell Joseph & Cardozo, to Rachel Peterson, Executive Director, California Public Utilities Commission and Trevor Pratt, CEQA Project Manager, California Public Utilities Commission (November 19, 2021) (on file with author).
[32] RDEIR, p. 1-12.

## V. THE CPUC ARBITRARILY INCREASED THE ACREAGE OF IMPORTANT FARMLAND THAT WILL BE CONVERTED AND FAILS TO ANALYZE THE RESULTANT SIGNIFICANT IMPACTS

The RDEIR states that the Project will convert 18.9 acres of Important Farmland, whereas the DEIR stated that only 15 acres would be converted.[33] This change is not supported by evidence in the record. Greg House's comments suggest that the RDEIR failed to analyze and mitigate the potentially significant impacts of the Project on agricultural resources. The RDEIR states that HWT "did not provide substantial evidence to ensure the agricultural resources will remain used for agricultural purposes."[34] The RDEIR was circulated to discuss this impact, but fails to adequately mitigate the additional permanent conversion of agricultural land as discussed in Greg House's comments. Mr. House concluded that the conversion of Important Farmland is not adequately mitigated by the implementation of a conservation easement at 1:1 ratio to land permanent lost to agriculture does not fully offset the significant impact because it does not create any new Important Farmland.[35] This impact is still not remedied in the RDEIR.

Mr. House recommended feasible mitigation measures including: increasing the ratio; donating additional funds to a local land trust or the California Council of Land Trusts; and implement strategies recommended by the California Department of Water Resources Agricultural and Land Stewardship Framework and Strategies guidebook.[36] These measures were not analyzed or required in the RDEIR. As a result, the impacts associated with the additional 5 acres of converted Important Farmland is significant and unmitigated. The RDEIR must be revised and recirculated to adequately analyze and mitigate impacts to agricultural resources.

## VI. THE RDEIR STILL FAILS TO PROVIDE AN ADEQUATE PROJECT DESCRIPTION

The RDEIR fails to remedy the issues raised in CURE's Comments on the DEIR with respect to the Project Description. The RDEIR fails to provide clarity

[33] RDEIR, p. 1-12.
[34] *Id.* at 1-7.
[35] House Comments, p. 1.
[36] *Id.*

regarding whether the new 5 acres within the Project site will be required to undergo vegetation management practices. The Kidwell communication referred to in the RDEIR does not clarify whether the vegetation management guidelines will be followed, or whether the land will be fallowed, or farmed.[37] The public has no way of knowing with certainty, that vegetation management activities will occur in a safe manner so as to protect sensitive biological communities on the Project site. This issue must be remedied in a revised and recirculated DEIR for public review and input.

The RDEIR failed to address CURE's comments on the DEIR regarding impermissible piecemealing of the Project and the Cholame substation. The updated Appendix G to the PEA states that "The proposed project provides a future opportunity to add an additional transmission line to Cholame Substation to create a looped circuit to improve reliability and operational flexibility on the 70 kV system. This line would likely be constructed within 2 to 3 years after Estrella Substation is built."[38] To the extent that building the Estrella Substation would lead to construction of a new 70 kV or 21 kV line from Estrella to Cholame, the DEIR should have addressed that result. The failure to do so constitutes impermissible piecemealing.

CEQA forbids piecemeal review of the significant environmental impacts of a project.[39] Agencies cannot allow "environmental considerations [to] become submerged by chopping a large project into many little ones-each with a minimal potential impact on the environment-which cumulatively may have disastrous consequences."[40] The CEQA Guidelines provide "Where an individual project is a necessary precedent for action on a larger project, or commits the Lead Agency to a larger project, with significant environmental effect, an EIR must address itself to the scope of the larger project."[41] The statement in the Updated Appendix G to the PEA that the "line [to Cholame substation] would likely be constructed within 2 to 3 years after Estrella Substation is built" should have been analyzed in the DEIR.

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[37] RDEIR, p. 1-13.
[38] Proponent's Environmental Assessment Estrella Substation and Paso Robles Area Reinforcement Project, Updated Appendix G Distribution Need Analysis (August 2017) *available at*: https://www.cpuc.ca.gov/environment/info/horizonh2o/estrella/docs/App%20G%20-%20Update%202%20v2.pdf.
[39] CEQA Guidelines § 15165; *Banning Ranch Conservancy v. City of Newport Beach* (2012) 211 Cal.App.4th 1209, 1222; *Berkeley Jets,* 91 Cal.App.4th at 1358.
[40] *Bozung v. Local Agency Formation Com.* (1975) 13 Cal.3d 263, 283-284.
[41] CEQA Guidelines § 15165.
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The CEQA Guidelines provide "the agency may prepare one EIR for all projects, or one for each project, but shall in either case comment upon the cumulative effect."[42] The DEIR should be revised and recirculated to include an analysis of the cumulative impact of the additional line to Cholame, otherwise the impact must be analyzed in a subsequent EIR. The RDEIR must be revised and recirculated to address the piecemealing issues related to utility reliability.

## VII. THE RDEIR STILL FAILS TO PROVIDE AN ADEQUATE BASELINE

CEQA requires the lead agency to include a description of the physical environmental conditions in the vicinity of a project as they exist at the time environmental review commences.[43] The RDEIR fails to adequately describe the environmental setting against which the Project's environmental impacts are to be measured for several critical aspects of the Project including utility capacity and biological resources.

The environmental setting analysis in the DEIR is still inadequate because it fails to adequately explain the existing conditions related to power outages which would support the DEIR's conclusion that Estrella Substation is needed to mitigate an outage of the Templeton 230/70 kV transformer and is not needed to meet Paso Robles DPA peak loads.[44] Further, Mr. Marcus determined that even if it were appropriate to build new facilities just to mitigate the consequences of an N-2 outage, it is unclear that Estrella would be adequate.[45] A double 230 kV line outage on the lines feeding Templeton would make the Templeton transformer unusable, as the DEIR asserted, and thus cause overloads on the underlying 70 kV system during high load periods. But the Project would not resolve this issue. As Mr. Marcus explains, even if Estrella were built as proposed, Paso Robles would still face a blackout after an N-2 outage of the Estrella-Paso Robles and Templeton-Paso Robles 70 kV lines.[46] It is not clear based on the evidence in the record that this Project is necessary for Paso Robles' utility needs.

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[42] *See* CEQA Guidelines § 15165.
[43] CEQA Guidelines, § 15125(a); *see* also *Communities for A Better Environment v. South Coast Air Quality Management Dist.* (2010) 48 Cal.4th 310, 321.
[44] Marcus Comments, p. 5.
[45] *Id.* at 6.
[46] *Id.*

The biological baseline issues raised in CURE's Comments on the DEIR were likewise not addressed in the RDEIR. CURE found that the DEIR failed to provide sufficient baseline information regarding golden eagles, and this issue is completely ignored in the RDEIR. The DEIR relied on incomplete reporting data in determining where golden eagles nests may be near the Project site. The DEIR was not based on substantial evidence regarding golden eagle nest territories and important eagle use areas. The RDEIR fails to mention that the eBird database has multiple records of golden eagles within the Paso Robles city limits between 2016 and 2020.[47] The DEIR erroneously stated that the most recent observation on eBird was in 2015.[48] The eBird database suggest that four sightings of golden eagles have been registered since 2018, at Barney Schwartz Park, a distance of less than three miles from the Estrella Substation site.[49] A revised EIR must identify the methods that were used to obtain information on golden eagle nests in the vicinity of the Proposed Project and Project alternatives and ensure Project elements are not endangering or harming the protected golden eagle.

All baseline issues raised in CURE's comments on the DEIR still stand, and have not been remedied in the revisions to the DEIR. The CPUC must correct these shortcomings and recirculate a revised EIR for public review and comment.

## VIII. THE RDEIR FAILS TO ADEQUATELY ANALYZE AND MITIGATE SIGNIFICANT IMPACTS TO AGRICULTURAL RESOURCES

The RDEIR states that the Project would "permanently convert 2.65 acres of Farmland of Statewide Importance and 11.78 acres of Unique Farmland to non-agricultural uses. Additionally, 0.69 acres of Prime Farmland, 4.58 acres of Farmland of Statewide Importance, and 19.68 acres of unique farmland would be temporarily affected by the Proposed Project construction activities.[50]

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[47] eBird.org, Map Function, Golden Eagle Search, https://ebird.org/map/goleag?neg=true&env.minX=-120.7440737754860 9&env.minY=35.52383762834864&env.maxX=-120.4924181968728&env.maxY=35.74316208344104&zh=true&gp=false&ev=Z&mr=1-12&bmo=1&emo=12&yr=all&byr=1900&eyr=2021.

[48] DEIR, p. 4.4-19.

[49] eBird.org, Barney Schwartz Park, San Luis Obispo County, California, US: Sightings, *available at*: https://ebird.org/hotspot/L3558694.

[50] RDEIR, p. 2-R.4.2-13

Mr. House confirmed his prior analysis on the DEIR, that the RDEIR still fails to analyze the full extent of the conversion of agricultural land. Mr. House concludes that the CPUC has underestimated the amount of land that will be permanently converted. The DEIR recognized that "temporary" impacts to Farmland may be permanent "if soil productivity were adversely affected over the long term."[51] However, the DEIR mischaracterized Project impacts as temporary instead of a permanent conversion of farmland. Agricultural expert Mr. House comments that the lack of specificity as to how temporary impacts will be mitigated "is just a cipher or placeholder to acknowledge that something will need to be done after the construction is completed."[52] This would constitute impermissibly deferred analysis under CEQA Guidelines § 15126.4(a)(1)(B) which provide that formulation of mitigation measures shall not be deferred until some future time.[53]

Mr. House found that the removal of rock that was imported to stabilize the site will likely be a permanent, rather than temporary, impact.[54] "While it is theoretically possible to remove all the placed rock and other imported materials, in practice this is generally economically infeasible, and it may as well be acknowledged that a 95% cleanup job is about the best likely outcome, thus this aspect of the temporary construction will not be fully restored to pre-construction conditions."[55] Further, Mr. House confirmed that de-compacting soil will likewise not return the Project site's soil to pre-construction conditions. Mr. House wrote, "ripping compacted soil is a standard practice and while it can't fully recreate the original conditions of a natural soil profile, ripping is the prescribed method to alleviate compacted soils. As with the top soil/vegetation/life-of-the-soil aspect discussed earlier, these measures may not bring the soil system back into balance and a semblance of what existed prior to the project activities."[56]

Mr. House also found that the RDEIR fails to adequately analyze and mitigate impacts associated with soil disturbance, hazardous materials, and restoration of slopes and contours on the Project site.[57] These represent potentially significant issues that have yet to be analyzed and mitigated by the CPUC. The

[51] DEIR, p. 4.2-18.
[52] House Comments, p. 2.
[53] CEQA Guidelines 15126.4(a)(1)(B).
[54] House Comments, p. 2.
[55] *Id.*
[56] *Id.*
[57] *Id.*

RDEIR must be revised and recirculated to fully analyze and mitigate all of the Project's potentially significant impacts to agricultural resources.

## IX. THE RDEIR FAILS TO ADEQUATELY ANALYZE AND MITIGATE SIGNIFICANT AIR QUALITY IMPACTS

An EIR must fully disclose all potentially significant impacts of a Project and implement all feasible mitigation to reduce those impacts to less than significant levels. The lead agency's significance determination with regard to each impact must be supported by accurate scientific and factual data.[58] An agency cannot conclude that an impact is less than significant unless it produces rigorous analysis and concrete substantial evidence justifying the finding.[59]

Moreover, the failure to provide information required by CEQA is a failure to proceed in the manner required by CEQA.[60] Challenges to an agency's failure to proceed in the manner required by CEQA, such as the failure to address a subject required to be covered in an EIR or to disclose information about a project's environmental effects or alternatives, are subject to a less deferential standard than challenges to an agency's factual conclusions.[61] In reviewing challenges to an agency's approval of an EIR based on a lack of substantial evidence, the court will "determine de novo whether the agency has employed the correct procedures, scrupulously enforcing all legislatively mandated CEQA requirements."[62]

Even when the substantial evidence standard is applicable to agency decisions to certify an EIR and approve a project, reviewing courts will not 'uncritically rely on every study or analysis presented by a project proponent in support of its position. A clearly inadequate or unsupported study is entitled to no judicial deference.'"[63]

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[58] 14 CCR § 15064(b).
[59] *Kings Cty. Farm Bur. v. Hanford* (1990) 221 Cal.App.3d 692, 732.
[60] *Sierra Club v. State Bd. Of Forestry* (1994) 7 Cal.4th 1215, 1236.
[61] *Vineyard Area Citizens for Responsible Growth, Inc. v. City of Rancho Cordova* (2007) 40 Cal.4th 412, 435.
[62] *Id., Madera Oversight Coal., Inc. v. County of Madera* (2011) 199 Cal. App. 4th 48, 102.
[63] *Berkeley Jets*, 91 Cal.App.4th at 1355.

## A. The RDEIR Fails to Adequately Analyze and Mitigate the Project's Potentially Significant Impacts from Construction Emissions

The RDEIR concludes that construction ROG and NOx emissions are significant and unavoidable, even with the implementation of Mitigation Measure AQ-1.[64] But, Dr. Phyllis Fox concluded that the RDEIR fails to require all feasible mitigation, which would significantly reduce construction ROG and NOx emissions to below the significance thresholds.[65]

Further, the RDEIR violates CEQA Guidelines section 15126.2, subdivision (a), which requires an EIR to "analyze any significant environmental effects the project might cause by bringing development and people into the area affected."[66] The CEQA Guidelines require an EIR identify "relevant specifics of … health and safety problems caused by the physical changes."[67] In *Sierra Club*, the County's failure to include a health risk analysis in the EIR enabled the California Supreme Court to find "the EIR insufficient because it failed to explain why it was not feasible to provide an analysis that connected the air quality effects to human health consequences."[68] Here, the DEIR is likewise insufficient because it fails to connect the Project's air quality impacts with human health consequences in a health risk analysis. The RDEIR's discussion of health impacts is therefore inadequate as a matter of law and the RDEIR fails as an informational document.[69]

### *i. Construction Health Risk Impacts Are Significant and Unmitigated*

The RDEIR refutes the evidence presented by CURE's experts Dr. Fox and Dr. Kapahi "that cancer and acute health impacts from diesel particulate matter ("DPM") would be significant for on-site construction workers and nearby residents and other sensitive receptors."[70] But, the RDEIR does not provide substantial evidence to rebut the Health Risk Assessment performed by Dr. Fox and Dr.

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[64] RDEIR, pdf 196.
[65] Fox Comments, p. 3.
[66] 14 CCR § 15126.2(a).
[67] *Id.*
[68] *Sierra Club v. County of Fresno* (2018) 6 Cal.5th 502, 525.
[69] *Sierra Club v. County of Fresno* (2018) 6 Cal.5th 502, 519; *Bakersfield Citizens for Local Control v. City of Bakersfield* (2004) 134 Cal.App.4th 1184, *1220 (*"After reading the EIRs, the public would have no idea of the health consequences that result when more pollutants are added to a nonattainment basin. On remand, the health impacts resulting from the adverse air quality impacts must be identified and analyzed in the new EIRs.").
[70] RDEIR, p. 1-5.

Kapahi. The RDEIR asserts that the information CURE provided "was not adequate to conduct a thorough review to determine if their model accurately represents the Proposed Project, as it did not include key details required to make their study reproducible regarding the specific sources' spatial representation and actual emissions assigned to specific sources were not provided."[71]

Dr. Fox concluded that the RDEIR utilized data from the HRA presented by CURE in some areas, but failed to implement in others. The RDEIR states, "the decision to recirculate the air quality section, and specifically the Impact AQ-3 discussion, had already been made based on the HRA findings described above" referring to the HRA conducted by Dr. Fox and Dr. Kapahi.[72] But, the RDEIR fails to rely on our HRA which also found significant acute health impacts along the 70kV power line and the reconductoring segment and significant cancer risks east of the reconductoring segment.[73] The CPUC should have utilized the substantial evidence presented by CURE's HRA uniformly across its analysis, rather than cherry picking the data.

The RDEIR concludes, absent substantial evidence that construction health risk impacts are unavoidable.[74] Dr. Fox concluded that, if the use of Tier 4 Final engines is made enforceable and Mitigation Measure AQ-1 is revised to require the use of Tier 4 Final engines and/or lower tier engines equipped with diesel particulate filters, Impact AQ-3 could be less than significant.[75] The RDEIR must be revised and recirculated to adequately address and mitigate health risk impacts associated with Project construction.

The RDEIR's conclusions regarding Impact AQ-3 are also inadequate and not based on substantial evidence. The RDEIR states that "the nearest sensitive receptors to the site are approximately 215 feet southwest of the site."[76] But goes on to assert that "However, the nearby sensitive receptors to the Estrella Substation site are not downwind from the most prominent wind directions so the majority of the construction emissions that would occur at this site are unlikely to disperse toward these receptors."[77] This statement is misleading and is not based

[71] RDEIR, p. 1-10.
[72] RDEIR, p. 1-10.
[73] Fox Comments, Exhibit 20, Secs. 4.1, 4.2.
[74] RDEIR, p. 2-R.4.3-28.
[75] Fox Comments, p. 10.
[76] RDEIR, p. 2-R.4.3-25.
[77] *Id.*

on the standard required by law. SLOCAPCD requires a health risk assessment where long-term projects occur within 1,000 feet of a sensitive receptor location.[78] The SLOCAPCD does not require such sensitive receptors be downwind, such a standard would be untenable. The RDEIR therefore relies on an inaccurate standard in analyzing health risk impacts associated with AQ-3. The RDEIR must be revised and recirculated to accurately analyze and mitigate such impacts.

*ii. Health Risk Impacts Associated With Helicopter Emissions are Significant and Unmitigated*

The RDEIR states that helicopters may be utilized for delivery of Project components, tower installation and removal, conductor installation and will be required to land for staging, storage, refueling and operation of the helicopters during construction.[79] The RDEIR fails to discuss the construction health risk impacts associated with operation and emissions of helicopters for Project construction. Dr. Fox wrote that helicopters emit highly toxic air pollutants, which may be hazardous to human health and safety absent mitigation. The RDEIR fails to include a health risk analysis for impacts associated with helicopter emissions.

Dr. Fox concluded that helicopters that use jet fuel emit other hazardous air pollutants that should have been evaluated in a health risk analysis for both construction and operation. Helicopters used during construction and operation pose potentially significant health impacts to construction workers, as well as nearby sensitive receptors because several of the landing zones are near residences and other sensitive receptors.[80] These potentially significant impacts must be mitigated in revised and recirculated EIR to comply with CEQA.

Neither the RDEIR or the DEIR identify at-risk receptors or provide any mitigation to assure that impacted parties are relocated during construction or operational helicopter operations.[81] The DEIR's only recognition of this issue asserts: "Construction of the Proposed Project may require some individuals to temporarily leave their homes to ensure their safety during helicopter operations…"[82] This is not enforceable mitigation under CEQA. Mitigation measures must be fully enforceable through permit conditions, agreements or other

[78] *Id.*
[79] RDEIR, p. 2-R.2-72; -73; -74; -78.
[80] Fox Comments, p. 13.
[81] Fox Comments, p. 15.
[82] DEIR, p. 4.14-5.

legally binding instruments.[83] Failure to include enforceable mitigation measures is considered a failure to proceed in the manner required by CEQA.[84] In order to meet this requirement, mitigation measures must be incorporated directly into the EIR to be enforceable.[85]

Thus, the RDEIR fails as an informational document under CEQA for failing to identify and mitigate the potentially significant chronic and acute health impacts of helicopter use during Project construction and operation. The RDEIR must be revised and recirculated to adequately analyze and mitigate these potentially significant impacts.

### B. The RDEIR Fails to Adequately Analyze and Mitigate the Project's Potentially Significant Operational Air Emissions

The RDEIR asserts that the BESS facilities may decrease criteria pollutants emitted from electricity generation by decreasing the use of peaker plants and making more efficient use of renewable energy.[86] However, absent enforceable conditions on the operation of the BESS, this is not necessarily true. In fact, Dr. Fox found that BESS charging could increase criteria pollutant emissions.[87] The RDEIR must be revised and recirculated to adequately analyze and mitigate this potentially significant impact.

### C. The RDEIR Fails to Adequately Analyze and Mitigate Potentially Significant Impacts Associated with Valley Fever

The RDEIR asserts that "Since valley fever is endemic to the area, nearby sensitive receptors may already have developed immunity."[88] This statement is misleading. The chances of a person developing immunity and then getting a recurrent case of valley fever and is exceedingly low. But, the chances of a person getting a new case of valley fever are significantly higher. In fact, it is exceedingly rare for a recurrent case of Valley Fever to affect an individual. CURE found no evidence to support the CPUC's assertion that immunity would protect workers and

[83] Id. at §15126.4(a)(2).
[84] *San Joaquin Raptor Rescue Ctr. v. County of Merced* (2007) 149 Cal.App.4th 645, 672.
[85] *Lotus v. Dept of Transportation* (2014) 223 Cal. App. 4th 645, 651-52.
[86] RDEIR, p. 2-R.4.3-38.
[87] Fox Comments, p. 16.
[88] RDEIR, p. 2-R.4.3-28.

sensitive receptors. Substantial evidence supports the opposite conclusion, that immunity does not protect sensitive receptors from Valley Fever at all.

As suggested in the RDEIR, Coccidioidomycosis is endemic in San Luis Obispo County, and since 2005, an average of 128 cases have been reported each year to County residents. [89] It is estimated that between 30-60% of all residents in an endemic area are exposed to the Coccidioidomycosis fungus, thus potentially exposing between 8 1,000 and 162,000 residents of San Luis Obispo County to the disease.[90] Although 60% of those infected show little or no symptoms, of those who are diagnosed from symptoms, more than 40% need to be hospitalized.[91]

The incidence rate for Valley Fever for San Luis Obispo County are among one of the highest rates in the state.[92] Substantial evidence supports the DEIR's conclusion that "the potential for…Valley Fever infections is high."[93] But, the RDEIR fails to adequately analyze impacts to construction workers and nearby sensitive receptors from exposure to Valley Fever. The RDEIR incorrectly asserts that impacts from Valley Fever are unavoidable. It is disingenuous to assert that impacts associated with Valley Fever are "unavoidable," they are not. Dr. Fox offers substantial mitigation that the CPUC should require in a recirculated revised EIR including:

- Use only heavy equipment with enclosed cabs and temperature-controlled, high efficiency particulate air-filtered air. Minimize the amount of digging by hand. Instead use heavy equipment with the operator in an enclosed, air conditioned, HEP-filtered cab. (The RDEIR only requires: "Provide air-conditioned cabs for vehicles that generate heavy dust and make sure workers keep windows and vents closed.")
- Continuously wet the soil before while digging or moving the earth. (The RDEIR only requires "use water, appropriate soil stabilizers, and/or re-vegetation to reduce airborne dust.")

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[89] San Luis Obispo County Public Health Department, Epidemiologic Profile of Coccidiodomycosis in San Luis Obispo County, CA 1996-2012 (May, 2014) https://www.slocounty.ca.gov/Departments/Health-Agency/Public-Health/Forms-Documents/Data-Reports/Other-Reports/Valley-Fever-Report_1996-2012.pdf.
[90] *Id.*
[91] *Id.*
[92] DEIR, p. 4.3-9.
[93] *Id.*
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- Landing zones for helicopters and areas where bulldozers, graders, or skid steer operate require continuous wetting. This is particularly critical where landing zones are adjacent to residential areas.
- When digging in soil is required, train workers to reduce the amount of dust inhaled by staying upwind when possible.
- Increase awareness of Valley Fever by educating the workers and supervisors on the distribution of endemic areas, ways to reduce exposure, how to recognize symptoms of Valley Fever, the need to report symptoms to a supervisor to obtain medical evaluation, where to seek care, and effective controls, including proper use of construction equipment and respirators. The RDEIR includes an incomplete version of this measure
- Require the use of powered air-purifying respirators with high efficiency particulate air (HEPA) filters.
- Implement a mandatory and comprehensive respirator program[94] that specifically requires NIOSH-approved respirators while performing in or near job activities that create airborne dust. The program must include medical clearance, training, fit testing, and procedures for cleaning and maintaining respirators.
- Provide coveralls to prevent street clothes from being contaminated with fungal spores and taken home or elsewhere. The RDEIR only requires "If workers' clothing is likely to be heavily contaminated with dust, provide coveralls and change rooms, and showers where possible."
- Alternatively, require change of clothing and shoes at worksite to prevent workers from taking dust and spores home.
- Provide workers with lockers or other storage areas to keep street clothes and work clothes separate.
- Encourage workers to shower and wash their hair at the workplace.
- Wash equipment before moving it off-site.
- Coordinate with local medical clinics that have a protocol for evaluation, follow-up, and treatment of Valley Fever to provide prompt evaluation and care.
- Clean tools, equipment, and vehicles with water to remove soil before transporting off site.
- Track and report all suspected Valley Fever illnesses that occur at the worksite to the San Louis Obispo Department of Public Health

[94] 8 CCR §5144, Respiratory Protection: https://www.dir.ca.gov/title8/5144.html.

The RDEIR should be revised and recirculated to adequately mitigate Valley Fever impacts through these measures.

### D. The RDEIR Fails to Adequately Analyze and Mitigate Impacts from Electromagnetic Radiation

Dr. Fox concluded that electromagnetic field ("EMF") remains significant and unmitigated. The RDEIR dismisses EMF impacts even though the proposed transmission line is within 50 feet of many homes.[95] Rather, the RDEIR asserts that the CPUC does not consider EMF to be an environmental issue under CEQA as "there is no agreement among scientists that EMF creates a potential health risk and because CEQA does not define or adopt standards for defining any potential risk from EMF."[96] However, the lack of agreement among scientists is not a valid reason for declining to review and mitigate a significant impact under CEQA. Where experts have presented conflicting evidence on the extent of the environmental effects of a project, the agency must consider the effects to be significant and prepare an EIR.[97]

In fact, there is substantial agreement in the scientific community that electromagnetic fields cause health impacts. The RDEIR ignores the recent evidence that Dr. Fox included in her comments on the DEIR and instead cites earlier studies. Dr. Fox concludes that the evidence cited in the RDEIR in support of the EMF health effects uncertainty theory is out of date, including a May 1999 NIEHS report, a June 2001 IARC report, a June 2002 DHS report, and a 2007 WHO Report.[98] In contrast, the evidence I cite in Exhibit 21 to my 2/22/2021 comments in support of adverse health impacts from exposure to electromagnetic radiation is based on a long-term collaboration of 29 international scientists from 10 countries holding medical degrees, PhDs, and MPHs. Their work was done independent of governments and industries with vested interests, employing a multidisciplinary approach to the EMF issue. Their work, summarized in Exhibit 21 to my 2/22/2021 comments, presents substantial evidence for the following

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[95] Fox Comments, p. 23.
[96] RDEIR, Section 2.9, pdf 145-151.
[97] *Pocket Protectors v. City of Sacramento* (2004) 124 Cal.App.4th 903, 935; *Sierra Club v. County of Sonoma* (1992) 6 Cal.App.4th 1307, 1317–1318; CEQA Guidelines § 15064(f)(5).
[98] Fox Comments, p. 23.

adverse impacts of EMF fields from locating the transmission line adjacent to residential areas including:

*Short-Term Health Impacts*:

- Headaches
- Fatigue
- Anxiety
- Insomnia
- Prickling and/or burning skin
- Rashes
- Muscle pain

*Long-Term Health Impacts*:

- Impacts on gene and protein expression
- Genotoxic effects, including RFR[99] and ELF DNA damage
- Adverse impacts on stress proteins
- Adverse impacts on immune function
- Adverse impacts on neurology and behavior
- Brain tumors and acoustic neuromas
- Childhood cancers (leukemia)
- Adult cancers (breast cancer promotion)
- Adverse impacts on melatonin, leading to Alzheimer's disease and breast cancer
- Changes in nervous system and brain function
- Impacts on DNA
- Impacts on stress proteins
- Impacts on the immune system
- Risk of leukemia
- Risk of neurodegenerative disease
- Risk of miscarriage

The RDEIR does not address the more recent evidence of adverse health impacts but rather cites to earlier studies that suggest lack of consensus.[100] Thus, Dr. Fox's evidence of adverse impacts from EMF due to the location of the

[99] RFR = radiofrequency radiation; ELF = extremely low frequency.
[100] Fox Comments, p. 23.

transmission line within 50 feet of many homes is unrebutted, and requires mitigation to comply with CEQA. Dr. Fox recommended mitigation in her comments on the DEIR, including undergrounding and adopting CPUC design guidelines.[101] The RDEIR is silent on mitigation of these significant impacts. The RDEIR must be revised and recirculated to adequately address and mitigate potentially significant impacts from EMF.

### E. The DEIR Fails to Adequately Analyze Undergrounding the Entire 70 kV Line as a Feasible Alternative

CEQA provides that public agencies should not approve a project if there are feasible mitigation measures that would substantially lessen the significant environmental effects of the project.[102] An agency may reject a mitigation measure if it finds it to be infeasible.[103] A feasible mitigation measure is one that is capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social, legal, and technological factors.[104]

The RDEIR failed to explain why only a portion of the line was considered for undergrounding when, in fact, undergrounding the whole line is a feasible alternative which would reduce one or more significant impacts to less than significant levels, including aesthetic impacts, which the DEIR asserts are significant and unavoidable. The DEIR states that "[b]ecause of the extremely limited space, some of the new 70 kV line sections would have to be undergrounded using 70 kV solid dielectric cables and pothead structures."[105] This rationale does not explain why undergrounding the entire 70 kV line is not feasible. Commenters recommend that feasible mitigation includes undergrounding the entire 70 kV power line, not just a 1.2 mile portion. It is without question, that an agency need not "adopt every nickel and dime mitigation scheme brought to its attention or proposed in the project EIR," but it must incorporate "feasible mitigation measures" "when such measures would 'substantially lessen' a significant environmental

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[101] *Id.*
[102] PRC § 21002.
[103] PRC § 21081.
[104] PRC §21061.1; CEQA Guidelines § 15364.
[105] NextEra Transmission West and PG&E Co., Estrella Substation and Paso Robles Reinforcement Project Proponent's Environmental Assessment, Response to Deficiency List No. 4, *available at*: https://www.cpuc.ca.gov/environment/info/horizonh2o/estrella/docs/Estrella%20Def%204%20Response.pdf.

effect."[106] Here, undergrounding the entire 70 kV line would substantially lessen significant impacts to biological resources and fire risk. The RDEIR must be revised and recirculated to adequately analyze this feasible and environmentally superior alternative.

## X. THE RDEIR FAILS TO ADEQUATELY ANALYZE AND MITIGATE SIGNIFICANT GHG IMPACTS

The RDEIR failed to adequately analyze and mitigate the impacts associated with Project operational GHG impacts. Operation of the BESS results in some BESS discharge during hours when solar is not available and the marginal fuel is natural gas, increasing emissions.[107] This results in more energy used for charging than is generated, because BESS efficiency will necessarily be less than 100%.[108] As a result, BESS operation in response to economic signals will certainly increase emissions in some hours, and likely increase emissions when netted over a full year.[109] The resulting net emissions will be located throughout the Western U.S. Grid. It is not possible to identify the level of emissions from any particular geographic location. However, the net increase in GHG emission is attributable to the Project, regardless of where they occur, as GHG emissions are a global issue. The RDEIR is silent on the mode of operation or fuel used for the BESS alternatives, and thus the RDEIR fails as an informational document under CEQA.

In sum, the operation of the BESS in Alternative BS-2 may increase GHG and criteria pollutant emissions. Thus, these emissions should be included in a revised and recirculated EIR or a condition should be imposed to require that the BESS be operated to assure no increase in GHG emissions. An enforceable condition should be required in the RDEIR prohibiting BESS operation in a manner that would increase either GHG or criteria pollutant emissions.

The RDEIR fails to mention the potentially significant indirect GHG emissions that will result from the Project, though the CPUC has previously analyzed such impacts. For the PG&E Windsor Substation Project, the CPUC utilized BAAQMD's GHG screening level of 10,000 metric tons per year for the analysis of the Project's direct and indirect GHG emissions generated by Project

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[106] *San Franciscans for Reasonable Growth v. City and County of San Francisco* (1989) 209 Cal.App.3d 1502, 1519.
[107] Fox Comments, p. 17.
[108] *Id.*
[109] *Id.*

operation.[110] In that Project, the CPUC concluded that "the substation transformers would leak small amounts of SF6, which is used as a circuit breaker electrical insulation medium. Although sulfur hexafluoride is a nonhazardous, inert gas, it has a global warming potential 23,900 times that of CO2."[111] Similarly, the CPUC analyzed indirect emissions associated with the use of electricity from PG&E's electrical grid by stationary sources at the power plant.[112] The RDEIR here, fails to adequately quantify and mitigate the Project's indirect emissions from charging the BESS or operating Project components. The RDEIR must be revised and recirculated to adequately quantify and mitigate potentially significant indirect GHG emissions.

## XI. THE RDEIR FAILS TO ADEQUATELY ANALYZE AND MITIGATE SIGNIFICANT IMPACTS ON BIOLOGICAL RESOURCES

The RDEIR fails to adequately analyze and mitigate impacts to biological resources. CURE's Comments on the DEIR still stand, and Scott Cashen's comments have been attached hereto for reference, because a majority of CURE's arguments were neither addressed nor remedied in the RDEIR.

The RDEIR states that the changes to the DEIR include:

- Increasing the length of the paved access road at the substation up to the second entrance to the 70 kV substation from 15 feet to 700 feet;
- Changing the height of the substation's chain-link fence from 'approximately 7-foot tall' to 'a minimum of 7 feet tall;'
- Increasing the estimate for the amount of cut and fill required for substation construction from 50,000 cubic yards to 68,000 cubic yards, not including an additional 16,500 cubic yards of topsoil that would be stripped and stockpiled (with 4,000 cubic yards of this amount to be reused during restoration activities);
- Changing the estimated temporary disturbance area during construction of the Estrella Substation from 6.20 acres to 0.09 acres; and

[110] PG&E Windsor Substation Project Final MND/Initial Study (October 2013) https://ia.cpuc.ca.gov/Environment/info/aspen/windsorsub/fmnd/5-07_greenhouse_gas_emissions.pdf.
[111] *Id.* p. 5-77.
[112] CalAm Monterey Peninsula Water Supply Project Draft EIR (April 2015) p. 4.11-7, https://ia.cpuc.ca.gov/Environment/info/esa/mpwsp/deir/4-11_greenhouse_gas_emissions.pdf.

- Increasing the length of the main substation access road from 1,100 feet long to 1,700 feet long.[113]

These new issues were not adequately analyzed for their impacts to biological resources. As discussed in our prior comments, the risk of bird strikes and mortality is significant and unmitigated. The DEIR notes that the impact on avian fatalities would not be limited to the Project, but rather, that the Project would incrementally increase a fatality risk that already exists in the area.[114] This cumulatively significant risk to avian species is further exacerbated through the RDEIR's failure to adequately mitigate and instead increasing the risks to avian species in the Project vicinity.

The additional trenching necessary to support the expanded Project components listed above will further exacerbate the threats to California red-legged frog and Western spadefoot toads. As previously addressed in CURE DEIR comments and in Scott Cashen's comments, mortality to these species may occur if mitigation is limited to escape ramps and if trenches are not covered.[115] Mr. Cashen determined that inspecting trenches at the beginning of the workday would be effective for California red-legged frog, but would not be effective for Western Spadefoots toads, which burrow under soil during the day.[116] The RDEIR does not remedy these issues, but further exacerbates threats to these sensitive biological communities.

Additionally, the expanded Project components listed above will require additional removal of vegetation. The RDEIR does not clarify how much additional vegetation will be required to be removed as result of the changes to the Project in the RDEIR. The RDEIR fails to quantify impacts to oak trees from the changes to the DEIR and thus fails to mitigate potentially significant impacts. The RDEIR must be revised and recirculated to adequately address and mitigate Project impacts to vegetative and biological resources.

As requested by CURE, the CPUC clarified that "[p]reparation of the site would typically be limited to mowing vegetation, as needed, to minimize the risk of fire."[117] Commenters appreciate the clarification that the Project may include a fuel

[113] RDEIR, p. 1-2.
[114] DEIR, p. 4.4-50.
[115] Cashen Comments, p. 13.
[116] *Id.*
[117] RDEIR, p. 2-R.2-78.

reduction program, but the RDEIR still fails to disclose and analyze the environmental impacts of the fuel reduction efforts. The RDEIR must be revised and recirculated to fully address and mitigate impacts associated with the measures that will be implemented to "minimize the risk of fire."[118]

The RDEIR fails to address the rest of the biological resources impacts raised in CURE DEIR Comments. Our comments and Mr. Cashen's comments are attached hereto, and incorporated by reference. The CPUC should refer to CURE's DEIR Comments and adequately address and mitigate all biological resources impacts of the Project in a revised and recirculated EIR.

## XII. CONCLUSION

For all the reasons discussed above, the RDEIR for the Project remains wholly inadequate under CEQA. It must be thoroughly revised to include an adequate description of the Project, adequate baseline, feasible mitigation and feasible alternatives, adequate analysis of the potentially significant impacts to air quality, health risk, biological resources, GHG, and agricultural resources. This revision will necessarily require that the RDEIR be recirculated for public review. Until the RDEIR has been revised and recirculated, as described herein, the CPUC may not lawfully approve the Project.

Thank you for your consideration to these comments.

Sincerely,

Kelilah Federman

Kelilah D. Federman

KDF:acp

[118] *Id.*

# EXHIBIT A

**Comments**

**on the**

# Recirculated
# Draft Environmental Impact Report

**for the**

# Estrella Substation and Paso Robles Area Reinforcement Project

San Luis Obispo County, California

January 12, 2022

Phyllis Fox, PhD, PE

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## LIST OF FIGURES

## 1. INTRODUCTION

The California Public Utilities Commission (CPUC), the CEQA lead agency, is recirculating portions of the Draft Environmental Impact Report (DEIR) for the Estrella Substation and Paso Robles Area Reinforcement Project (Project) due to substantive changes to the Project and comments filed by California Unions for Reliable Energy (CURE) and Pacific Gas & Electric (PG&E), one of the applicants. The changes are documented in the Recirculated Draft Environmental Impact Report (RDEIR).[1]

I reviewed the Air Quality and Electric and Magnetic Fields sections of the RDEIR. My review indicates the following omissions and unidentified significant impacts:

- Construction air quality impacts are significant and inadequately mitigated.
- The RDEIR erroneously concludes that construction health risks are significant and "unavoidable." Construction health risks are avoidable if mitigated by requiring the use of Tier 4 Final engines and diesel particulate traps.
- Health impacts of helicopter emissions were not evaluated and are potentially significant, requiring mitigation (e.g., relocation of affected sensitive receptors).
- The RDEIR fails to disclose or mitigate the significant PM10 and PM2.5 fugitive dust emissions and potential Valley Fever impacts from helicopter landings and takeoffs, which occur near many sensitive receptors.
- Construction emissions are underestimated because the RDEIR failed to revise the CalEEMod analysis to address changes in Project construction relative to the Project evaluated in the DEIR.
- Construction mitigation is inadequate and unenforceable.
- Valley Fever mitigation is inadequate and unenforceable.
- Electromagnetic field impacts are significant and unmitigated.
- Operation of the BESS in Alternative BS-2 may increase GHG and criteria pollutant emissions. An enforceable condition should be imposed to require that the BESS be operated in a manner that would not increase GHG or criteria pollutant emissions.

[1] CPUC, Estrella Substation and Paso Robles Area Reinforcement Project, Recirculated Draft Environmental Impact Report, November 2021; https://ia.cpuc.ca.gov/environment/info/horizonh2o/estrella/RDEIR.html.

These issues are discussed below.

## 2. CONSTRUCTION AIR QUALITY IMPACTS ARE SIGNIFICANT AND INADEQUATELY MITIGATED

The RDEIR concludes that construction ROG and NOx emissions are significant and unavoidable, even with the implementation of Mitigation Measure AQ-1.[2] However, the RDEIR fails to require all feasible mitigation, which would significantly reduce construction ROG and NOx emissions, perhaps below the significance thresholds.

### 2.1. Mitigation Measure AQ-1 Is Not Valid Mitigation Because It Is Not Enforceable

Mitigation Measure AQ-1 requires the preparation of a Construction Activity Management Plan (CAMP) for review by the SLOCAPCD and final approval by the CPUC.[3] "Review by the APCD" and "final approval by CPUC" are not acceptable substitutes for public review under CEQA. All measures to reduce significant construction impacts must be fully disclosed in the CEQA document. The subject CAMP is not available for public review as part of RDEIR. Further, it is incomplete and unenforceable, as summarized in the RDEIR.

#### 2.1.1. CAMP Is Not in the Record

The CAMP will lay out the mitigation for significant construction impacts. As I demonstrated in my comments, fugitive dust PM10 emissions and NOx emissions would be significant unless enforceable mitigation is required.[4] The CAMP, which will identify mitigation for significant construction impacts, must be available for public review. Instead, the RDEIR only includes a list of five general items that will be present in the CAMP. Two of these five items on their face are not enforceable and thus are not valid mitigation. Further, the CAMP fails to address the major source of NOx, PM10, and PM2.5, helicopters.[5]

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[2] RDEIR, pdf 196.

[3] RDEIR, pdf 196.

[4] 2/22/2021 Fox Comment 2.

[5] RDEIR, Table 4.3-5b, pdf 194-195.

### 2.1.2. Mitigation Measure AQ-1 Is Silent on Enforcement

*Responsible Party for Enforcement Is Not Identified*

Mitigation Measure AQ-1 fails to explain how compliance will be demonstrated with the CAMP. Generally, site plans list the mitigation measures. A construction manager is designated to confirm compliance with all the mitigation measures and report observations to the responsible agency. Mitigation Measure AQ-1 is silent on how compliance with the CAMP will be demonstrated.

*Tier 4 Final Engine Condition Is Not Enforceable*

The CalEEMod construction emission modeling assumed the use of 100% Tier 4 Final engines.[6] This mitigation measure does not require the use of all Tier 4 Final construction equipment, as assumed in the CalEEMod analysis of construction emission. Instead, it only requires "documentation on why anything less than a Tier 4 final off-road engine is infeasible for the project such as unavailability of specialized equipment with a Tier 4 engine."[7] Further, this condition is not enforceable on the Applicant.

The RDEIR should be revised to assure that Tier 4 Final engines are used on all construction equipment, as assumed in the CalEEMod analysis. This can be achieved by requiring the following:

1. Include the Tier 4 Final requirement in all bid documents, purchase orders, and contracts;
2. Successful contractor(s) must be required to demonstrate the ability to supply Tier 4 Final equipment prior to any ground disturbance and construction activities;
3. A copy of each unit's certified tier specification or model year specification and CARB or SCAQMD operating permit (if applicable) shall be available upon request at the time of mobilization of each unit of equipment;
4. Written construction documents by the construction contractor(s) that ensure compliance with Tier 4 Final standards; and

[6] 2/22/2021 Fox Comment 2.3. See also: DEIR, Appendix C, pdf 3: "Construction Off-road Equipment Mitigation—Change to assume all equipment Tier 4 Final." See also Appendix C, pdf 420, 560, 561.

[7] RDEIR, pdf 197, #2.

5. Regular inspections of all construction equipment tiers by a licensed independent contractor (e.g., a licensed professional civil or mechanical engineer).[8]

It is possible that Tier 4 Final construction equipment may not be available for all required equipment when it is needed. In this event, before using noncompliant construction equipment, the Project representative or contractor must:

1. Demonstrate that the use of noncompliant construction equipment will not result in a significant impact. This demonstration must be based on emission calculations with written findings supported by substantial evidence that is approved by the SLOCAPCD.

2. Adopt alternative strategies to the use of Tier 4 Final equipment, which may include reducing the number and/or horsepower rating of construction equipment, limiting the number of daily construction haul truck trips to and from the Project site, using cleaner vehicle fuel, or limiting the number of individual construction project phases occurring simultaneously.

3. Retrofit or repower lower tier equipment to meet Tier 4 Final standards by, for example, using equipment that has been retrofitted with diesel particulate traps or selective catalytic reduction (SCR)[9] on the next highest tier equipment available to achieve Tier 4 Final standards.

*The Dust Control Management Plan Is Not in the Record*

Condition AQ-1, Section 3 requires the development of a "Dust Control Management Plan" to control fugitive PM2.5 and PM10 emissions. This Plan is not in the RDEIR and thus cannot be reviewed, failing as valid mitigation under CEQA.

### 2.1.3. The Dust Control Management Plan Does Not Address Helicopter Fugitive Dust Emissions, the Major Source of PM10 and PM2.5 Emissions

The unmitigated and mitigated PM2.5 and PM10 emissions from the helicopters are identical.[10] The supporting calculations in DEIR Appendix C indicate that 96% of

[8] See, for example, Lijin Sun, JD, SCAQMD, Comments on Mitigated Negative Declaration (MND) for the Proposed ENV-2018-6903; 10810 West Vanowen Street Project, July 10, 2019; http://www.aqmd.gov/docs/default-source/ceqa/comment-letters/2019/july/LAC190702-08.pdf?sfvrsn=8.

[9] See, e.g., CARB, Off-Road Vehicle Research; https://ww2.arb.ca.gov/resources/documents/off-road-equipment-research.

[10] RDEIR, Tables 4.3-5a and 4.3-5b.

the helicopter PM2.5 and PM10 emissions are from fugitive dust generated during landings and takeoffs and the balance is due to helicopter exhaust. Thus, helicopter fugitive dust PM2.5 and PM10 emissions by themselves are significant, requiring targeted mitigation. The RDEIR does not require any mitigation for the major source of PM2.5 and PM10 emissions from Project construction,[11] failing as an informational document under CEQA.

The turbulent air current created by the helicopter rotor wash drives loose soil particles into the air. See Figures 1 and 2. This dust is typically controlled at permanent helicopter landing sites by constructing a concrete pad, applying asphalt pavement, or growing a vegetative cover such as sod. However, the temporary landing sites used by this Project require a different approach. Fugitive dust at temporary landing sites is typically addressed by locating the landing area to minimize airborne dust, such as in a grassy field. If this is not an option, then a dust suppressant may be used and/or the landing area can be watered. Watering, however, requires frequent applications on hot dry windy days to counteract evaporation, requiring frequent applications.[12] Alternatively, a specialized dust control agent may be used, e.g., Soil–Sediment,[13] Envirokleen.[14] The RDEIR contains no mitigation for helicopter landing and takeoff fugitive dust as demonstrated by comparing PM10 and PM2.5 emissions in Tables 4.3-5a (unmitigated) and 4.3-5b (mitigated), which are equal.

[11] DEIR, Appendix C, Helicopter Emission Calculations, pdf 23-25. The calculations in this appendix indicate 2.8 lb/day from helicopter combustion emissions and 66.14 lb/day for fugitive dust from helicopter landings and takeoff (LTOs) per day for a total of 68.94 lb/day. RDEIR Tables 4.3-5a and 4.3-5B show that mitigated and unmitigated PM10 and PM2.5 are identical, indicating no mitigation for the major source of PM10 and PM2.5 emissions.

[12] Yaada, December 1998.

[13] Soil Sement, https://www.midwestind.com/product-overview/soil-sement/?_ga=2.165558327.949387747.1641957361-95671759.1641957361.

[14] Envirokleen, https://www.midwestind.com/product-overview/envirokleen/?_ga=2.123540483.949387747.1641957361-95671759.1641957361.

**Figure 1: Helicopter Landing on an Untreated Landing Area[15]**

**Figure 2: Dust Generated During Helicopter Operations[16]**

In sum, the RDEIR fails to mitigate fugitive PM10 and PM2.5 emissions from helicopter takeoffs and landings, which are the major source of construction PM10 and PM2.5 emissions.

*Wind Speed Conditions Are Not Enforceable*

Condition AQ-1, Section 3(e) requires suspending grading operations when wind speeds are high enough to result in dust emissions crossing the property line.

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[15] Alan Yamada, Dust Suppressants for Temporary Helicopter Landing Areas, U.S. Department of Agriculture, Technology & Development Program, December 1998; https://www.fs.fed.us/eng/pubs/html/98571319/98571319.html.

[16] https://blog.midwestind.com/preventing-helipad-dust/.

However, the "property line" is not defined here as the Project consists of many components that will be built over a very large area.

Condition AQ-1, Section 3(f) requires that all earthmoving activities be ceased when sustained wind speeds exceed 25 mph or if two wind gusts exceed 25 mph in a 30-minute period.[17] However, the RDEIR does not require any method to assure that these conditions are met.

Condition AQ-1 should be modified to require real-time monitoring of PM2.5 and PM10 at all active construction sites. Further, this condition should require the use of one or more mobile meteorological towers capable of electronically monitoring wind speed. These monitoring systems must be designed to follow the progress of construction, which occurs over a very large area, and to alert the construction manager when conditions 3(e) and 3(f) are triggered so that grading and other dust-generating activities can be terminated.

*Helicopter Emissions Are Not Addressed*

The major source of ROG, NOx, fugitive dust PM10, and exhaust PM10 and PM2.5 is the helicopters.[18] Condition AQ-1 does not address helicopter emissions, including helicopter exhaust emissions and fugitive dust generated from landings and takeoffs. Thus, the Condition AQ-1 is not effective mitigation for helicopter fugitive dust emissions.

### 2.2. Construction Emissions Are Underestimated

The RDEIR revised the construction plan in ways that will increase construction emissions. The RDEIR increased the Estrella Substation size from 15 acres to 20 acres[19] and construction duration from 18 months to 20 months.[20] Other changes were made to the Project description, including increasing the length of the substation access road from 1,100 feet to 1,700 feet and excavation for the access road from 2 feet deep to 17 feet deep.[21] The volume of cut and fill material from substation construction increased from 50,000 $yd^3$ to 68,000 $yd^3$.[22] These changes would increase construction emissions. The RDEIR failed to revise the CalEEMod analysis to incorporate these changes. Thus, construction emissions are underestimated by an unknown amount.

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[17] RDEIR, pdf 199.

[18] RDEIR, Table 4.3-5b, pdf 194-195.

[19] RDEIR, pdf 14, 23.

[20] RDEIR, pdf 24.

[21] RDEIR, pdf 23.

[22] RDEIR, pdf 23.

## 3. CONSTRUCTION HEALTH RISKS ARE SIGNIFICANT AND MUST BE MITIGATED

I submitted a health risk assessment demonstrating that construction cancer and acute health impacts would be significant for construction workers and nearby residents unless mitigation is imposed.[23] The RDEIR makes several erroneous claims about this analysis and the health impacts of the Project. Further, the RDEIR fails to evaluate or even acknowledge the health impacts of helicopter exhaust emissions, failing as an informational document under CEQA.[24]

### 3.1. CURE Health Risk Assessment Stands Unrebutted in the Record

We prepared a health risk assessment (HRA) that concluded that construction health risks would be significant.[25] The RDEIR asserts that the information we provided "was not adequate to conduct a thorough review to determine if their model accurately represents the Proposed Project, as it did not include key details required to make their study reproducible regarding the specific sources' spatial representation and actual emissions assigned to specific sources were not provided."[26]

The information in Sections 2 and 3 of Exhibit 20 to my comments includes the actual emissions[27] and the sources' spatial representation.[28] The risk assessment native format modeling files, which include more detail, were not attached to my comments, as is standard practice, because the files are huge and not accessible to the general public who review CEQA documents. If a reviewer chooses to dig into the details of a health risk assessment, it is standard practice to file a public records act request (PRA) requesting the native format modeling files. The PUC and the Applicant did not file a PRA requesting the native format modeling files. The native format modelling files are attached to these comments as Exhibits 1, 2, and 3.

The RDEIR nevertheless concludes that "a few receptors located close to the project construction areas, in particular the Estrella Substation area, may experience increased TACs, which may lead to adverse health impacts. Thus, the significance

[23] 2/22/2021 Fox Comments, Comment 2.8.

[24] 2/22/2021 Fox Comments, Comment 2.8.

[25] 2/22/2021 Fox Comments, Comment 2.8.

[26] RDEIR, pdf 22. See also pdf 200-203.

[27] 2/22/2021 Fox Comments, Exhibit 20, Tables 2-1 and 2-2 and Section 3.

[28] Ibid., Figure 2-1.

determination for Impact AQ-3 has been changed to significant and unavoidable."[29] This new conclusion in Impact AQ-3 is apparently based on our analysis, as the RDEIR does not include an independent HRA. However, our analysis also found significant acute health impacts along the 70kV power line and the reconductoring segment and significant cancer risks east of the reconductoring segment.[30] The RDEIR has cherrypicked our HRA.

The RDEIR does not provide any support for the "unavoidable" nature of these significant construction health impacts. I agree that construction health impacts would be significant if not adequately mitigated. However, I do not agree that they are unavoidable. They can and must be mitigated.

The discussion of significant construction health impacts elsewhere states that "Implementation of APMs AIR-1, AIR-2, and AIR-3 and **Mitigation Measure AQ-1** would provide a substantial reduction in the DPM emissions that occur on the project site during construction due to use of diesel particulate filters and using Tier 4 final engines to the extent feasible. However, even with this mitigation, the impact would remain significant."[31]

None of these mitigation measures requires the use of diesel particulate filters, which would reduce DPM emissions by at least 85% beyond the reduction achieved by using Tier 4 Final engines.[32] Thus, if the use of Tier 4 Final engines is made enforceable (Comment 2.1.2) and Mitigation Measure AQ-1 is revised to require the use of Tier 4 Final engines and/or lower tier engines equipped with diesel particulate filters, Impact AQ-3 would be less than significant. Alternatively, the significantly impacted receptors could be relocated during construction in the vicinity of their homes.

### 3.2. Health Impacts of Helicopter Emissions Were Not Evaluated and Are Potentially Significant, Requiring Mitigation

The RDEIR's discussion of construction health impacts focuses only on DPM emissions from on-the-ground construction equipment, asserting that the "use of diesel particulate filters and using Tier 4 final engines to the extent feasible" on this equipment

[29] RDEIR, pdf 22. See also pdf 27 and Impact AQ-3 at pdf 200.

[30] 2/22/2021 Fox Comments, Exhibit 20, Secs. 4.1, 4.2.

[31] RDEIR, pdf 203-204.

[32] See, e.g., CARB, A Guide to California's Clean Air Regulations for Heavy-Duty Diesel Vehicles, February 2020, pdf 12; https://ww3.arb.ca.gov/msprog/truckstop/pdfs/truck_bus_booklet.pdf and CARB, Heavy-Duty Diesel Emission Control Strategy Installation and Maintenance, June 28, 2019; https://ww2.arb.ca.gov/resources/fact-sheets/heavy-duty-diesel-emission-control-strategy-installation-and-maintenance.

mitigates construction health impacts "to the extent feasible."[33] However, this discussion, the DEIR, and the balance of the RDEIR totally ignore the health impacts of helicopters that will be used during construction and during operation for maintenance. Helicopters do not emit DPM, but rather other highly toxic air pollutants. Tier 4 engines and diesel particulate filters, proposed as construction mitigation, are not used on helicopters.

Helicopters will be used during construction for staging, storage, and refueling.[34] They will be used to assist with tower and conductor removal and/or installation,[35] delivery, and assembly of power line poles and hardware in difficult terrain[36] near the Estrella Substation and along the northwest portions of the new distribution line.[37] They will also be used to maintain facilities after the Project is operational. Sensitive receptors are present in most locations where helicopters will operate. Thus, an HRA for helicopter emissions must be included in the RDEIR.

The DEIR and RDEIR assert that helicopters used for Project construction and future maintenance do not emit diesel particulate matter (DPM), a carcinogen, "as they use jet fuel."[38] This is correct. However, the DEIR and RDEIR fail to disclose that helicopters that use jet fuel emit other hazardous air pollutants (HAPs) that should have been evaluated in a health risk assessment (HRA) for both construction and operation and mitigated.

Studies of emissions from helicopters indicate that they emit high concentrations of HAPs. A study of a helicopter engine at different thrusts analyzed 22 polynuclear aromatic hydrocarbon (PAH) compounds.[39] This study found that 97.5% of the total PAH emissions were two- and three-ringed PAHs, with a mean total PAH concentration of 843 $\mu g/m^3$ and a maximum of 1,653 $\mu g/m^3$ during ground idle. This was 1.05 to 51.7 times higher compared to a heavy-duty diesel engine, a motor vehicle engine, and an F101 aircraft engine.

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[33] RDEIR, pdf 204.

[34] DEIR, pdf 156, Helicopter Landing Zones.

[35] DEIR, pdf 145, 152.

[36] DEIR, pdf 150, 151.

[37] DEIR, Figure ES-1, pdf 27

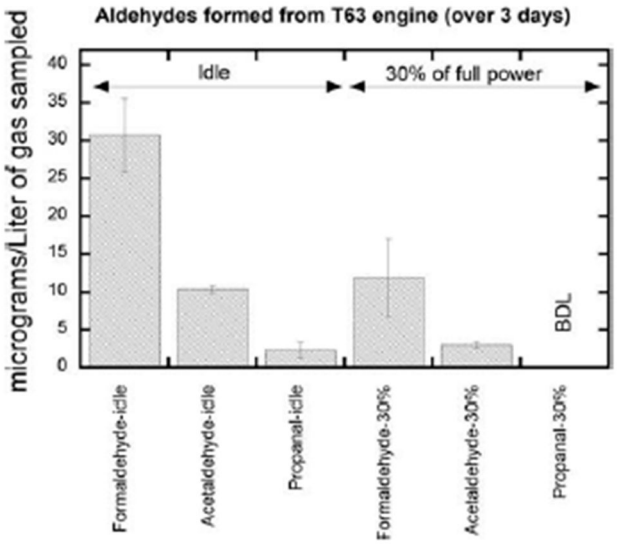
[38] RDEIR, pdf 192.

[39] Yu-Cheng Chen and others, Characteristics of Polycyclic Aromatic Hydrocarbon (PAH) Emissions from a UH-1H Helicopter Engine and Its Impact on the Ambient Environment, *Atmospheric Environment*, pp. 7589-97, 2006; https://www.infona.pl/resource/bwmeta1.element.elsevier-2159a2a2-0d16-3dad-9339-aa30b67052f9.

Further, total benzo(a)pyrene (BaP), a potent carcinogen, during one landing and take-off (LTO) cycle was higher than the European Commission emission factor of 1.24 mg/LTO.[40] The Danish occupational exposure limit for PAHs is 200 µg/m$^3$ (0.2 mg/m$^3$). The OSHA permissible exposure level (PEL) for PAHs in the workplace is 0.2 mg/m$^3$ for an 8-hour time weighted average.[41] The American Conference of Governmental Industrial Hygienists exposure level is 0.2 mg/m$^3$. The National Institute for Occupational Safety and Health (NIOSH) exposure level is 0.1 mg/m$^3$.[42] The PAH concentrations measured in this study, ranging from 0.8 to 1.7 mg/m$^3$, exceed these levels, indicating potential adverse worker health impacts from exposure to helicopter engine exhaust. The RDEIR is silent on this issue.

Another study found that helicopter engine exhaust contains high concentrations of aldehydes—for example, formaldehyde, acetaldehyde and hydrocarbons, including benzene, a potent carcinogen, and numerous acutely and chronically toxic hydrocarbons, including toluene, ethylbenzene, xylenes, and naphthalene. The highest concentrations occur during idling.[43] Figures 3 and 4.

**Figure 3: Aldehydes Emitted from a T63 Engine Helicopter**



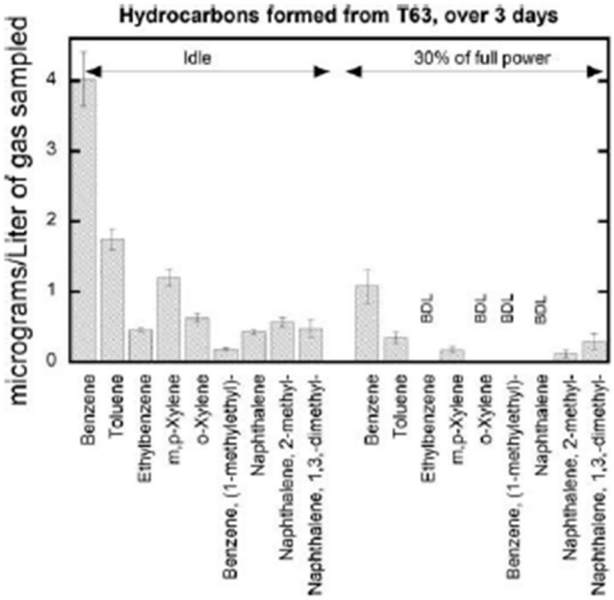

[40]. European Commission: Ambient Air Pollution by Polycyclic Aromatic Hydrocarbons (PAH). Position Paper, 2001; https://ec.europa.eu/environment/archives/.

[41] Agency for Toxic Substances and Disease Registry (ATSDR), Polycyclic Aromatic Hydrocarbons (PAHs), What are the Standards and Regulations for PAHs Exposure?, Toxipedia, Polycyclic Aromatic Hydrocarbons, 2011, pdf 8; https://www.healthandenvironment.org/docs/ToxipediaPAHArchive.pdf.

[42] Ibid.

[43] David Anneken and others, Development of Methodologies for Identification and Quantification of Hazardous Air Pollutants from Turbine Engine Emissions, *Journal of the Air & Waste Management Association*, v. 65, no. 3, pp. 336-346,2015; https://doi.org/10.1080/10962247.2014.991855.

**Figure 4: Hydrocarbons Emitted from a T63 Engine Helicopter**



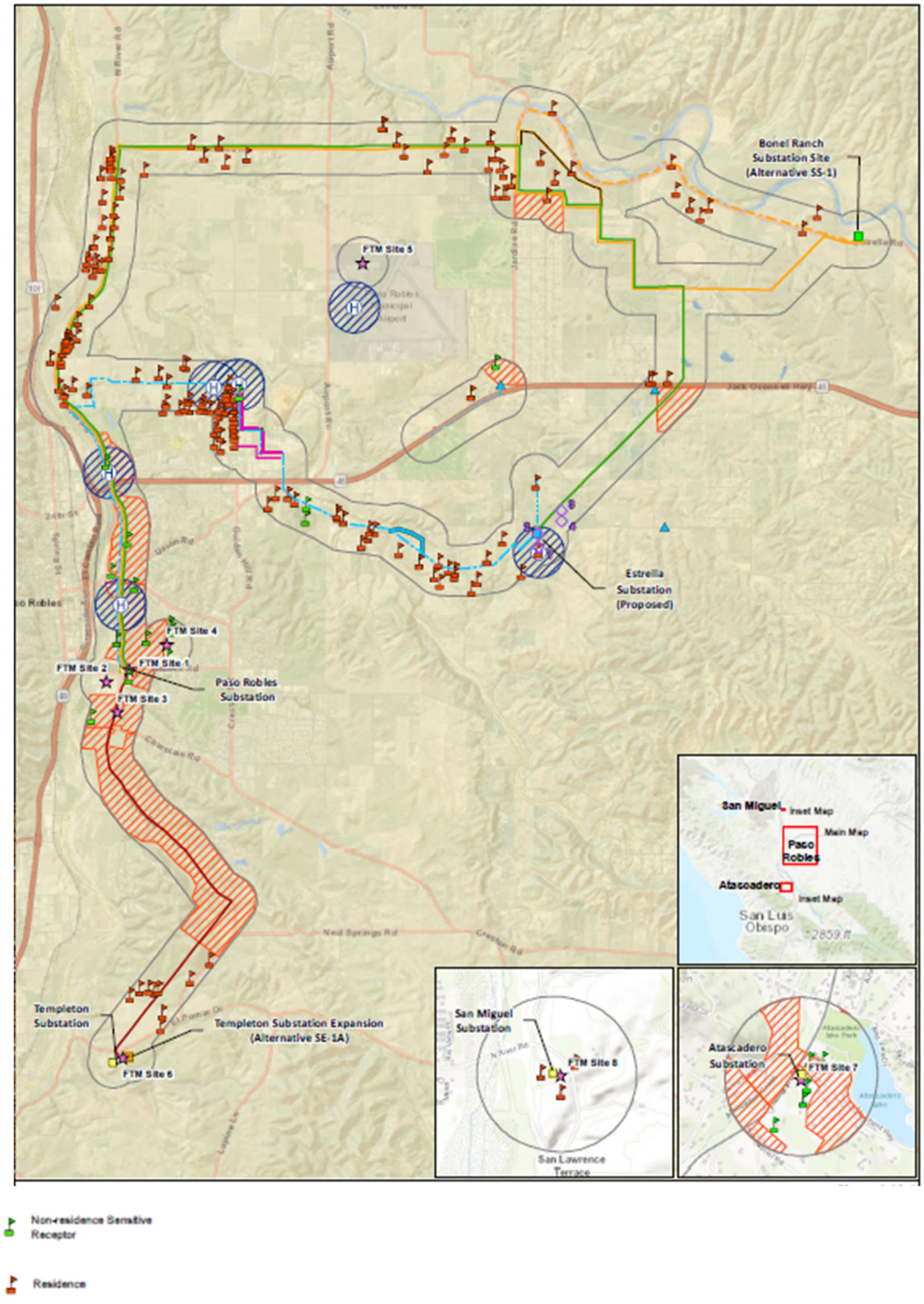

The concentrations of many of the HAPs summarized in Figures 3 and 4 exceed the OEHHA acute, 8-hour, and/or chronic reference exposure levels (RELs) established by the California Office of Environmental Health Hazard Assessment,[44] including, for example:

- Formaldehyde during idling (30,000 µg/m$^3$) and 30% full power (10,000 µg/m$^3$) exceeds the OEHHA acute (55 µg/m$^3$), 8-hour (9 µg/m$^3$), and chronic (9 µg/m$^3$) RELs.
- Acetaldehyde during idling (10,000 µg/m$^3$) and 30% full power (3,000 µg/m$^3$) exceed the OEHHA acute (470 µg/m$^3$), 8-hour (300 µg/m$^3$), and chronic (140 µg/m$^3$) RELs.
- Benzene during idling (4,000 µg/m$^3$) and 30% full power (1,000 µg/m$^3$) exceed the OEL acute (27 µg/m$^3$), 8-hour (3 µg/m$^3$), and chronic (3 µg/m$^3$) RELs.

Helicopters used during construction and operation pose potentially significant health impacts to construction workers, as well as nearby sensitive receptors because several of the landing zones are near residences and other sensitive receptors. Figure 5.

[44] OEHHA Acute, 8-hour and/or Chronic Reference Exposure Levels (RELs), November 4, 2019; https://oehha.ca.gov/air/general-info/oehha-acute-8-hour-and-chronic-reference-exposure-level-rel-summary.

**Figure 5: Locations of Helicopter Landing Sites and Sensitive Receptors[45]**




[45] DEIR, Figure 4.13-1, pdf 741.

The DEIR asserts that helicopter operation would be planned to avoid sensitive receptors and limited to 7:00 AM to 5:30 PM, Monday through Friday and Saturdays when needed. However, Figure 5 shows that helicopter landing sites are adjacent to residences and nonresident sensitive receptors. Thus, clearly, sensitive receptors will not be avoided.

The DEIR also asserts that "In some cases, residents may need to relocate from their home temporarily during helicopter activities; this is discussed further in Section 4.14, 'Population and Housing.'"[46] However, neither the RDEIR or the DEIR, including cited Section 4.14, contain any analysis to identify at-risk receptors or any mitigation to assure that impacted parties are relocated during construction or operational helicopter operations. The DEIR's only recognition of this issue asserts: "Construction of the Proposed Project may require some individuals to temporarily leave their homes to ensure their safety during helicopter operations…"[47] This is not enforceable mitigation. Further, residents may choose not to move, which would require that external measures be implemented to protect them, such as residence tenting, sealing homes to make them air tight, arranging for delivery of necessities, relocating the land zone, etc.

Thus, the RDEIR fails as an informational document under CEQA for failing to identify and mitigate the potentially significant chronic and acute health impacts of helicopter use during Project construction and operation.

### 3.3. Construction Health Impacts from Criteria Pollutants Were Not Evaluated

The RDEIR asserts that "it is anticipated that the health effects from the Project would generally be low compared to background incidences of such health effects due to the relatively low level of emissions from this project compared to the total emissions in the South Central Coast Air Basin."[48] Health impacts are not evaluated on a basin-wide basis relative to existing air quality, but rather on a project basis, based on the project's emissions using ambient air quality modeling. Thus, this statement is highly misleading and should be deleted from the RDEIR. Further, the RDEIR should be modified to include AERMOD modeling to determine if construction emissions that exceed significance thresholds would significantly contribute to existing violations or cause new violations of any ambient air quality standards in the Project air, thus resulting in significant health impacts.

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[46] DEIR, pdf 158.

[47] DEIR, p. 4.14-5.

[48] RDEIR, pdf 196.

## 4. OPERATIONAL EMISSIONS

### 4.1. Recharging the BESS Can Increase Criteria Pollutant and GHG Emissions

The RDEIR asserts that the BESS facilities may decrease criteria pollutants emitted from electricity generation by decreasing the use of peaker plants and making more efficient use of renewable energy.[49] However, absent enforceable conditions on the operation of the BESS, this is not necessarily true. In fact, BESS charging could increase criteria pollutant emissions.

BESS alternative BS-3[50] involves BESSes located behind the meter (BTM) on customer premises. Unless operation of these BTM BESSes were under the control of PG&E, they would not meet the Project purpose of increasing distribution capacity as there would be no way to assure that they would be discharged when needed, such as after an N-1 or N-2 event during a high load period that would otherwise cause an overload of the area distribution system.

BESS alternative BS-2[51] is a front-of-the-meter (FTM) BESS proposal which would presumably be under PG&E dispatch control. As such, it would meet the Project purpose. If it were used **only** for that purpose, then BESS discharge (generation) would occur **only** rarely, during N-1 or N-2 events when the local transmission system would otherwise be overloaded. Such events are expected to occur only during high load hours. It is therefore plausible to assert, as the RDEIR[52] does, that BESS discharges on those rare occasions would indeed displace peaking generation and reduce emissions. However, the reduction would not occur locally, since there are no peaking power plants in or near Paso Robles but would instead occur elsewhere on the grid.

However, if alternative BS-2 were implemented, and if BESS charging and discharging were allowed to occur in response to economic signals in addition to occurring in response to reliability needs, then the principal use of the FTM BESS would be to make money, which is not disclosed in the RDEIR, but is plausible and feasible, absence a mitigation prohibiting this mode of operation.

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[49] RDEIR, pdf 214, 215.

[50] RDEIR, pdf 215.

[51] RDEIR, pdf 175, 214.

[52] RDEIR, pdf 214.

Operating a FTM BESS for economic reasons, as I demonstrated in my comments on the proposed North Central Valley Energy Center BESS project,[53] results in some BESS discharge during hours when solar is being curtailed and the marginal fuel is natural gas, increasing emissions. This results in more GWh of energy used for charging than generated, because BESS efficiency will necessarily be less than 100%. As a result, BESS operation in response to economic signals will certainly increase emissions in some hours, and likely increase emissions when netted over a full year.[54] The resulting net emissions will be located throughout the Western U.S. Grid. It is not possible to identify the level of emissions from any particular geographic location. However, the net increase in GHG emission is attributable to the Project, regardless of where they occur, as GHG emissions are a global issue. The RDEIR is silent on the mode of operation of the BESS alternatives, thus failing as an informational document under CEQA.

In sum, the operation of the BESS in Alternative BS-2 may increase GHG and criteria pollutant emissions. Thus, these emissions should be included in a revised and recirculated EIR or a condition should be imposed to require that the BESS be operated to assure no increase in GHG and criteria pollutant emissions. An enforceable condition should be required in the RDEIR prohibiting BESS operation in a manner that would increase either GHG or criteria pollutant emissions.

## 5. VALLEY FEVER MITIGATION IS INADEQUATE

The RDEIR concludes, based on my comments, that Valley Fever impacts are significant and unavoidable and proposes Mitigation Measure AQ-2: "Prepare a Valley Fever Management Plan for Review by CDPH and San Luis Obispo Department of Public Health and Final Approval by CPUC."[55] This is a step in the right direction.

Valley Fever impacts from Project construction are avoidable if all feasible mitigation measures are required and enforced. However, the proposed mitigation does not include all feasible mitigation for Valley Fever but rather only a tiny subset of feasible measures. Further, MM AQ-2 is not consistent with CEQA and is not enforceable for many of the same reasons discussed in Comment 2 on fugitive dust mitigation.

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[53] Phyllis Fox, Comments on the Initial Study and Mitigated Negative Declaration for the North Central Valley Energy Center Battery Energy Storage Project, Linden, San Joaquin County, December 13, 2021, Comment 4, Exhibit 4.

[54] Ibid.

[55] RDEIR, pdf 204.

### 5.1. The VFMP Is Incomplete

Mitigation Measure AQ-2 requires the preparation of a Valley Fever Management Plan (VFMP) for review by the CDPH and San Luis Obispo Department of Public Health and final approval by the CPUC. However, all measures required to reduce significant impacts must be fully disclosed in the CEQA document. The subject VFMP is not available for public review as part of RDEIR. Further, what is disclosed in the RDEIR is unenforceable.

I provided a comprehensive list of important Valley Fever mitigation that has been required elsewhere.[56] The list of mitigation in MM AQ-2 excludes the majority of these measures, including:

- Use only heavy equipment with enclosed cabs and temperature-controlled, high efficiency particulate air-filtered air. Minimize the amount of digging by hand. Instead use heavy equipment with the operator in an enclosed, air conditioned, HEP-filtered cab. (The RDEIR only requires: "Provide air-conditioned cabs for vehicles that generate heavy dust and make sure workers keep windows and vents closed.")[57]
- Continuously wet the soil before while digging or moving the earth. (The RDEIR only requires "use water, appropriate soil stabilizers, and/or re-vegetation to reduce airborne dust.")
- Landing zones for helicopters and areas where bulldozers, graders, or skid steer operate require continuous wetting. This is particularly critical where landing zones are adjacent to residential areas. Figure 5. (Omitted in the RDEIR.)
- When digging in soil is required, train workers to reduce the amount of dust inhaled by staying upwind when possible. (Omitted in the RDEIR.)
- Increase awareness of Valley Fever by educating the workers and supervisors on the distribution of endemic areas, ways to reduce exposure, how to recognize symptoms of Valley Fever, the need to report symptoms to a supervisor to obtain medical evaluation, where to seek care, and effective controls, including proper use of construction equipment and respirators. (The RDEIR includes an incomplete version of this measure.)

[56] 2/22/2021 Fox Comments, pp. 41-44.

[57] RDEIR, p. 2-R.4.3-28, pdf 204.

- Require the use of powered air-purifying respirators with high efficiency particulate air (HEPA) filters. (Omitted in the RDEIR.)
- Implement a mandatory and comprehensive respirator program (8 CCR §5144, Respiratory Protection: https://www.dir.ca.gov/title8/5144.html) that specifically requires NIOSH-approved respirators while performing in or near job activities that create airborne dust. The program must include medical clearance, training, fit testing, and procedures for cleaning and maintaining respirators. (Omitted in the RDEIR.)
- Provide coveralls to prevent street clothes from being contaminated with fungal spores and taken home or elsewhere. The RDEIR only requires "If workers' clothing is likely to be heavily contaminated with dust, provide coveralls and change rooms, and showers where possible."
- Alternatively, require change of clothing and shoes at worksite to prevent workers from taking dust and spores home. (RDEIR only requires "If workers' clothing is likely to be heavily contaminated with dust, provide coveralls and change rooms, and showers where possible.")
- Provide workers with lockers or other storage areas to keep street clothes and work clothes separate. (Omitted in the RDEIR.)
- Encourage workers to shower and wash their hair at the workplace.
- Wash equipment before moving it off-site. (Omitted in the RDEIR.)
- Coordinate with local medical clinics that have a protocol for evaluation, follow-up, and treatment of Valley Fever to provide prompt evaluation and care. (Omitted in the RDEIR.)
- Clean tools, equipment, and vehicles with water to remove soil before transporting off site.
- Track and report all suspected Valley Fever illnesses that occur at the worksite to the San Louis Obispo Department of Public Health. (Omitted in the RDEIR.)

The VFMP discussion in the RDEIR should be modified to include all of these measures.

### 5.2. The VFMP Is Not Enforceable

#### 5.2.1. The Responsible Party for Enforcement Is Not Identified

Mitigation Measure AQ-2 fails to explain how compliance will be demonstrated with the VFMP. As explained in Comment 2 for fugitive dust, site plans generally list

the mitigation measures. A construction manager is designated to confirm compliance with all the mitigation measures and report observations to the responsible agency. Mitigation Measure AQ-2 is silent on how compliance with the VFMP will be enforced during construction.

#### 5.2.2. Wind Monitoring Is Not Required

Mitigation Measure AQ-2 requires that work be suspended during heavy wind. However, this mitigation measure does not define "heavy winds" in the context of Valley Fever spores. Further, it does not explain how "heavy winds" will be measured and used to implement work suspension. See Comment 2.1.2.

### 5.3. Valley Fever Spore Monitoring in Soils Should Be Required

A comprehensive VFMP cannot be developed without comprehensive soil monitoring for Valley Fever spores at all disturbed sites, including helicopter landing areas, prior to the start of construction. As all of the proposed Project construction sites have the potential to contain Coccidioidomycosis spores and it is well known that the spores can easily become airborne when soil is disturbed, the Project construction sites should be tested well in advance of construction to determine if spores are present, and the results used to refine the VFMP.

Accurate test methods have been developed and used in similar applications.[58,59] A study conducted in the Antelope Valley, slated for six solar ranches of varying sizes, concluded that soil analyses should be conducted before soil disturbance in endemic areas, noting: "Based on the findings of this study, we recommend that EIRs include soil analyses for *Coccidioides spp.* on land destined for construction of any type in endemic areas of the pathogen."[60] An Environmental Assessment for a solar project has required soil testing.[61] The result of soil testing for Valley Fever spores should be used to refine the VFMP.

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[58] J. R. Bowers et al., Direct Detection of Coccidioides from Arizona Soils Using CocciENV, a Highly Sensitive and Specific Real-time PCR Assay, *Medical Mycology*, 2018 (Exhibit 5); and Proceedings of the 60th Annual Coccidioidomycosis Study Group Meeting, April 8–9, 2016, Fresno, CA; http://coccistudygroup.com/wp-content/uploads/2016/10/CSG-60th-Annual.pdf.

[59] 2/22/2021 Fox Comments, Exhibit 10, Colson et al. 2017, pp. 439–458.

[60] Colson et al. 2017, p. 456. (Exhibit 10 to 2/22/2021 Fox Comments).

[61] Final Environmental Assessment for Construction, Operation, and Decommissioning of a Solar Photovoltaic System at Marine Air Ground Task Force Training Command Marine Corps Air Ground Combat Center, Twentynine Palms, California, November 2015, Table ES-1, AQ-17; https://www.29palms.marines.mil/Portals/56/Docs/G4/NREA/Environmental%20Assessment%20Construction%20and%20Operation%20of%20Solar%20Photovoltaic%20System%20at%20MAGTFTC,%20MCAGCC%20(Final)%20November%202015.pdf.

## 6. ELECTROMAGNETIC FIELD IMPACTS ARE SIGNIFICANT

I commented that overhead transmission lines are a source of two fields: the electric field produced by the voltage and the magnetic field produced by the current. CPUC guidance specifically requires that "[t]he construction of a new transmission line will incorporate no-cost and low-cost magnetic field reduction measures. Magnetic field modeling is required."[62] Other similar projects have adopted CPUC's "no-cost/low-cost EMF reduction measures."[63] In spite of this guidance, the RDEIR does not require compliance with it, instead citing outdated information that casts doubt on the health impacts of electromagnetic field (EMF) impacts.

The RDEIR dismisses EMF impacts even though the proposed transmission line is within 50 feet of many homes. Rather, the RDEIR asserts that the CPUC does not consider EMF to be an environmental issue under CEQA as "there is no agreement among scientists that EMF creates a potential health risk and because CEQA does not define or adopt standards for defining any potential risk from EMF."[64] However, the lack of agreement among scientists is not a valid reason for declining to review and mitigate a significant impact under CEQA. There is lack of agreement on many issues routinely evaluated under CEQA. As long as there is substantial evidence, even if there are dissenting opinions, CEQA requires that the impact be analyzed and mitigated. Further, CEQA does not define or adopt standards for assessing any impact.

In fact, there is substantial agreement in the scientific community that electromagnetic fields cause health impacts. The RDEIR ignores the recent evidence that I included in my 2/22/2021 comments and instead cites earlier studies. All of the evidence cited in the RDEIR in support of the EMF health effects uncertainty theory is out of date, including a May 1999 NIEHS report, a June 2001 IARC report, a June 2002 DHS report, and a 2007 WHO Report. In contrast, the evidence I cite in Exhibit 21 to my 2/22/2021 comments in support of adverse health impacts from exposure to electromagnetic radiation is based on a long-term collaboration of 29 international scientists from 10 countries holding medical degrees, PhDs, and MPHs. Their work was done independent of governments and industries with vested interests, employing a multidisciplinary approach to the EMF issue. Their work, summarized in Exhibit 21 to my 2/22/2021 comments, presents substantial evidence for the following adverse

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[62] California Public Utility Commission, EMF Design Guidelines for Electrical Facilities, Table 3-1, pdf 9, July 21, 2006; https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/energy-division/documents/infrastructure/emfs/ca_emf_design_guidelines.pdf.

[63] Appendix B, Electric and Magnetic Fields (EMF) and Other Field-Related Concerns; https://ia.cpuc.ca.gov/Environment/info/esa/lakeville/fmnd/6b-AppendixB-EMF.pdf.

[64] RDEIR, Section 2.9, pdf 145-151.

impacts of EMF fields from locating the transmission line adjacent to residential areas including:

*Short-Term Health Impacts*:

- Headaches
- Fatigue
- Anxiety
- Insomnia
- Prickling and/or burning skin
- Rashes
- Muscle pain

*Long-Term Health Impacts*:

- Impacts on gene and protein expression
- Genotoxic effects, including RFR[65] and ELF DNA damage
- Adverse impacts on stress proteins
- Adverse impacts on immune function
- Adverse impacts on neurology and behavior
- Brain tumors and acoustic neuromas
- Childhood cancers (leukemia)
- Adult cancers (breast cancer promotion)
- Adverse impacts on melatonin, leading to Alzheimer's disease and breast cancer
- Changes in nervous system and brain function
- Impacts on DNA
- Impacts on stress proteins
- Impacts on the immune system
- Risk of leukemia
- Risk of neurodegenerative disease
- Risk of miscarriage

The RDEIR does not address this more recent evidence of adverse health impacts but rather cites to earlier studies that suggest lack of consensus. Thus, my evidence of adverse impacts from EMF due to the location of the transmission line within 50 feet of many homes is unrebutted, requiring mitigation. I recommended mitigation in my 2/22/2021 comments, including undergrounding and adopting CPUC design guidelines. The RDEIR is silent on mitigation of these significant impacts. The RDEIR does not respond to my proposed mitigation measures.

[65] RFR = radiofrequency radiation; ELF = extremely low frequency.

However, a letter from Winston & Strawn commenting on the DEIR behalf of Horizon West Transmission, LLC, concluded that mitigation of EMF impacts is feasible:[66]

> **Methods to Reduce EMF**
>
> EMF levels from transmission lines can be reduced in three primary ways: shielding, field cancellation, or increasing the distance from the source. Shielding, which reduces exposure to electric fields, can be actively accomplished by placing trees or other physical barriers along the transmission line right-of-way. Shielding also results from existing structures the public may use or occupy along the line. Since electric fields can be blocked by most materials, shielding is effective for the electric fields but is not effective for magnetic fields.
>
> Magnetic fields can be reduced either by cancellation or by increasing distance from the source. Cancellation is achieved in two ways. A transmission line circuit consists of three "phases": three separate wires (conductors) on a transmission tower. The configuration of these three conductors can reduce magnetic fields. First, when the configuration places the three
>
> conductors closer together, the interference, or cancellation, of the fields from each wire is enhanced. This technique has practical limitations because of the potential for short circuits if the wires are placed too close together. There are also worker safety issues to consider if spacing is reduced. In underground lines, the three phases typically can be placed much closer together than for overhead lines because the cables have dielectric insulation.
>
> The distance between the source of fields and the public can be increased by either placing the wires higher aboveground, burying underground cables deeper, or by increasing the width of the right-of-way. For transmission lines, these methods can prove effective in reducing fields because the reduction of the field strength drops rapidly with distance.

In sum, the RDEIR must be modified to identify EMF impacts and to impose enforceable mitigation.

[66] Letter from Winston & Strawn, to Robert Peterson, c/o Tom Engels, Horizon Water and Environment Re: Comments of Horizon West Transmission, LLC on the Draft Environmental Impact Report for the Estrella substation and Paso Robles Area Reinforcement Project, December 2020, February 22, 2021.

Phyllis Fox, Ph.D, PE
Environmental Management
745 White Pine Ave.
Rockledge, FL 32955
321-626-6885
phyllisfox@gmail.com

Dr. Fox has over 40 years of experience in the field of environmental engineering, including air pollution control (BACT, BART, MACT, LAER, RACT), greenhouse gas emissions and control, cost effectiveness analyses, water quality and water supply investigations, hydrology, hazardous waste investigations, environmental permitting, nuisance investigations (odor, noise), environmental impact reports, CEQA/NEPA documentation, risk assessments, and litigation support.

## EDUCATION

Ph.D. Environmental/Civil Engineering, University of California, Berkeley, 1980.
M.S. Environmental/Civil Engineering, University of California, Berkeley, 1975.
B.S. Physics (with high honors), University of Florida, Gainesville, 1971.

## REGISTRATION

Registered Professional Engineer: Arizona (2001-2014: #36701; retired), California (2002-present; CH 6058), Florida (2001-2016; #57886; retired), Georgia (2002-2014; #PE027643; retired), Washington (2002-2014; #38692; retired), Wisconsin (2005-2014; #37595-006; retired)
Board Certified Environmental Engineer, American Academy of Environmental Engineers, Certified in Air Pollution Control (DEE #01-20014), 2002-2014; retired)
Qualified Environmental Professional (QEP), Institute of Professional Environmental Practice (QEP #02-010007, 2001-2015: retired).

## PROFESSIONAL HISTORY

Environmental Management, Principal, 1981-present
Lawrence Berkeley National Laboratory, Principal Investigator, 1977-1981
University of California, Berkeley, Program Manager, 1976-1977
Bechtel, Inc., Engineer, 1971-1976, 1964-1966

## PROFESSIONAL AFFILIATIONS

American Chemical Society (1981-2010)
Phi Beta Kappa (1970-present)
Sigma Pi Sigma (1970-present)
*Who's Who Environmental Registry,* PH Publishing, Fort Collins, CO, 1992.
*Who's Who in the World,* Marquis Who's Who, Inc., Chicago, IL, 11th Ed., p. 371, 1993-present.

*Who's Who of American Women*, Marquis Who's Who, Inc., Chicago, IL, 13th Ed., p. 264, 1984-present.
*Who's Who in Science and Engineering*, Marquis Who's Who, Inc., New Providence, NJ, 5th Ed., p. 414, 1999-present.
*Who's Who in America*, Marquis Who's Who, Inc., 59th Ed., 2005.
*Guide to Specialists on Toxic Substances*, World Environment Center, New York, NY, p. 80, 1980.
National Research Council Committee on Irrigation-Induced Water Quality Problems (Selenium), Subcommittee on Quality Control/Quality Assurance (1985-1990).
National Research Council Committee on Surface Mining and Reclamation, Subcommittee on Oil Shale (1978-80)

*REPRESENTATIVE EXPERIENCE*

Performed environmental and engineering investigations, as outlined below, for a wide range of industrial and commercial facilities including: petroleum refineries and upgrades thereto; reformulated fuels projects; refinery upgrades to process heavy sour crudes, including tar sands and light sweet crudes from the Eagle Ford and Bakken Formations; petroleum, gasoline and ethanol distribution terminals; coal, coke, and ore/mineral export terminals; LNG export, import, and storage terminals; crude-by-rail projects; shale oil plants; crude oil/condensate marine and rail terminals; coal gasification and liquefaction plants; oil and gas production, including conventional, thermally enhanced, hydraulic fracking, and acid stimulation techniques; underground storage tanks; pipelines; compressor stations; gasoline stations; landfills; railyards; hazardous waste treatment facilities; nuclear, hydroelectric, geothermal, wood, biomass, waste, tire-derived fuel, gas, oil, coke and coal-fired power plants; wind farms; solar energy facilities; battery storage facilities; transmission lines; airports; hydrogen plants; petroleum coke calcining plants; coke plants; activated carbon manufacturing facilities; asphalt plants; cement plants; incinerators; flares; manufacturing facilities (e.g., semiconductors, electronic assembly, aerospace components, printed circuit boards, amusement park rides); lanthanide processing plants; ammonia plants; nitric acid plants; urea plants; food processing plants; wineries; almond hulling facilities; composting facilities; grain processing facilities; grain elevators; ethanol production facilities; soy bean oil extraction plants; biodiesel plants; paint formulation plants; wastewater treatment plants; marine terminals and ports; gas processing plants; steel mills; iron nugget production facilities; pig iron plant, based on blast furnace technology; direct reduced iron plant; acid regeneration facilities; railcar refinishing facility; battery manufacturing plants; pesticide manufacturing and repackaging facilities; pulp and paper mills; olefin plants; methanol plants; ethylene crackers; alumina plants, desalination plants; battery storage facilities; data centers; covered lagoon anaerobic digesters with biogas generators and upgrading equipment to produce renewable natural gas and electricity; selective catalytic reduction (SCR) systems; selective noncatalytic reduction (SNCR) systems; halogen acid furnaces; contaminated property

redevelopment projects (e.g., Mission Bay, Southern Pacific Railyards, Moscone Center expansion, San Diego Padres Ballpark); residential developments; commercial office parks, campuses, and shopping centers; server farms; transportation plans; and a wide range of mines including sand and gravel, hard rock, limestone, nacholite, coal, molybdenum, gold, zinc, and oil shale.

*EXPERT WITNESS/LITIGATION SUPPORT*

- For plaintiffs-intervenors (Sierra Club), in civil action relating to alleged violations of the Clean Air Act, Prevention of Significant Deterioration, for historic modifications at Rush Island Units 1 and 2 and Labadie Energy Center, assist counsel in evaluating best available control technology (BACT) to reduce SO2 emissions, including wet and dry scrubbing, sorbent injection, and offsets. Case settled. *U.S. and Sierra Club vs. Ameren Missouri*, Case No. 4-11 CV 77 RWS, U.S. District Court, Eastern District of Missouri, Eastern Division, September 30, 2019.
- For the California Attorney General, assist in determining compliance with probation terms in the matter of People v. Chevron USA.
- For plaintiffs, assist in developing Petitioners' proof brief for National Parks Conservation Association et al v. U.S. EPA, Petition for Review of Final Administrative Action of the U.S. EPA, In the U.S. Court of Appeals for the Third Circuit, Docket No. 14-3147.
- For plaintiffs, expert witness in civil action relating to alleged violations of the Clean Air Act, Prevention of Significant Deterioration, for historic modifications (1997-2000) at the Cemex cement plant in Lyons, Colorado. Reviewed produced documents, prepared expert and rebuttal reports on PSD applicability based on NOx emission calculations for a collection of changes considered both individually and collectively. Deposed August 2011. *United States v. Cemex, Inc.*, In U.S. District Court for the District of Colorado (Civil Action No. 09-cv-00019-MSK-MEH). Case settled June 13, 2013.
- For plaintiffs, in civil action relating to alleged violations of the Clean Air Act, Prevention of Significant Deterioration, for historic modifications (1988 – 2000) at James De Young Units 3, 4, and 5. Reviewed produced documents, analyzed CEMS and EIA data, and prepared netting and BACT analyses for NOx, SO2, and PM10 (PSD case). Expert report February 24, 2010 and affidavit February 20, 2010. *Sierra Club v. City of Holland, et al.*, U.S. District Court, Western District of Michigan (Civil Action 1:08-cv-1183). Case settled. Consent Decree 1/19/14.
- For plaintiffs, in civil action alleging failure to obtain MACT permit, expert on potential to emit hydrogen chloride (HCl) from a new coal-fired boiler. Reviewed record, estimated HCl emissions, wrote expert report June 2010 and March 2013 (Cost to Install a Scrubber at the Lamar Repowering Project Pursuant to Case-by-Case MACT), deposed August 2010 and

March 2013. *Wildearth Guardian et al. v. Lamar Utilities Board*, Civil Action No. 09-cv-02974, U.S. District Court, District of Colorado. Case settled August 2013.

- For plaintiffs, expert witness on permitting, emission calculations, and wastewater treatment for coal-to-gasoline plant. Reviewed produced documents. Assisted in preparation of comments on draft minor source permit. Wrote two affidavits on key issues in case. Presented direct and rebuttal testimony 10/27 - 10/28/10 on permit enforceability and failure to properly calculate potential to emit, including underestimate of flaring emissions and omission of VOC and CO emissions from wastewater treatment, cooling tower, tank roof landings, and malfunctions. *Sierra Club, Ohio Valley Environmental Coalition, Coal River Mountain Watch, West Virginia Highlands Conservancy v. John Benedict, Director, Division of Air Quality, West Virginia Department of Environmental Protection and TransGas Development System, LLC*, Appeal No. 10-01-AQB. Virginia Air Quality Board remanded the permit on March 28, 2011 ordering reconsideration of potential to emit calculations, including: (1) support for assumed flare efficiency; (2) inclusion of startup, shutdown and malfunction emissions; and (3) inclusion of wastewater treatment emissions in potential to emit calculations.
- For plaintiffs, expert on BACT emission limits for gas-fired combined cycle power plant. Prepared declaration in support of CBE's Opposition to the United States' Motion for Entry of Proposed Amended Consent Decree. Assisted in settlement discussions. *U.S. EPA, Plaintiff, Communities for a Better Environment, Intervenor Plaintiff, v. Pacific Gas & Electric Company, et al.*, U.S. District Court, Northern District of California, San Francisco Division, Case No. C-09-4503 SI.
- Technical expert in confidential settlement discussions with large coal-fired utility on BACT control technology and emission limits for NOx, SO2, PM, PM2.5, and CO for new natural gas fired combined cycle and simple cycle turbines with oil backup. (July 2010). Case settled.
- For plaintiffs, expert witness in remedy phase of civil action relating to alleged violations of the Clean Air Act, Prevention of Significant Deterioration, for historic modifications (1998-99) at Gallagher Units 1 and 3. Reviewed produced documents, prepared expert and rebuttal reports on historic and current-day BACT for SO2, control costs, and excess emissions of SO2. Deposed 11/18/09. *United States et al. v. Cinergy, et al.*, In U.S. District Court for the Southern District of Indiana, Indianapolis Division, Civil Action No. IP99-1693 C-M/S. Settled 12/22/09.
- For plaintiffs, expert witness on MACT, BACT for NOx, and enforceability in an administrative appeal of draft state air permit issued for four 300-MW pet-coke-fired CFBs. Reviewed produced documents and prepared prefiled testimony. Deposed 10/8/09 and 11/9/09. Testified 11/10/09. *Application of Las Brisas Energy Center, LLC for State Air Quality Permit*; before the State Office of Administrative Hearings, Texas. Permit remanded 3/29/10 as LBEC failed to meet burden of proof on a number of issues including MACT.

Texas Court of Appeals dismissed an appeal to reinstate the permit. The Texas Commission on Environmental Quality and Las Brisas Energy Center, LLC sought to overturn the Court of Appeals decision but moved to have their appeal dismissed in August 2013.

- For defense, expert witness in unlawful detainer case involving a gasoline station, minimart, and residential property with contamination from leaking underground storage tanks. Reviewed agency files and inspected site. Presented expert testimony on July 6, 2009, on causes of, nature and extent of subsurface contamination. *A. Singh v. S. Assaedi,* in Contra Costa County Superior Court, CA. Settled August 2009.
- For plaintiffs, expert witness on netting and enforceability for refinery being upgraded to process tar sands crude. Reviewed produced documents. Prepared expert and rebuttal reports addressing use of emission factors for baseline, omitted sources including coker, flares, tank landings and cleaning, and enforceability. Deposed. *In the Matter of Objection to the Issuance of Significant Source Modification Permit No. 089-25484-00453 to BP Products North America Inc., Whiting Business Unit, Save the Dunes Council, Inc., Sierra Club., Inc., Hoosier Environmental Council et al., Petitioners, B. P. Products North American, Respondents/Permittee,* before the Indiana Office of Environmental Adjudication. Case settled.
- For plaintiffs, expert witness on BACT, MACT, and enforceability in appeal of Title V permit issued to 600 MW coal-fired power plant burning Powder River Basin coal. Prepared technical comments on draft air permit. Reviewed record on appeal, drafted BACT, MACT, and enforceability pre-filed testimony. Drafted MACT and enforceability pre-filed rebuttal testimony. Deposed March 24, 2009. Testified June 10, 2009. *In Re: Southwestern Electric Power Company*, Arkansas Pollution Control and Ecology Commission, Consolidated Docket No. 08-006-P. Recommended Decision issued December 9, 2009 upholding issued permit. Commission adopted Recommended Decision January 22, 2010.
- For plaintiffs, expert witness in remedy phase of civil action relating to alleged violations of the Clean Air Act, Prevention of Significant Deterioration, for historic modifications (1989-1992) at Wabash Units 2, 3 and 5. Reviewed produced documents, prepared expert and rebuttal report on historic and current-day BACT for NOx and SO2, control costs, and excess emissions of NOx, SO2, and mercury. Deposed 10/21/08. *United States et al. v. Cinergy, et al.*, In U.S. District Court for the Southern District of Indiana, Indianapolis Division, Civil Action No. IP99-1693 C-M/S. Testified 2/3/09. Memorandum Opinion & Order 5-29-09 requiring shutdown of Wabash River Units 2, 3, 5 by September 30, 2009, run at baseline until shutdown, and permanently surrender SO2 emission allowances.
- For plaintiffs, expert witness in liability phase of civil action relating to alleged violations of the Clean Air Act, Prevention of Significant Deterioration, for three historic modifications (1997-2001) at two portland cement plants involving three cement kilns. Reviewed produced documents, analyzed CEMS data covering subject period, prepared netting analysis for NOx, $SO_2$ and CO, and prepared expert and rebuttal reports. *United States v. Cemex California*

*Cement,* In U.S. District Court for the Central District of California, Eastern Division, Case No. ED CV 07-00223-GW (JCRx). Settled 1/15/09.

- For intervenors Clean Wisconsin and Citizens Utility Board, prepared data requests, reviewed discovery and expert report. Prepared prefiled direct, rebuttal and surrebuttal testimony on cost to extend life of existing Oak Creek Units 5-8 and cost to address future regulatory requirements to determine whether to control or shutdown one or more of the units. Oral testimony 2/5/08. Application for a Certificate of Authority to Install Wet Flue Gas Desulfurization and Selective Catalytic Reduction Facilities and Associated Equipment for Control of Sulfur Dioxide and Nitrogen Oxide Emissions at Oak Creek Power Plant Units 5, 6, 7 and 8, WPSC Docket No. 6630-CE-299.
- For plaintiffs, expert witness on alternatives analysis and BACT for NOx, SO2, total PM10, and sulfuric acid mist in appeal of PSD permit issued to 1200 MW coal fired power plant burning Powder River Basin and/or Central Appalachian coal (Longleaf). Assisted in drafting technical comments on NOx on draft permit. Prepared expert disclosure. Presented 8+ days of direct and rebuttal expert testimony. Attended all 21 days of evidentiary hearing from 9/5/07 – 10/30/07 assisting in all aspects of hearing. *Friends of the Chatahooche and Sierra Club v. Dr. Carol Couch, Director, Environmental Protection Division of Natural Resources Department, Respondent, and Longleaf Energy Associates, Intervener*. ALJ Final Decision 1/11/08 denying petition. ALJ Order vacated & remanded for further proceedings, Fulton County Superior Court, 6/30/08. Court of Appeals of GA remanded the case with directions that the ALJ's final decision be vacated to consider the evidence under the correct standard of review, July 9, 2009. The ALJ issued an opinion April 2, 2010 in favor of the applicant. Final permit issued April 2010.
- For plaintiffs, expert witness on diesel exhaust in inverse condemnation case in which Port expanded maritime operations into residential neighborhoods, subjecting plaintiffs to noise, light, and diesel fumes. Measured real-time diesel particulate concentrations from marine vessels and tug boats on plaintiffs' property. Reviewed documents, depositions, DVDs, and photographs provided by counsel. Deposed. Testified October 24, 2006. *Ann Chargin, Richard Hackett, Carolyn Hackett, et al. v. Stockton Port District*, Superior Court of California, County of San Joaquin, Stockton Branch, No. CV021015. Judge ruled for plaintiffs.
- For plaintiffs, expert witness on NOx emissions and BACT in case alleging failure to obtain necessary permits and install controls on gas-fired combined-cycle turbines. Prepared and reviewed (applicant analyses) of NOx emissions, BACT analyses (water injection, SCR, ultra low NOx burners), and cost-effectiveness analyses based on site visit, plant operating records, stack tests, CEMS data, and turbine and catalyst vendor design information. Participated in negotiations to scope out consent order. *United States v. Nevada Power.* Case settled June 2007, resulting in installation of dry low NOx burners (5 ppm NOx averaged over 1 hr) on four units and a separate solar array at a local business.

- For plaintiffs, expert witness in appeal of PSD permit issued to 850 MW coal fired boiler burning Powder River Basin coal (Iatan Unit 2) on BACT for particulate matter, sulfuric acid mist and opacity and emission calculations for alleged historic violations of PSD. Assisted in drafting technical comments, petition for review, discovery requests, and responses to discovery requests. Reviewed produced documents. Prepared expert report on BACT for particulate matter. Assisted with expert depositions. Deposed February 7, 8, 27, and 28, 2007. *In Re PSD Construction Permit Issued to Great Plains Energy, Kansas City Power & Light – Iatan Generating Station, Sierra Club v. Missouri Department of Natural Resources, Great Plains Energy, and Kansas City Power & Light.* Case settled March 27, 2007, providing offsets for over 6 million ton/yr of CO2 and lower NOx and $SO_2$ emission limits.
- For plaintiffs, expert witness in remedy phase of civil action relating to alleged violations of the Clean Air Act, Prevention of Significant Deterioration, for historic modifications of coal-fired boilers and associated equipment. Reviewed produced documents, prepared expert report on cost to retrofit 24 coal-fired power plants with scrubbers designed to remove 99% of the sulfur dioxide from flue gases. Prepared supplemental and expert report on cost estimates and BACT for SO2 for these 24 complaint units. Deposed 1/30/07 and 3/14/07. *United States and State of New York et al. v. American Electric Power*, In U.S. District Court for the Southern District of Ohio, Eastern Division, Consolidated Civil Action Nos. C2-99-1182 and C2-99-1250. Settlement announced 10/9/07.
- For plaintiffs, expert witness on BACT, enforceability, and alternatives analysis in appeal of PSD permit issued for a 270-MW pulverized coal fired boiler burning Powder River Basin coal (City Utilities Springfield Unit 2). Reviewed permitting file and assisted counsel draft petition and prepare and respond to interrogatories and document requests. Reviewed interrogatory responses and produced documents. Assisted with expert depositions. Deposed August 2005. Evidentiary hearings October 2005. *In the Matter of Linda Chipperfield and Sierra Club v. Missouri Department of Natural Resources.* Missouri Supreme Court denied review of adverse lower court rulings August 2007.
- For plaintiffs, expert witness in civil action relating to plume touchdowns at AEP's Gavin coal-fired power plant. Assisted counsel draft interrogatories and document requests. Reviewed responses to interrogatories and produced documents. Prepared expert report "Releases of Sulfuric Acid Mist from the Gavin Power Station." The report evaluates sulfuric acid mist releases to determine if AEP complied with the requirements of CERCLA Section 103(a) and EPCRA Section 304. This report also discusses the formation, chemistry, release characteristics, and abatement of sulfuric acid mist in support of the claim that these releases present an imminent and substantial endangerment to public health under Section 7002(a)(1)(B) of the Resource Conservation and Recovery Act ("RCRA"). *Citizens Against Pollution v. Ohio Power Company*, In the U.S. District Court for the Southern District of Ohio, Eastern Division, Civil Action No. 2-04-cv-371. Case settled 12-8-06.

- For petitioners, expert witness in contested case hearing on BACT, enforceability, and emission estimates for an air permit issued to a 500-MW supercritical Power River Basin coal-fired boiler (Weston Unit 4). Assisted counsel prepare comments on draft air permit and respond to and draft discovery. Reviewed produced file, deposed (7/05), and prepared expert report on BACT and enforceability. Evidentiary hearings September 2005. *In the Matter of an Air Pollution Control Construction Permit Issued to Wisconsin Public Service Corporation for the Construction and Operation of a 500 MW Pulverized Coal-fired Power Plant Known as Weston Unit 4 in Marathon County, Wisconsin*, Case No. IH-04-21. The Final Order, issued 2/10/06, lowered the NOx BACT limit from 0.07 lb/MMBtu to 0.06 lb/MMBtu based on a 30-day average, added a BACT SO2 control efficiency, and required a 0.0005% high efficiency drift eliminator as BACT for the cooling tower. The modified permit, including these provisions, was issued 3/28/07. Additional appeals in progress.
- For plaintiffs, adviser on technical issues related to Citizen Suit against U.S. EPA regarding failure to update New Source Performance Standards for petroleum refineries, 40 CFR 60, Subparts J, VV, and GGG. *Our Children's Earth Foundation and Sierra Club v. U.S. EPA et al.* Case settled July 2005. CD No. C 05-00094 CW, U.S. District Court, Northern District of California – Oakland Division. Proposed revisions to standards of performance for petroleum refineries published 72 FR 27178 (5/14/07).
- For interveners, reviewed proposed Consent Decree settling Clean Air Act violations due to historic modifications of boilers and associated equipment at two coal-fired power plants. In response to stay order, reviewed the record, selected one representative activity at each of seven generating units, and analyzed to identify CAA violations. Identified NSPS and NSR violations for NOx, $SO_2$, PM/PM10, and sulfuric acid mist. Summarized results in an expert report. *United States of America, and Michael A. Cox, Attorney General of the State of Michigan, ex rel. Michigan Department of Environmental Quality, Plaintiffs, and Clean Wisconsin, Sierra Club, and Citizens' Utility Board, Intervenors, v. Wisconsin Electric Power Company, Defendant*, U.S. District Court for the Eastern District of Wisconsin, Civil Action No. 2:03-CV-00371-CNC. Order issued 10-1-07 denying petition.
- For a coalition of Nevada labor organizations (ACE), reviewed preliminary determination to issue a Class I Air Quality Operating Permit to Construct and supporting files for a 250-MW pulverized coal-fired boiler (Newmont). Prepared about 100 pages of technical analyses and comments on BACT, MACT, emission calculations, and enforceability. Assisted counsel draft petition and reply brief appealing PSD permit to U.S. EPA Environmental Appeals Board (EAB). Order denying review issued 12/21/05. *In re Newmont Nevada Energy Investment, LLC, TS Power Plant*, PSD Appeal No. 05-04 (EAB 2005).
- For petitioners and plaintiffs, reviewed and prepared comments on air quality and hazardous waste based on negative declaration for refinery ultra low sulfur diesel project located in SCAQMD. Reviewed responses to comments and prepared responses. Prepared declaration and presented oral testimony before SCAQMD Hearing Board on exempt sources (cooling towers) and calculation of potential to emit under NSR. Petition for writ of mandate filed

March 2005. Case remanded by Court of Appeals to trial court to direct SCAQMD to re-evaluate the potential environmental significance of NOx emissions resulting from the project in accordance with court's opinion. California Court of Appeals, Second Appellate Division, on December 18, 2007, affirmed in part (as to baseline) and denied in part. *Communities for a Better Environment v. South Coast Air Quality Management District and ConocoPhillips and Carlos Valdez et al v. South Coast Air Quality Management District and ConocoPhillips.* Certified for partial publication 1/16/08. Appellate Court opinion upheld by CA Supreme Court 3/15/10. *(2010) 48 Cal.4th 310*.

- For amici seeking to amend a proposed Consent Decree to settle alleged NSR violations at Chevron refineries, reviewed proposed settlement, related files, subject modifications, and emission calculations. Prepared declaration on emission reductions, identification of NSR and NSPS violations, and BACT/LAER for FCCUs, heaters and boilers, flares, and sulfur recovery plants. *U.S. et al. v. Chevron U.S.A.*, Northern District of California, Case No. C 03-04650. Memorandum and Order Entering Consent Decree issued June 2005. Case No. C 03-4650 CRB.
- For petitioners, prepared declaration on enforceability of periodic monitoring requirements, in response to EPA's revised interpretation of 40 CFR 70.6(c)(1). This revision limited additional monitoring required in Title V permits. 69 FR 3203 (Jan. 22, 2004). *Environmental Integrity Project et al. v. EPA* (U.S. Court of Appeals for the District of Columbia). Court ruled the Act requires all Title V permits to contain monitoring requirements to assure compliance. *Sierra Club v. EPA*, 536 F.3d 673 (D.C. Cir. 2008).
- For interveners in application for authority to construct a 500 MW supercritical coal-fired generating unit before the Wisconsin Public Service Commission, prepared pre-filed written direct and rebuttal testimony with oral cross examination and rebuttal on BACT and MACT (Weston 4). Prepared written comments on BACT, MACT, and enforceability on draft air permit for same facility.
- For property owners in Nevada, evaluated the environmental impacts of a 1,450-MW coal-fired power plant proposed in a rural area adjacent to the Black Rock Desert and Granite Range, including emission calculations, air quality modeling, comments on proposed use permit to collect preconstruction monitoring data, and coordination with agencies and other interested parties. Project cancelled.
- For environmental organizations, reviewed draft PSD permit for a 600-MW coal-fired power plant in West Virginia (Longview). Prepared comments on permit enforceability; coal washing; BACT for $SO_2$ and PM10; Hg MACT; and MACT for HCl, HF, non-Hg metallic HAPs, and enforceability. Assist plaintiffs draft petition appealing air permit. Retained as expert to develop testimony on MACT, BACT, offsets, enforceability. Participate in settlement discussions. Case settled July 2004.
- For petitioners, reviewed record produced in discovery and prepared affidavit on emissions of carbon monoxide and volatile organic compounds during startup of GE 7FA combustion

turbines to successfully establish plaintiff standing. *Sierra Club et al. v. Georgia Power Company* (Northern District of Georgia).

- For building trades, reviewed air quality permitting action for 1500-MW coal-fired power plant before the Kentucky Department for Environmental Protection (Thoroughbred).
- For petitioners, expert witness in administrative appeal of the PSD/Title V permit issued to a 1500-MW coal-fired power plant. Reviewed over 60,000 pages of produced documents, prepared discovery index, identified and assembled plaintiff exhibits. Deposed. Assisted counsel in drafting discovery requests, with over 30 depositions, witness cross examination, and brief drafting. Presented over 20 days of direct testimony, rebuttal and sur-rebuttal, with cross examination on BACT for NOx, $SO_2$, and PM/PM10; MACT for Hg and non-Hg metallic HAPs; emission estimates for purposes of Class I and II air modeling; risk assessment; and enforceability of permit limits. Evidentiary hearings from November 2003 to June 2004. *Sierra Club et al. v. Natural Resources & Environmental Protection Cabinet, Division of Air Quality and Thoroughbred Generating Company et al.* Hearing Officer Decision issued August 9, 2005 finding in favor of plaintiffs on counts as to risk, BACT (IGCC/CFB, NOx, $SO_2$, Hg, Be), single source, enforceability, and errors and omissions. Assist counsel draft exceptions. Cabinet Secretary issued Order April 11, 2006 denying Hearing Offer's report, except as to NOx BACT, Hg, 99% SO2 control and certain errors and omissions.
- For citizens group in Massachusetts, reviewed, commented on, and participated in permitting of pollution control retrofits of coal-fired power plant (Salem Harbor).
- Assisted citizens group and labor union challenge issuance of conditional use permit for a 317,000 $ft^2$ discount store in Honolulu without any environmental review. In support of a motion for preliminary injunction, prepared 7-page declaration addressing public health impacts of diesel exhaust from vehicles serving the Project. In preparation for trial, prepared 20-page preliminary expert report summarizing results of diesel exhaust and noise measurements at two big box retail stores in Honolulu, estimated diesel PM10 concentrations for Project using ISCST, prepared a cancer health risk assessment based on these analyses, and evaluated noise impacts.
- Assisted environmental organizations to challenge the DOE Finding of No Significant Impact (FONSI) for the Baja California Power and Sempra Energy Resources Cross-Border Transmissions Lines in the U.S. and four associated power plants located in Mexico (DOE EA-1391). Prepared 20-page declaration in support of motion for summary judgment addressing emissions, including $CO_2$ and $NH_3$, offsets, BACT, cumulative air quality impacts, alternative cooling systems, and water use and water quality impacts. Plaintiff's motion for summary judgment granted in part. U.S. District Court, Southern District decision concluded that the Environmental Assessment and FONSI violated NEPA and the APA due to their inadequate analysis of the potential controversy surrounding the project, water impacts, impacts from $NH_3$ and $CO_2$, alternatives, and cumulative impacts. *Border Power Plant Working Group v. Department of Energy and Bureau of Land Management*, Case No. 02-CV-513-IEG (POR) (May 2, 2003).

- For Sacramento school, reviewed draft air permit issued for diesel generator located across from playfield. Prepared comments on emission estimates, enforceability, BACT, and health impacts of diesel exhaust. Case settled. BUG trap installed on the diesel generator.
- Assisted unions in appeal of Title V permit issued by BAAQMD to carbon plant that manufactured coke. Reviewed District files, identified historic modifications that should have triggered PSD review, and prepared technical comments on Title V permit. Reviewed responses to comments and assisted counsel draft appeal to BAAQMD hearing board, opening brief, motion to strike, and rebuttal brief. Case settled.
- Assisted California Central Coast city obtain controls on a proposed new city that would straddle the Ventura-Los Angeles County boundary. Reviewed several environmental impact reports, prepared an air quality analysis, a diesel exhaust health risk assessment, and detailed review comments. Governor intervened and State dedicated the land for conservation purposes April 2004.
- Assisted Central California city to obtain controls on large alluvial sand quarry and asphalt plant proposing a modernization. Prepared comments on Negative Declaration on air quality, public health, noise, and traffic. Evaluated process flow diagrams and engineering reports to determine whether proposed changes increased plant capacity or substantially modified plant operations. Prepared comments on application for categorical exemption from CEQA. Presented testimony to County Board of Supervisors. Developed controls to mitigate impacts. Assisted counsel draft Petition for Writ. Case settled June 2002. Substantial improvements in plant operations were obtained including cap on throughput, dust control measures, asphalt plant loadout enclosure, and restrictions on truck routes.
- Assisted oil companies on the California Central Coast in defending class action citizen's lawsuit alleging health effects due to emissions from gas processing plant and leaking underground storage tanks. Reviewed regulatory and other files and advised counsel on merits of case. Case settled November 2001.
- Assisted oil company on the California Central Coast in defending property damage claims arising out of a historic oil spill. Reviewed site investigation reports, pump tests, leachability studies, and health risk assessments, participated in design of additional site characterization studies to assess health impacts, and advised counsel on merits of case. Prepare health risk assessment.
- Assisted unions in appeal of Initial Study/Negative Declaration ("IS/ND") for an MTBE phaseout project at a Bay Area refinery. Reviewed IS/ND and supporting agency permitting files and prepared technical comments on air quality, groundwater, and public health impacts. Reviewed responses to comments and final IS/ND and ATC permits and assisted counsel to draft petitions and briefs appealing decision to Air District Hearing Board. Presented sworn direct and rebuttal testimony with cross examination on groundwater impacts of ethanol spills on hydrocarbon contamination at refinery. Hearing Board ruled 5 to 0 in favor of appellants, remanding ATC to district to prepare an EIR.

- Assisted Florida cities in challenging the use of diesel and proposed BACT determinations in prevention of significant deterioration (PSD) permits issued to two 510-MW simple cycle peaking electric generating facilities and one 1,080-MW simple cycle/combined cycle facility. Reviewed permit applications, draft permits, and FDEP engineering evaluations, assisted counsel in drafting petitions and responding to discovery. Participated in settlement discussions. Cases settled or applications withdrawn.
- Assisted large California city in federal lawsuit alleging peaker power plant was violating its federal permit. Reviewed permit file and applicant's engineering and cost feasibility study to reduce emissions through retrofit controls. Advised counsel on feasible and cost-effective NOx, SOx, and PM10 controls for several 1960s diesel-fired Pratt and Whitney peaker turbines. Case settled.
- Assisted coalition of Georgia environmental groups in evaluating BACT determinations and permit conditions in PSD permits issued to several large natural gas-fired simple cycle and combined-cycle power plants. Prepared technical comments on draft PSD permits on BACT, enforceability of limits, and toxic emissions. Reviewed responses to comments, advised counsel on merits of cases, participated in settlement discussions, presented oral and written testimony in adjudicatory hearings, and provided technical assistance as required. Cases settled or won at trial.
- Assisted construction unions in review of air quality permitting actions before the Indiana Department of Environmental Management ("IDEM") for several natural gas-fired simple cycle peaker and combined cycle power plants.
- Assisted coalition of towns and environmental groups in challenging air permits issued to 523 MW dual fuel (natural gas and distillate) combined-cycle power plant in Connecticut. Prepared technical comments on draft permits and 60 pages of written testimony addressing emission estimates, startup/shutdown issues, BACT/LAER analyses, and toxic air emissions. Presented testimony in adjudicatory administrative hearings before the Connecticut Department of Environmental Protection in June 2001 and December 2001.
- Assisted various coalitions of unions, citizens groups, cities, public agencies, and developers in licensing and permitting of over 110 coal, gas, oil, biomass, and pet coke-fired power plants generating over 75,000 MW of electricity. These included base-load, combined cycle, simple cycle, and peaker power plants in Alaska, Arizona, Arkansas, California, Colorado, Georgia, Florida, Illinois, Indiana, Kentucky, Michigan, Missouri, Ohio, Oklahoma, Oregon, Texas, West Virginia, Wisconsin, and elsewhere. Prepared analyses of and comments on applications for certification, preliminary and final staff assessments, and various air, water, wastewater, and solid waste permits issued by local agencies. Presented written and oral testimony before various administrative bodies on hazards of ammonia use and transportation, health effects of air emissions, contaminated property issues, BACT/LAER issues related to SCR and SCONOx, criteria and toxic pollutant emission estimates, MACT analyses, air quality modeling, water supply and water quality issues, and methods to reduce

water use, including dry cooling, parallel dry-wet cooling, hybrid cooling, and zero liquid discharge systems.

- Assisted unions, cities, and neighborhood associations in challenging an EIR issued for the proposed expansion of the Oakland Airport. Reviewed two draft EIRs and prepared a health risk assessment and extensive technical comments on air quality and public health impacts. The California Court of Appeals, First Appellate District, ruled in favor of appellants and plaintiffs, concluding that the EIR "2) erred in using outdated information in assessing the emission of toxic air contaminants (TACs) from jet aircraft; 3) failed to support its decision not to evaluate the health risks associated with the emission of TACs with meaningful analysis," thus accepting my technical arguments and requiring the Port to prepare a new EIR. See *Berkeley Keep Jets Over the Bay Committee, City of San Leandro, and City of Alameda et al. v. Board of Port Commissioners* (August 30, 2001) 111 Cal.Rptr.2d 598.
- Assisted lessor of former gas station with leaking underground storage tanks and TCE contamination from adjacent property. Lessor held option to purchase, which was forfeited based on misrepresentation by remediation contractor as to nature and extent of contamination. Remediation contractor purchased property. Reviewed regulatory agency files and advised counsel on merits of case. Case not filed.
- Advised counsel on merits of several pending actions, including a Proposition 65 case involving groundwater contamination at an explosives manufacturing firm and two former gas stations with leaking underground storage tanks.
- Assisted defendant foundry in Oakland in a lawsuit brought by neighbors alleging property contamination, nuisance, trespass, smoke, and health effects from foundry operation. Inspected and sampled plaintiff's property. Advised counsel on merits of case. Case settled.
- Assisted business owner facing eminent domain eviction. Prepared technical comments on a negative declaration for soil contamination and public health risks from air emissions from a proposed redevelopment project in San Francisco in support of a CEQA lawsuit. Case settled.
- Assisted neighborhood association representing residents living downwind of a Berkeley asphalt plant in separate nuisance and CEQA lawsuits. Prepared technical comments on air quality, odor, and noise impacts, presented testimony at commission and council meetings, participated in community workshops, and participated in settlement discussions. Cases settled. Asphalt plant was upgraded to include air emission and noise controls, including vapor collection system at truck loading station, enclosures for noisy equipment, and improved housekeeping.
- Assisted a Fortune 500 residential home builder in claims alleging health effects from faulty installation of gas appliances. Conducted indoor air quality study, advised counsel on merits of case, and participated in discussions with plaintiffs. Case settled.

- Assisted property owners in Silicon Valley in lawsuit to recover remediation costs from insurer for large TCE plume originating from a manufacturing facility. Conducted investigations to demonstrate sudden and accidental release of TCE, including groundwater modeling, development of method to date spill, preparation of chemical inventory, investigation of historical waste disposal practices and standards, and on-site sewer and storm drainage inspections and sampling. Prepared declaration in opposition to motion for summary judgment. Case settled.
- Assisted residents in east Oakland downwind of a former battery plant in class action lawsuit alleging property contamination from lead emissions. Conducted historical research and dry deposition modeling that substantiated claim. Participated in mediation at JAMS. Case settled.
- Assisted property owners in West Oakland who purchased a former gas station that had leaking underground storage tanks and groundwater contamination. Reviewed agency files and advised counsel on merits of case. Prepared declaration in opposition to summary judgment. Prepared cost estimate to remediate site. Participated in settlement discussions. Case settled.
- Consultant to counsel representing plaintiffs in two Clean Water Act lawsuits involving selenium discharges into San Francisco Bay from refineries. Reviewed files and advised counsel on merits of case. Prepared interrogatory and discovery questions, assisted in deposing opposing experts, and reviewed and interpreted treatability and other technical studies. Judge ruled in favor of plaintiffs.
- Assisted oil company in a complaint filed by a resident of a small California beach community alleging that discharges of tank farm rinse water into the sanitary sewer system caused hydrogen sulfide gas to infiltrate residence, sending occupants to hospital. Inspected accident site, interviewed parties to the event, and reviewed extensive agency files related to incident. Used chemical analysis, field simulations, mass balance calculations, sewer hydraulic simulations with SWMM44, atmospheric dispersion modeling with SCREEN3, odor analyses, and risk assessment calculations to demonstrate that the incident was caused by a faulty drain trap and inadequate slope of sewer lateral on resident's property. Prepared a detailed technical report summarizing these studies. Case settled.
- Assisted large West Coast city in suit alleging that leaking underground storage tanks on city property had damaged the waterproofing on downgradient building, causing leaks in an underground parking structure. Reviewed subsurface hydrogeologic investigations and evaluated studies conducted by others documenting leakage from underground diesel and gasoline tanks. Inspected, tested, and evaluated waterproofing on subsurface parking structure. Waterproofing was substandard. Case settled.
- Assisted residents downwind of gravel mine and asphalt plant in Siskiyou County, California, in suit to obtain CEQA review of air permitting action. Prepared two declarations analyzing

air quality and public health impacts. Judge ruled in favor of plaintiffs, closing mine and asphalt plant.

- Assisted defendant oil company on the California Central Coast in class action lawsuit alleging property damage and health effects from subsurface petroleum contamination. Reviewed documents, prepared risk calculations, and advised counsel on merits of case. Participated in settlement discussions. Case settled.
- Assisted defendant oil company in class action lawsuit alleging health impacts from remediation of petroleum contaminated site on California Central Coast. Reviewed documents, designed and conducted monitoring program, and participated in settlement discussions. Case settled.
- Consultant to attorneys representing irrigation districts and municipal water districts to evaluate a potential challenge of USFWS actions under CVPIA section 3406(b)(2). Reviewed agency files and collected and analyzed hydrology, water quality, and fishery data. Advised counsel on merits of case. Case not filed.
- Assisted residents downwind of a Carson refinery in class action lawsuit involving soil and groundwater contamination, nuisance, property damage, and health effects from air emissions. Reviewed files and provided advice on contaminated soil and groundwater, toxic emissions, and health risks. Prepared declaration on refinery fugitive emissions. Prepared deposition questions and reviewed deposition transcripts on air quality, soil contamination, odors, and health impacts. Case settled.
- Assisted residents downwind of a Contra Costa refinery who were affected by an accidental release of naphtha. Characterized spilled naphtha, estimated emissions, and modeled ambient concentrations of hydrocarbons and sulfur compounds. Deposed. Presented testimony in binding arbitration at JAMS. Judge found in favor of plaintiffs.
- Assisted residents downwind of Contra Costa County refinery in class action lawsuit alleging property damage, nuisance, and health effects from several large accidents as well as routine operations. Reviewed files and prepared analyses of environmental impacts. Prepared declarations, deposed, and presented testimony before jury in one trial and judge in second. Case settled.
- Assisted business owner claiming damages from dust, noise, and vibration during a sewer construction project in San Francisco. Reviewed agency files and PM10 monitoring data and advised counsel on merits of case. Case settled.
- Assisted residents downwind of Contra Costa County refinery in class action lawsuit alleging property damage, nuisance, and health effects. Prepared declaration in opposition to summary judgment, deposed, and presented expert testimony on accidental releases, odor, and nuisance before jury. Case thrown out by judge, but reversed on appeal and not retried.

- Presented testimony in small claims court on behalf of residents claiming health effects from hydrogen sulfide from flaring emissions triggered by a power outage at a Contra Costa County refinery. Analyzed meteorological and air quality data and evaluated potential health risks of exposure to low concentrations of hydrogen sulfide. Judge awarded damages to plaintiffs.
- Assisted construction unions in challenging PSD permit for an Indiana steel mill. Prepared technical comments on draft PSD permit, drafted 70-page appeal of agency permit action to the Environmental Appeals Board challenging permit based on faulty BACT analysis for electric arc furnace and reheat furnace and faulty permit conditions, among others, and drafted briefs responding to four parties. EPA Region V and the EPA General Counsel intervened as amici, supporting petitioners. EAB ruled in favor of petitioners, remanding permit to IDEM on three key issues, including BACT for the reheat furnace and lead emissions from the EAF. Drafted motion to reconsider three issues. Prepared 69 pages of technical comments on revised draft PSD permit. Drafted second EAB appeal addressing lead emissions from the EAF and BACT for reheat furnace based on European experience with SCR/SNCR. Case settled. Permit was substantially improved. See *In re: Steel Dynamics, Inc.*, PSD Appeal Nos. 99-4 & 99-5 (EAB June 22, 2000).
- Assisted defendant urea manufacturer in Alaska in negotiations with USEPA to seek relief from penalties for alleged violations of the Clean Air Act. Reviewed and evaluated regulatory files and monitoring data, prepared technical analysis demonstrating that permit limits were not violated, and participated in negotiations with EPA to dismiss action. Fines were substantially reduced and case closed.
- Assisted construction unions in challenging PSD permitting action for an Indiana grain mill. Prepared technical comments on draft PSD permit and assisted counsel draft appeal of agency permit action to the Environmental Appeals Board challenging permit based on faulty BACT analyses for heaters and boilers and faulty permit conditions, among others. Case settled.
- As part of a consent decree settling a CEQA lawsuit, assisted neighbors of a large west coast port in negotiations with port authority to secure mitigation for air quality impacts. Prepared technical comments on mobile source air quality impacts and mitigation and negotiated a $9 million CEQA mitigation package. Represented neighbors on technical advisory committee established by port to implement the air quality mitigation program. Program successfully implemented.
- Assisted construction unions in challenging permitting action for a California hazardous waste incinerator. Prepared technical comments on draft permit, assisted counsel prepare appeal of EPA permit to the Environmental Appeals Board. Participated in settlement discussions on technical issues with applicant and EPA Region 9. Case settled.

- Assisted environmental group in challenging DTSC Negative Declaration on a hazardous waste treatment facility. Prepared technical comments on risk of upset, water, and health risks. Writ of mandamus issued.
- Assisted several neighborhood associations and cities impacted by quarries, asphalt plants, and cement plants in Alameda, Shasta, Sonoma, and Mendocino counties in obtaining mitigations for dust, air quality, public health, traffic, and noise impacts from facility operations and proposed expansions.
- For over 100 industrial facilities, commercial/campus, and redevelopment projects, developed the record in preparation for CEQA and NEPA lawsuits. Prepared technical comments on hazardous materials, solid wastes, public utilities, noise, worker safety, air quality, public health, water resources, water quality, traffic, and risk of upset sections of EIRs, EISs, FONSIs, initial studies, and negative declarations. Assisted counsel in drafting petitions and briefs and prepared declarations.
- For several large commercial development projects and airports, assisted applicant and counsel prepare defensible CEQA documents, respond to comments, and identify and evaluate "all feasible" mitigation to avoid CEQA challenges. This work included developing mitigation programs to reduce traffic-related air quality impacts based on energy conservation programs, solar, low-emission vehicles, alternative fuels, exhaust treatments, and transportation management associations.

*SITE INVESTIGATION/REMEDIATION/CLOSURE*

- Technical manager and principal engineer for characterization, remediation, and closure of waste management units at former Colorado oil shale plant. Constituents of concern included BTEX, As, 1,1,1-TCA, and TPH. Completed groundwater monitoring programs, site assessments, work plans, and closure plans for seven process water holding ponds, a refinery sewer system, and processed shale disposal area. Managed design and construction of groundwater treatment system and removal actions and obtained clean closure.
- Principal engineer for characterization, remediation, and closure of process water ponds at a former lanthanide processing plant in Colorado. Designed and implemented groundwater monitoring program and site assessments and prepared closure plan.
- Advised the city of Sacramento on redevelopment of two former railyards. Reviewed work plans, site investigations, risk assessment, RAPS, RI/FSs, and CEQA documents. Participated in the development of mitigation strategies to protect construction and utility workers and the public during remediation, redevelopment, and use of the site, including buffer zones, subslab venting, rail berm containment structure, and an environmental oversight plan.

- Provided technical support for the investigation of a former sanitary landfill that was redeveloped as single family homes. Reviewed and/or prepared portions of numerous documents, including health risk assessments, preliminary endangerment assessments, site investigation reports, work plans, and RI/FSs. Historical research to identify historic waste disposal practices to prepare a preliminary endangerment assessment. Acquired, reviewed, and analyzed the files of 18 federal, state, and local agencies, three sets of construction field notes, analyzed 21 aerial photographs and interviewed 14 individuals associated with operation of former landfill. Assisted counsel in defending lawsuit brought by residents alleging health impacts and diminution of property value due to residual contamination. Prepared summary reports.
- Technical oversight of characterization and remediation of a nitrate plume at an explosives manufacturing facility in Lincoln, CA. Provided interface between owners and consultants. Reviewed site assessments, work plans, closure plans, and RI/FSs.
- Consultant to owner of large western molybdenum mine proposed for NPL listing. Participated in negotiations to scope out consent order and develop scope of work. Participated in studies to determine premining groundwater background to evaluate applicability of water quality standards. Served on technical committees to develop alternatives to mitigate impacts and close the facility, including resloping and grading, various thickness and types of covers, and reclamation. This work included developing and evaluating methods to control surface runoff and erosion, mitigate impacts of acid rock drainage on surface and ground waters, and stabilize nine waste rock piles containing 328 million tons of pyrite-rich, mixed volcanic waste rock (andesites, rhyolite, tuff). Evaluated stability of waste rock piles. Represented client in hearings and meetings with state and federal oversight agencies.

*REGULATORY (PARTIAL LIST)*

- In June to August 2020, researched and wrote 69 pages of comments on inadequate project description, construction impacts, operational air quality impacts, cumulative air quality impacts, public health impacts, valley fever, hazards, geologic impacts, water use, CEC licensing, and extended lifetime impacts for the repower of a geothermal power plant in Imperial County.
- In June 2020, review revised quarry reclamation plan and draft 27 pages of comments on proposed modification.
- In June and July 2020, researched and wrote 23 pages of comments on cement terminal at Port of Stockton on construction impacts, emission baseline, operational emissions, and greenhouse gas mitigation.

- In May 2020, researched and wrote 10 pages of comments on FEIR for a new apartment project in Contra Costa County on GHG emissions from vegetation removal, mobile sources, and water use and mitigation for same.
- In March/April 2020, researched and wrote 50 pages of comments on IS/MND for battery energy storage project in San Jose (Hummingbird) on inadequate project description, criteria pollutant and GHG emissions, significant and unmitigated energy impacts, cumulative impacts, construction impacts, public health impacts from BESS accidents, and battery handling and transportation accidents. Wrote 15 pages of responses to comments on vendor specifications, battery composition, cumulative impacts, construction impacts, fire control methods, and battery accidents.
- In April 2020, researched and wrote 47 pages of comments on IS/MND for data center in Santa Clara (SV1) on operational NOx emissions; out-of-district emissions; interbasin pollutant transport; omitted emission sources; GHG compliance with plans, policies and regulations; indirect GHG emissions; air quality impacts; construction emissions; cumulative impacts; and risk of upset from battery accidents.
- In March 2020, researched and wrote 30 pages of comments on IS/MND for data center in San Jose (Hummingbird) on operational GHG and criteria pollutant emissions, cumulative impacts, and public health risks. Research and write responses to comments.
- In February-March 2020, researched and wrote 30 pages on an IS/MND for a data center in San Jose (Stack) on operational NOx and GHG emissions, cumulative impacts, heath risks, and odor.
- In February 2020, researched and wrote 33 pages of comments on Initial Study for a battery storage facility in Ventura County (Orni) on criteria pollutant and GHG emissions, worker and public health impacts, cumulative impacts, valley fever, and consistency with general plan.
- In February 2020, researched and wrote 20 pages of comments on valley fever in response to applicant's global response to comments on Valley Fever for a wind project in San Diego County.
- In January 2020, researched and wrote 32 pages of comments on the Orni battery storage facility (BESS) on incomplete project description, cumulative GHG and NOx impacts, BESS accidents, and health impacts, including soil contamination and valley fever.
- In January 2020, research and wrote 41 pages of comments on the DEIR for the NuStar Port of Stockton Liquid Bulk Terminal on operational emission calculations, significant NOx emissions, significant GHG emissions. GHG mitigation, and cumulative impacts.
- In December 2019, researched and wrote 3 pages of comments on the Silverstrand Grid battery storage facility on greenhouse gas emissions.

- In December 2019, researched and wrote 15 pages of comments on the Initial Study for the K2 Pure – Chlorine Rail Transportation Curtailment Project, including on air quality baseline, project description, emissions, cancer risks, risk of upset.
- In November 2019, reviewed agency files and researched and wrote 42 pages of comments on the Belridge Solar Project on compliance with local zoning ordinances, water quality impacts, air quality impacts, and worker and public health impacts due to soil contamination and valley fever.
- In October 2019, researched and wrote 49 pages of comments on IS/MND for data center in Santa Clara, CA on operational criteria pollutants (mobile sources, off-site electricity generation, emergency generators), ambient air quality impacts, greenhouse gas emissions and mitigation, and cumulative impacts.
- In October 2019, researched and wrote 9 pages of comments on the Application, Statement of Basis and draft Permit to Construct and Temporary Permit to Operate for proposed changes at the Paramount Refinery to facilitate refining of biomass-based feedstock to produce renewable fuels.
- In September 2019, reviewed City of Sunnyvale's file on Google's proposed Central Utility Plant and researched and wrote 34 pages of comments on construction and operational air quality impacts, cumulative impacts, and battery fire and explosion impacts. In October 2019, researched and wrote 15 pages of responses to comments.
- In August 2019, research and wrote 37 pages of comments on the DSEIR for the Le Conte Battery Energy Storage System on GHG emissions, hazards and hazardous material impacts, and health impacts.
- In August 2019, researched and wrote 38 pages of comments on IS/MND for the Hanford-Lakeside Dairy digester Project, Kings County, on project description (piecemealing), cumulative impacts, construction impacts, air quality impacts, valley fever and risk of upset.
- In July 2019, researched and wrote 48 pages of comments on IS/MND for the Five Points Pipeline Dairy Digester Cluster Project, including on air quality, cumulative impacts, worker and public health impacts (including on pesticide-contaminated soils), Valley Fever, construction air quality impacts, and risk of upset.
- In June 2019, researched and wrote 15 pages of responses to comments on IS/MND for SV1 Data Center, including operational NOx emissions, air quality analyses, construction emissions, battery hazards, and mitigation plans for noise, vibration, risk management, storm water pollution, and emergency response and evacuation plans.
- In June 2019, researched and wrote 30 pages of comments on DEIR for the Humboldt Wind Energy Project on fire and aesthetic impacts of transmission line, construction air quality impacts and mitigation, and greenhouse gas emissions.

- In May 2019, researched and wrote 25 pages of comments on the DEIR for the ExxonMobil Interim Trucking for Santa Ynez Phased Restart Project on project description, baseline, and mitigation.
- In April 2019, researched and wrote a 16 page letter critiquing the adequacy of the FEIR for CalAm Desalination Project to support a Monterey County Combined Development Permit, consisting of a Use Permit, an Administrative Permit, and Design Approval for the Desalination Plant and Carmel Valley Pump Station.
- In April 2019, researched and wrote 22 pages of comments on DEIR for the Eco-Energy Liquid Bulk Terminal at the Port of Stockton on emissions, air quality impact mitigation, and health risk assessment.
- In March 2019, researched and wrote 43 pages of comments on DEIR for Contanda Renewable Diesel Bulk Liquid Terminal at the Port of Stockton on operational emissions, air quality impacts and mitigation and health risks.
- In February 2019, researched and wrote 36 pages of comments on general cumulative impacts, air quality, accidents, and valley fever for IS/MND for biogas cluster project in Kings County.
- In January 2019, researched and wrote 30 pages of comments on air quality and valley fever for IS/MND for energy storage facility in Kings County.
- In December 2018, researched and wrote 11 pages of comments on air quality for IS/MND for biomass gasification facility in Madera County.
- In December 2018, researched and wrote 10 pages of responses to comments on IS/MND for a wind energy project in Riverside County.
- In December 2018, researched and wrote 12 pages of responses to comments on IS/MND for a large Safeway fueling station in Petaluma. The Planning Commission voted unanimously to require an EIR.
- In November 2018, researched and wrote 30 pages of comments on IS/MND on wind energy project in Riverside County on construction health risks, odor impacts, waste disposal, transportation, construction emissions and mitigation and Valley Fever.
- In November 2018, researched and wrote 32 pages of comments on the DEIR for a solar energy generation and storage project in San Bernardino County on hazards, health risks, odor, construction emissions and mitigation, and Valley Fever.
- In September 2018, researched and wrote 36 pages of comments on the FEIR for the Newland Sierra Project including on greenhouse gas emissions, construction emissions, and cumulative impacts.
- In August 2018, researched and wrote 20 pages of comments on the health risk assessment in the IS/MND for a large Safeway fueling station in Petaluma.

- In August 2018, researched and wrote responses to comments on DEIR for the Newland Sierra Project, San Diego County on greenhouse gas emissions, construction emissions, odor, and Valley Fever.
- In July/August 2018, researched and wrote 12 pages of comments on DEIR for proposed Doheny Desal Project, on GHG, criteria pollutant, and TAC emissions and public health impacts during construction and indirect emissions during operation.
- In June 2018, researched and wrote 12 pages of technical comments rebutting NDDH responses to comments on Meridian Davis Refinery.
- In April 2018, researched and wrote 26 pages of comments on greenhouse gas emissions and mitigation as proposed in the San Diego County Climate Action Plan.
- In April 2018, researched and wrote 24 pages of comments on the FEIR for Monterey County water supply project, including GHG mitigation, air quality impacts and mitigation, and Valley Fever.
- In March-June 2018, researched and wrote 37 pages of comments on the IS/MND for the 2305 Mission College Boulevard Data Center, Santa Clara, California and responded to responses to comments.
- In March 2018, researched and wrote 40 pages of comments on the IS/MND for the Diablo Energy Storage Facility in Pittsburg, California.
- In March 2018, researched and wrote 19 pages of comments on Infill Checklist/Mitigated Negative Declaration for the Legacy@Livermore Project on CalEEMod emission calculations, including NOx and PM10 and construction health risk assessment, including Valley Fever.
- In January 2018, researched and wrote 28 pages of comments on draft Permit to Construct for the Davis Refinery Project, North Dakota, as a minor source of criteria pollutants and HAPs.
- In December 2017, researched and wrote 19 pages of comments on DEIR for the Rialto Bioenergy Facility, Rialto, California.
- In November and December 2017, researched and wrote 6 pages of comments on the Ventura County Air Pollution Control District's Preliminary Determination if Compliance (PDOC) for Mission Rock Energy Center.
- In November 2017, researched and wrote 11 pages of comments on control technology evaluation for the National Emission Standards for Hazardous Air Pollutants from the Portland Cement Manufacturing Industry Residual Risk and Technology Review.
- In September and November 2017, prepared comments on revised Negative Declaration for Delicato Winery in San Joaquin County, California.

- In October and November 2017, researched and wrote comments on North City Project Pure Water San Diego Program DEIR/DEIS to reclaim wastewater for municipal use.
- In August 2017, reviewed DEIR on a new residential community in eastern San Diego County (Newland Sierra) and research and wrote 60 pages of comments on air quality, greenhouse gas emissions and health impacts, including Valley Fever.
- In August 2017, reviewed responses to comments on Part 70 operating permit for IGP Methanol's Gulf Coast Methanol Complex, near Myrtle Grove, Louisiana, and researched and wrote comments on metallic HAP issues.
- In July 2017, reviewed the FEIS for an expansion of the Port of Gulfport and researched and wrote 10 pages of comments on air quality and public health.
- In June 2017, reviewed and prepared technical report on an Application for a synthetic minor source construction permit for a new Refinery in North Dakota.
- In June 2017, reviewed responses to NPCA and other comments on the BP Cherry Point Refinery modifications and assisted counsel in evaluating issues to appeal, including GHG BACT, coker heater SCR cost effectiveness analysis, and $SO_2$ BACT.
- In June 2017, reviewed Part 70 Operating Permit Renewal/Modification for the Noranda Alumina LC/Gramercy Holdings I, LLC alumina processing plant, St. James, Louisiana, and prepared comments on HAP emissions from bauxite feedstock.
- In May and June 2017, reviewed FEIR on Tesoro Integration Project and prepared responses to comments on the DEIR.
- In May 2017, prepared comments on tank VOC and HAP emissions from Tesoro Integration Project, based on real time monitoring at the Tesoro and other refineries in the SCAQMD.
- In April 2017, prepared comments on Negative Declaration for Delicato Winery in San Joaquin County, California.
- In March 2017, reviewed Negative Declaration for Ellmore geothermal facility in Imperial County, California and prepared summary of issues.
- In March 2017, prepared response to Phillips 66 Company's Appeal of the San Luis Obispo County Planning Commission's Decision Denying the Rail Spur Extension Project Proposed for the Santa Maria Refinery.
- In February 2017, researched and wrote comments on Kalama draft Title V permit for 10,000 MT/day methanol production and marine export facility in Kalama, Washington.
- In January 2017, researched and wrote 51 pages of comments on proposed Title V and PSD permits for the St. James Methanol Plant, St. James Louisiana, on BACT and enforceability of permit conditions.

- In December 2016, researched and wrote comments on draft Title V Permit for Yuhuang Chemical Inc. Methanol Plant, St. James, Louisiana, responding to EPA Order addressing enforceability issues.
- In November 2016, researched and wrote comments on Initial Study/Mitigated Negative Declaration for the AES Battery Energy Storage Facility, Long Beach, CA.
- In November 2016, researched and wrote comments on Campo Verde Battery Energy Storage System Draft Environmental Impact Report.
- In October 2016, researched and wrote comments on Title V Permit for NuStar Terminal Operations Partnership L.P, Stockton, CA.
- In October 2016, prepared expert report, Technical Assessment of Achieving the 40 CFR Part 423 Zero Discharge Standard for Bottom Ash Transport Water at the Belle River Power Plant, East China, Michigan. Reported resulted in a 2 year reduction in compliance date for elimination of bottom ash transport water. 1/30/17 DEQ Letter.
- In September 2016, researched and wrote comments on Proposed Title V Permit and Environmental Assessment Statement, Yuhuang Chemical Inc. Methanol Plant, St. James, Louisiana.
- In September 2016, researched and wrote response to "Further Rebuttal in Support of Appeal of Planning Commission Resolution No. 16-1, Denying Use Permit Application 12PLN-00063 and Declining to Certify Final Environmental Impact Report for the Valero Benicia Crude-by-Rail Project.
- In August 2016, reviewed and prepared comments on manuscript: Hutton et al., Freshwater Flows to the San Francisco Bay-Delta Estuary over Nine Decades: Trends Evaluation.
- In August/September 2016, researched and wrote comments on Mitigated Negative Declaration for the Chevron Long Wharf Maintenance and Efficiency Project.
- In July 2016, researched and wrote comments on the Ventura County APCD Preliminary Determination of Compliance and the California Energy Commission Revised Preliminary Staff Assessment for the Puente Power Project.
- In June 2016, researched and wrote comments on an Ordinance (1) Amending the Oakland Municipal Code to Prohibit the Storage and Handling of Coal and Coke at Bulk Material Facilities or Terminals Throughout the City of Oakland and (2) Adopting CEQA Exemption Findings and supporting technical reports. Council approved Ordinance on an 8 to 0 vote on June 27, 2016.
- In May 2016, researched and wrote comments on Draft Title V Permit and Draft Environmental Impact Report for the Tesoro Los Angeles Refinery Integration and Compliance Project.

- In March 2016, researched and wrote comments on Valero's Appeal of Planning Commission's Denial of Valero Crude-by-Rail Project.
- In February 2016, researched and wrote comments on Final Environmental Impact Report, Santa Maria Rail Spur Project.
- In February 2016, researched and wrote comments on Final Environmental Impact Report, Valero Benicia Crude by Rail Project.
- In January 2016, researched and wrote comments on Draft Programmatic Environmental Impact Report for the Southern California Association of Government's (SCAG) 2016-2040 Regional Transportation Plan/Sustainable Communities Strategy.
- In November 2015, researched and wrote comments on Final Environmental Impact Report for Revisions to the Kern County Zoning Ordinance – 2015(C) (Focused on Oil and Gas Local Permitting), November 2015.
- In October 2015, researched and wrote comments on Revised Draft Environmental Report, Valero Benicia Crude by Rail Project.
- In September 2015, prepared report, "Environmental, Health and Safety Impacts of the Proposed Oakland Bulk and Oversized Terminal, and presented oral testimony on September 21, 2015 before Oakland City Council on behalf of the Sierra Club.
- In September 2015, researched and wrote comments on revisions to two chapters of EPA's Air Pollution Control Cost Manual: Docket ID No. EPA-HQ-OAR-2015-0341.
- In June 2015, researched and wrote comments on DEIR for the CalAm Monterey Peninsula Water Supply Project.
- In April 2015, researched and wrote comments on proposed Title V Operating Permit Revision and Prevention of Significant Deterioration Permit for Arizona Public Service's Ocotillo Power Plant Modernization Project (5 GE LMS100 105-MW simple cycle turbines operated as peakers), in Tempe, Arizona; Final permit appealed to EAB.
- In March 2015, researched and wrote "Comments on Proposed Title V Air Permit, Yuhuang Chemical Inc. Methanol Plant, St. James, Louisiana". Client filed petition objecting to the permit. EPA granted majority of issues. In the Matter of Yuhuang Chemical Inc. Methanol Plant, St. James Parish, Louisiana, Permit No. 2560-00295-V0, Issued by the Louisiana Department of Environmental Quality, Petition No. VI-2015-03, Order Responding to the Petitioners' Request for Objection to the Issuance of a Title V Operating Permit, September 1, 2016.
- In February 2015, prepared compilation of BACT cost effectiveness values in support of comments on draft PSD Permit for Bonanza Power Project.
- In January 2015, prepared cost effectiveness analysis for SCR for a 500-MW coal fire power plant, to address unpermitted upgrades in 2000.

- In January 2015, researched and wrote comments on Revised Final Environmental Impact Report for the Phillips 66 Propane Recovery Project. *Communities for a Better Environment et al. v. Contra Costa County et al. Contra Costa County (Superior Court, Contra Costa County, Case No. MSN15-0301, December 1, 2016).*
- In December 2014, researched and wrote "Report on Bakersfield Crude Terminal Permits to Operate." In response, the U.S. EPA cited the Terminal for 10 violations of the Clean Air Act. The Fifth Appellate District Court upheld the finding in this report in CBE et al v. San Joaquin Valley Unified Air Pollution Control District and Bakersfield Crude Terminal LLC et al, Super. Ct. No. 284013, June 23, 2017.
- In December 2014, researched and wrote comments on Revised Draft Environmental Impact Report for the Phillips 66 Propane Recovery Project.
- In November 2014, researched and wrote comments on Revised Draft Environmental Impact Report for Phillips 66 Rail Spur Extension Project and Crude Unloading Project, Santa Maria, CA to allow the import of tar sands crudes.
- In November 2014, researched and wrote comments on Draft Environmental Impact Report for Phillips 66 Ultra Low Sulfur Diesel Project, responding to the California Supreme Court Decision, *Communities for a Better Environment v. South Coast Air Quality Management Dist. (2010) 48 Cal.4th 310.*
- In November 2014, researched and wrote comments on Draft Environmental Impact Report for the Tesoro Avon Marine Oil Terminal Lease Consideration.
- In October 2014, prepared: "Report on Hydrogen Cyanide Emissions from Fluid Catalytic Cracking Units", pursuant to the Petroleum Refinery Sector Risk and Technology Review and New Source Performance Standards, 79 FR 36880.
- In October 2014, researched and wrote technical comments on Final Environmental Impact Reports for Alon Bakersfield Crude Flexibility Project to build a rail terminal to allow the import/export of tar sands and Bakken crude oils and to upgrade an existing refinery to allow it to process a wide range of crudes.
- In October 2014, researched and wrote technical comments on the Title V Permit Renewal and three De Minimus Significant Revisions for the Tesoro Logistics Marine Terminal in the SCAQMD.
- In September 2014, researched and wrote technical comments on the Draft Environmental Impact Report for the Valero Crude by Rail Project.
- In August 2014, for EPA Region 6, prepared technical report on costing methods for upgrades to existing scrubbers at coal-fired power plants.
- In July 2014, researched and wrote technical comments on Draft Final Environmental Impact Reports for Alon Bakersfield Crude Flexibility Project to build a rail terminal to allow the

import/export of tar sands and Bakken crude oils and to upgrade an existing refinery to allow it to process a wide range of crudes.

- In June 2014, researched and wrote technical report on Initial Study and Draft Negative Declaration for the Tesoro Logistics Storage Tank Replacement and Modification Project.
- In May 2014, researched and wrote technical comments on Intent to Approve a new refinery and petroleum transloading operation in Utah.
- In March and April 2014, prepared declarations on air permits issued for two crude-by-rail terminals in California, modified to switch from importing ethanol to importing Bakken crude oils by rail and transferring to tanker cars. Permits were issued without undergoing CEQA review. One permit was upheld by the San Francisco Superior Court as statute of limitations had run. The Sacramento Air Quality Management District withdrew the second one due to failure to require BACT and conduct CEQA review.
- In March 2014, researched and wrote technical report on Negative Declaration for a proposed modification of the air permit for a bulk petroleum and storage terminal to the allow the import of tar sands and Bakken crude oil by rail and its export by barge, under the New York State Environmental Quality Review Act (SEQRA).
- In February 2014, researched and wrote technical report on proposed modification of air permit for midwest refinery upgrade/expansion to process tar sands crudes.
- In January 2014, prepared cost estimates to capture, transport, and use CO2 in enhanced oil recovery, from the Freeport LNG project based on both Selexol and Amine systems.
- In January 2014, researched and wrote technical report on Draft Environmental Impact Report for Phillips 66 Rail Spur Extension Project, Santa Maria, CA. Comments addressed project description (piecemealing, crude slate), risk of upset analyses, mitigation measures, alternative analyses and cumulative impacts.
- In November 2013, researched and wrote technical report on the Phillips 66 Propane Recovery Project, Rodeo, CA. Comments addressed project description (piecemealing, crude slate) and air quality impacts.
- In September 2013, researched and wrote technical report on the Draft Authority to Construct Permit for the Casa Diablo IV Geothermal Development Project Environmental Impact Report and Declaration in Support of Appeal and Petition for Stay, U.S. Department of the Interior, Board of Land Appeals, Appeal of Decision Record for the Casa Diablo IV Geothermal Development Project.
- In September 2013, researched and wrote technical report on Effluent Limitation Guidelines for Best Available Technology Economically Available (BAT) for Bottom Ash Transport Waters from Coal-Fired Power Plants in the Steam Electric Power Generating Point Source Category.

- In July 2013, researched and wrote technical report on Initial Study/Mitigated Negative Declaration for the Valero Crude by Rail Project, Benicia, California, Use Permit Application 12PLN-00063.
- In July 2013, researched and wrote technical report on fugitive particulate matter emissions from coal train staging at the proposed Coyote Island Terminal, Oregon, for draft Permit No. 25-0015-ST-01.
- In July 2013, researched and wrote technical comments on air quality impacts of the Finger Lakes LPG Storage Facility as reported in various Environmental Impact Statements.
- In July 2013, researched and wrote technical comments on proposed Greenhouse Gas PSD Permit for the Celanese Clear Lake Plant, including cost analysis of CO2 capture, transport, and sequestration.
- In June/July 2013, researched and wrote technical comments on proposed Draft PSD Preconstruction Permit for Greenhouse Gas Emission for the ExxonMobil Chemical Company Baytown Olefins Plant, including cost analysis of CO2 capture, transport, and sequestration.
- In June 2013, researched and wrote technical report on a Mitigated Negative Declaration for a new rail terminal at the Valero Benicia Refinery to import increased amounts of "North American" crudes. Comments addressed air quality impacts of refining increased amounts of tar sands crudes.
- In June 2013, researched and wrote technical report on Draft Environmental Impact Report for the California Ethanol and Power Imperial Valley 1 Project.
- In May 2013, researched and wrote comments on draft PSD permit for major expansion of midwest refinery to process 100% tar sands crudes, including a complex netting analysis involving debottlenecking, piecemealing, and BACT analyses.
- In April 2013, researched and wrote technical report on the Draft Supplemental Environmental Impact Statement (DSEIS) for the Keystone XL Pipeline on air quality impacts from refining increased amount of tar sands crudes at Refineries in PADD 3.
- In October 2012, researched and wrote technical report on the Environmental Review for the Coyote Island Terminal Dock at the Port of Morrow on fugitive particulate matter emissions.
- In October 2012-October 2014, review and evaluate Flint Hills West Application for an expansion/modification for increased (Texas, Eagle Ford Shale) crude processing and related modification, including netting and BACT analysis. Assist in settlement discussions.
- In February 2012, researched and wrote comments on BART analysis in PA Regional Haze SIP, 77 FR 3984 (Jan. 26, 2012). On Sept. 29, 2015, a federal appeals court overturned the U.S. EPA's approval of this plan, based in part on my comments, concluding "..we will vacate the 2014 Final Rule to the extent it approved Pennsylvania's source-specific BART

analysis and remand to the EPA for further proceedings consistent with this Opinion." Nat'l Parks Conservation Assoc. v. EPA, 3d Cir., No. 14-3147, 9/19/15.

- Prepared cost analyses and comments on New York's proposed BART determinations for NOx, SO2, and PM and EPA's proposed approval of BART determinations for Danskammer Generating Station under New York Regional Haze State Implementation Plan and Federal Implementation Plan, 77 FR 51915 (August 28, 2012).
- Prepared cost analyses and comments on NOx BART determinations for Regional Haze State Implementation Plan for State of Nevada, 77 FR 23191 (April 18, 2012) and 77 FR 25660 (May 1, 2012).
- Prepared analyses of and comments on New Source Performance Standards for Greenhouse Gas Emissions for New Stationary Sources: Electric Utility Generating Units, 77 FR 22392 (April 13, 2012).
- Researched and wrote comments on CASPR-BART emission equivalency and NOx and PM BART determinations in EPA proposed approval of State Implementation Plan for Pennsylvania Regional Haze Implementation Plan, 77 FR 3984 (January 26, 2012).
- Researched and wrote comments and statistical analyses on hazardous air pollutants (HAPs) emission controls, monitoring, compliance methods, and the use of surrogates for acid gases, organic HAPs, and metallic HAPs for proposed National Emission Standards for Hazardous Air Pollutants from Coal- and Oil-Fired Electric Utility Steam Generating Units, 76 FR 24976 (May 3, 2011).
- Prepared cost analyses and comments on NOx BART determinations and emission reductions for proposed Federal Implementation Plan for Four Corners Power Plant, 75 FR 64221 (October 19, 2010).
- Prepared cost analyses and comments on NOx BART determinations for Colstrip Units 1- 4 for Montana State Implementation Plan and Regional Haze Federal Implementation Plan, 77 FR 23988 (April 20, 2010).
- For EPA Region 8, prepared report: Revised BART Cost Effectiveness Analysis for Tail-End Selective Catalytic Reduction at the Basin Electric Power Cooperative Leland Olds Station Unit 2 Final Report, March 2011, in support of 76 FR 58570 (Sept. 21, 2011).
- For EPA Region 6, prepared report: Revised BART Cost-Effectiveness Analysis for Selective Catalytic Reduction at the Public Service Company of New Mexico San Juan Generating Station, November 2010, in support of 76 FR 52388 (Aug. 22, 2011).
- For EPA Region 6, prepared report: Revised BART Cost-Effectiveness Analysis for Flue Gas Desulfurization at Coal-Fired Electric Generating Units in Oklahoma: Sooner Units 1 & 2, Muskogee Units 4 & 5, Northeastern Units 3 &4, October 2010, in support of 76 FR 16168

(March 26, 2011). My work was upheld in: *State of Oklahoma v. EPA*, App. Case 12-9526 (10th Cri. July 19, 2013).

- Identified errors in $N_2O$ emission factors in the Mandatory Greenhouse Gas Reporting Rule, 40 CFR 98, and prepared technical analysis to support Petition for Rulemaking to Correct Emissions Factors in the Mandatory Greenhouse Gas Reporting Rule, filed with EPA on 10/28/10.
- Assisted interested parties develop input for and prepare comments on the Information Collection Request for Petroleum Refinery Sector NSPS and NESHAP Residual Risk and Technology Review, 75 FR 60107 (9/29/10).
- Technical reviewer of EPA's "Emission Estimation Protocol for Petroleum Refineries," posted for public comments on CHIEF on 12/23/09, prepared in response to the City of Houston's petition under the Data Quality Act (March 2010).
- Researched and wrote comments on SCR cost effectiveness for EPA's Advanced Notice of Proposed Rulemaking, Assessment of Anticipated Visibility Improvements at Surrounding Class I Areas and Cost Effectiveness of Best Available Retrofit Technology for Four Corners Power Plant and Navajo Generating Station, 74 FR 44313 (August 28, 2009).
- Researched and wrote comments on Proposed Rule for Standards of Performance for Coal Preparation and Processing Plants, 74 FR 25304 (May 27, 2009).
- Prepared comments on draft PSD permit for major expansion of midwest refinery to process up to 100% tar sands crudes. Participated in development of monitoring and controls to mitigate impacts and in negotiating a Consent Decree to settle claims in 2008.
- Reviewed and assisted interested parties prepare comments on proposed Kentucky air toxic regulations at 401 KAR 64:005, 64:010, 64:020, and 64:030 (June 2007).
- Prepared comments on proposed Standards of Performance for Electric Utility Steam Generating Units and Small Industrial-Commercial-Industrial Steam Generating Units, 70 FR 9706 (February 28, 2005).
- Prepared comments on Louisville Air Pollution Control District proposed Strategic Toxic Air Reduction regulations.
- Prepared comments and analysis of BAAQMD Regulation, Rule 11, Flare Monitoring at Petroleum Refineries.
- Prepared comments on Proposed National Emission Standards for Hazardous Air Pollutants; and, in the Alternative, Proposed Standards of Performance for New and Existing Stationary Sources: Electricity Utility Steam Generating Units (MACT standards for coal-fired power plants).

- Prepared Authority to Construct Permit for remediation of a large petroleum-contaminated site on the California Central Coast. Negotiated conditions with agencies and secured permits.
- Prepared Authority to Construct Permit for remediation of a former oil field on the California Central Coast. Participated in negotiations with agencies and secured permits.
- Prepared and/or reviewed hundreds of environmental permits, including NPDES, UIC, Stormwater, Authority to Construct, Prevention of Significant Deterioration, Nonattainment New Source Review, Title V, and RCRA, among others.
- Participated in the development of the CARB document, *Guidance for Power Plant Siting and Best Available Control Technology*, including attending public workshops and filing technical comments.
- Performed data analyses in support of adoption of emergency power restoration standards by the California Public Utilities Commission for "major" power outages, where major is an outage that simultaneously affects 10% of the customer base.
- Drafted portions of the Good Neighbor Ordinance to grant Contra Costa County greater authority over safety of local industry, particularly chemical plants and refineries.
- Participated in drafting BAAQMD Regulation 8, Rule 28, Pressure Relief Devices, including participation in public workshops, review of staff reports, draft rules and other technical materials, preparation of technical comments on staff proposals, research on availability and costs of methods to control PRV releases, and negotiations with staff.
- Participated in amending BAAQMD Regulation 8, Rule 18, Valves and Connectors, including participation in public workshops, review of staff reports, proposed rules and other supporting technical material, preparation of technical comments on staff proposals, research on availability and cost of low-leak technology, and negotiations with staff.
- Participated in amending BAAQMD Regulation 8, Rule 25, Pumps and Compressors, including participation in public workshops, review of staff reports, proposed rules, and other supporting technical material, preparation of technical comments on staff proposals, research on availability and costs of low-leak and seal-less technology, and negotiations with staff.
- Participated in amending BAAQMD Regulation 8, Rule 5, Storage of Organic Liquids, including participation in public workshops, review of staff reports, proposed rules, and other supporting technical material, preparation of technical comments on staff proposals, research on availability and costs of controlling tank emissions, and presentation of testimony before the Board.
- Participated in amending BAAQMD Regulation 8, Rule 18, Valves and Connectors at Petroleum Refinery Complexes, including participation in public workshops, review of staff reports, proposed rules and other supporting technical material, preparation of technical

comments on staff proposals, research on availability and costs of low-leak technology, and presentation of testimony before the Board.

- Participated in amending BAAQMD Regulation 8, Rule 22, Valves and Flanges at Chemical Plants, etc, including participation in public workshops, review of staff reports, proposed rules, and other supporting technical material, preparation of technical comments on staff proposals, research on availability and costs of low-leak technology, and presentation of testimony before the Board.
- Participated in amending BAAQMD Regulation 8, Rule 25, Pump and Compressor Seals, including participation in public workshops, review of staff reports, proposed rules, and other supporting technical material, preparation of technical comments on staff proposals, research on availability of low-leak technology, and presentation of testimony before the Board.
- Participated in the development of the BAAQMD Regulation 2, Rule 5, Toxics, including participation in public workshops, review of staff proposals, and preparation of technical comments.
- Participated in the development of SCAQMD Rule 1402, Control of Toxic Air Contaminants from Existing Sources, and proposed amendments to Rule 1401, New Source Review of Toxic Air Contaminants, in 1993, including review of staff proposals and preparation of technical comments on same.
- Participated in the development of the Sunnyvale Ordinance to Regulate the Storage, Use and Handling of Toxic Gas, which was designed to provide engineering controls for gases that are not otherwise regulated by the Uniform Fire Code.
- Participated in the drafting of the Statewide Water Quality Control Plans for Inland Surface Waters and Enclosed Bays and Estuaries, including participation in workshops, review of draft plans, preparation of technical comments on draft plans, and presentation of testimony before the SWRCB.
- Participated in developing Se permit effluent limitations for the five Bay Area refineries, including review of staff proposals, statistical analyses of Se effluent data, review of literature on aquatic toxicity of Se, preparation of technical comments on several staff proposals, and presentation of testimony before the Bay Area RWQCB.
- Represented the California Department of Water Resources in the 1991 Bay-Delta Hearings before the State Water Resources Control Board, presenting sworn expert testimony with cross examination and rebuttal on a striped bass model developed by the California Department of Fish and Game.
- Represented the State Water Contractors in the 1987 Bay-Delta Hearings before the State Water Resources Control Board, presenting sworn expert testimony with cross examination and rebuttal on natural flows, historical salinity trends in San Francisco Bay, Delta outflow, and hydrodynamics of the South Bay.

- Represented interveners in the licensing of over 20 natural-gas-fired power plants and one coal gasification plant at the California Energy Commission and elsewhere. Reviewed and prepared technical comments on applications for certification, preliminary staff assessments, final staff assessments, preliminary determinations of compliance, final determinations of compliance, and prevention of significant deterioration permits in the areas of air quality, water supply, water quality, biology, public health, worker safety, transportation, site contamination, cooling systems, and hazardous materials. Presented written and oral testimony in evidentiary hearings with cross examination and rebuttal. Participated in technical workshops.
- Represented several parties in the proposed merger of San Diego Gas & Electric and Southern California Edison. Prepared independent technical analyses on health risks, air quality, and water quality. Presented written and oral testimony before the Public Utilities Commission administrative law judge with cross examination and rebuttal.
- Represented a PRP in negotiations with local health and other agencies to establish impact of subsurface contamination on overlying residential properties. Reviewed health studies prepared by agency consultants and worked with agencies and their consultants to evaluate health risks.

*WATER QUALITY/RESOURCES*

- Directed and participated in research on environmental impacts of energy development in the Colorado River Basin, including contamination of surface and subsurface waters and modeling of flow and chemical transport through fractured aquifers.
- Played a major role in Northern California water resource planning studies since the early 1970s. Prepared portions of the Basin Plans for the Sacramento, San Joaquin, and Delta basins including sections on water supply, water quality, beneficial uses, waste load allocation, and agricultural drainage. Developed water quality models for the Sacramento and San Joaquin Rivers.
- Conducted hundreds of studies over the past 40 years on Delta water supplies and the impacts of exports from the Delta on water quality and biological resources of the Central Valley, Sacramento-San Joaquin Delta, and San Francisco Bay. Typical examples include:
    1. Evaluate historical trends in salinity, temperature, and flow in San Francisco Bay and upstream rivers to determine impacts of water exports on the estuary;
    2. Evaluate the role of exports and natural factors on the food web by exploring the relationship between salinity and primary productivity in San Francisco Bay, upstream rivers, and ocean;
    3. Evaluate the effects of exports, other in-Delta, and upstream factors on the abundance of salmon and striped bass;

4. Review and critique agency fishery models that link water exports with the abundance of striped bass and salmon;
5. Develop a model based on GLMs to estimate the relative impact of exports, water facility operating variables, tidal phase, salinity, temperature, and other variables on the survival of salmon smolts as they migrate through the Delta;
6. Reconstruct the natural hydrology of the Central Valley using water balances, vegetation mapping, reservoir operation models to simulate flood basins, precipitation records, tree ring research, and historical research;
7. Evaluate the relationship between biological indicators of estuary health and down-estuary position of a salinity surrogate (X2);
8. Use real-time fisheries monitoring data to quantify impact of exports on fish migration;
9. Refine/develop statistical theory of autocorrelation and use to assess strength of relationships between biological and flow variables;
10. Collect, compile, and analyze water quality and toxicity data for surface waters in the Central Valley to assess the role of water quality in fishery declines;
11. Assess mitigation measures, including habitat restoration and changes in water project operation, to minimize fishery impacts;
12. Evaluate the impact of unscreened agricultural water diversions on abundance of larval fish;
13. Prepare and present testimony on the impacts of water resources development on Bay hydrodynamics, salinity, and temperature in water rights hearings;
14. Evaluate the impact of boat wakes on shallow water habitat, including interpretation of historical aerial photographs;
15. Evaluate the hydrodynamic and water quality impacts of converting Delta islands into reservoirs;
16. Use a hydrodynamic model to simulate the distribution of larval fish in a tidally influenced estuary;
17. Identify and evaluate non-export factors that may have contributed to fishery declines, including predation, shifts in oceanic conditions, aquatic toxicity from pesticides and mining wastes, salinity intrusion from channel dredging, loss of riparian and marsh habitat, sedimentation from upstream land alternations, and changes in dissolved oxygen, flow, and temperature below dams.

- Developed, directed, and participated in a broad-based research program on environmental issues and control technology for energy industries including petroleum, oil shale, coal mining, and coal slurry transport. Research included evaluation of air and water pollution, development of novel, low-cost technology to treat and dispose of wastes, and development and application of geohydrologic models to evaluate subsurface contamination from in-situ retorting. The program consisted of government and industry contracts and employed 45 technical and administrative personnel.
- Coordinated an industry task force established to investigate the occurrence, causes, and solutions for corrosion/erosion and mechanical/engineering failures in the waterside systems (e.g., condensers, steam generation equipment) of power plants. Corrosion/erosion failures caused by water and steam contamination that were investigated included waterside corrosion caused by poor microbiological treatment of cooling water, steam-side corrosion caused by ammonia-oxygen attack of copper alloys, stress-corrosion cracking of copper alloys in the air cooling sections of condensers, tube sheet leaks, oxygen in-leakage through condensers, volatilization of silica in boilers and carry over and deposition on turbine blades, and iron corrosion on boiler tube walls. Mechanical/engineering failures investigated included: steam impingement attack on the steam side of condenser tubes, tube-to-tube-sheet joint leakage, flow-induced vibration, structural design problems, and mechanical failures due to stresses induced by shutdown, startup and cycling duty, among others. Worked with electric utility plant owners/operators, condenser and boiler vendors, and architect/engineers to collect data to document the occurrence of and causes for these problems, prepared reports summarizing the investigations, and presented the results and participated on a committee of industry experts tasked with identifying solutions to prevent condenser failures.
- Evaluated the cost effectiveness and technical feasibility of using dry cooling and parallel dry-wet cooling to reduce water demands of several large natural-gas fired power plants in California and Arizona.
- Designed and prepared cost estimates for several dry cooling systems (e.g., fin fan heat exchangers) used in chemical plants and refineries.
- Designed, evaluated, and costed several zero liquid discharge systems for power plants.
- Evaluated the impact of agricultural and mining practices on surface water quality of Central Valley steams. Represented municipal water agencies on several federal and state advisory committees tasked with gathering and assessing relevant technical information, developing work plans, and providing oversight of technical work to investigate toxicity issues in the watershed.

*AIR QUALITY/PUBLIC HEALTH*

- Prepared or reviewed the air quality and public health sections of hundreds of EIRs and EISs on a wide range of industrial, commercial and residential projects.

- Prepared or reviewed hundreds of NSR and PSD permits for a wide range of industrial facilities.
- Designed, implemented, and directed a 2-year-long community air quality monitoring program to assure that residents downwind of a petroleum-contaminated site were not impacted during remediation of petroleum-contaminated soils. The program included real-time monitoring of particulates, diesel exhaust, and BTEX and time integrated monitoring for over 100 chemicals.
- Designed, implemented, and directed a 5-year long source, industrial hygiene, and ambient monitoring program to characterize air emissions, employee exposure, and downwind environmental impacts of a first-generation shale oil plant. The program included stack monitoring of heaters, boilers, incinerators, sulfur recovery units, rock crushers, API separator vents, and wastewater pond fugitives for arsenic, cadmium, chlorine, chromium, mercury, 15 organic indicators (e.g., quinoline, pyrrole, benzo(a)pyrene, thiophene, benzene), sulfur gases, hydrogen cyanide, and ammonia. In many cases, new methods had to be developed or existing methods modified to accommodate the complex matrices of shale plant gases.
- Conducted investigations on the impact of diesel exhaust from truck traffic from a wide range of facilities including mines, large retail centers, light industrial uses, and sports facilities. Conducted traffic surveys, continuously monitored diesel exhaust using an aethalometer, and prepared health risk assessments using resulting data.
- Conducted indoor air quality investigations to assess exposure to natural gas leaks, pesticides, molds and fungi, soil gas from subsurface contamination, and outgasing of carpets, drapes, furniture and construction materials. Prepared health risk assessments using collected data.
- Prepared health risk assessments, emission inventories, air quality analyses, and assisted in the permitting of over 70 1 to 2 MW emergency diesel generators.
- Prepare over 100 health risk assessments, endangerment assessments, and other health-based studies for a wide range of industrial facilities.
- Developed methods to monitor trace elements in gas streams, including a continuous real-time monitor based on the Zeeman atomic absorption spectrometer, to continuously measure mercury and other elements.
- Performed nuisance investigations (odor, noise, dust, smoke, indoor air quality, soil contamination) for businesses, industrial facilities, and residences located proximate to and downwind of pollution sources.

## PUBLICATIONS AND PRESENTATIONS (Partial List - Representative Publications)

J.P. Fox, P.H. Hutton, D.J. Howes, A.J. Draper, and L. Sears, Reconstructing the Natural Hydrology of the San Francisco Bay-Delta Watershed, Hydrology and Earth System Sciences, Special Issue: Predictions under Change: Water, Earth, and Biota in the Anthropocene, v. 19, pp. 4257-4274, 2015. http://www.hydrol-earth-syst-sci.net/19/4257/2015/hess-19-4257-2015.pdf. See also: Estimates of Natural and Unimpaired Flows for the Central Valley of California: Water Years 1922-2014 at: https://msb.water.ca.gov/documents/86728/a702a57f-ae7a-41a3-8bff-722e144059d6.

D. Howes, P. Fox, and P. Hutton, Evapotranspiration from Natural Vegetation in the Central Valley of California: Monthly Grass Reference Based Vegetation Coefficients and the Dual Crop Coefficient Approach, *Journal of Hydrologic Engineering*, v.20, no. 10, October 2015.

Phyllis Fox and Lindsey Sears, *Natural Vegetation in the Central Valley of California*, June 2014, Prepared for State Water Contractors and San Luis & Delta-Mendota Water Authority, 311 pg.

J.P. Fox, T.P. Rose, and T.L. Sawyer, Isotope Hydrology of a Spring-fed Waterfall in Fractured Volcanic Rock, 2007.

C.E. Lambert, E.D. Winegar, and Phyllis Fox, Ambient and Human Sources of Hydrogen Sulfide: An Explosive Topic, Air & Waste Management Association, June 2000, Salt Lake City, UT.

San Luis Obispo County Air Pollution Control District and San Luis Obispo County Public Health Department, *Community Monitoring Program,* February 8, 1999.

The Bay Institute, *From the Sierra to the Sea. The Ecological History of the San Francisco Bay-Delta Watershed*, 1998.

J. Phyllis Fox, *Well Interference Effects of HDPP's Proposed Wellfield in the Victor Valley Water District*, Prepared for the California Unions for Reliable Energy (CURE), October 12, 1998.

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# Direct detection of *Coccidioides* from Arizona soils using CocciENV, a highly sensitive and specific real-time PCR assay

**J. R. Bowers[1,†], K. L. Parise[2,†], E. J. Kelley[1], D. Lemmer[1], J. M. Schupp[1], E. M. Driebe[1], D. M. Engelthaler[1], P. Keim[1,2] and B. M. Barker[1,2,*]**

[1]Pathogen Genomics Division, Translational Genomics Research Institute North, Flagstaff, Arizona and [2]Pathogen and Microbiome Institute, Northern Arizona University, Flagstaff, Arizona

*To whom correspondence should be addressed. Bridget M. Barker, PhD. Pathogen and Microbiome Institute, Northern Arizona University, Flagstaff, AZ 86011, USA. Tel: +928-523-6074; E-mail: bridget.barker@nau.edu

†JRB and KLP contributed equally to this work.

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## Abstract

*Coccidioides immitis* and *Coccidioides posadasii* are soil fungi endemic to desert regions of the southwestern United States, and the causative agents of valley fever, or coccidioidomycosis. Studies have shown that the distribution of *Coccidioides* in soils is sporadic and cannot be explained by soil characteristics alone, suggesting that biotic and other abiotic factors should be examined. However, tools to reliably and robustly screen the large number of soils needed to investigate these potential associations have not been available. Thus, we developed a real-time polymerase chain reaction (PCR) assay for testing environmental samples by modifying CocciDx, an assay validated for testing clinical specimens to facilitate coccidioidomycosis diagnosis. For this study, we collected soil samples from previously established locations of *C. posadasii* in Arizona and new locations in fall 2013 and spring 2014, and screened the extracted DNA with the new assay known as CocciEnv. To verify the presence of *Coccidioides* in soil using an alternate method, we employed next generation amplicon sequencing targeting the ITS2 region. Results show our modified assay, CocciEnv, is a rapid and robust method for detecting *Coccidioides* DNA in complex environmental samples. The ability to test a large number of soils for the presence of *Coccidioides* is a much-needed tool in the understanding of the ecology of the organism and epidemiology of the disease and will greatly improve our understanding of this human pathogen.

**Key words:** Coccidioides, valley fever, soil sampling, molecular detection, real-time PCR.

## Introduction

*Coccidioides posadasii* and *Coccidioides immitis* are species of soil fungi endemic to arid regions of the Americas, and both cause valley fever, or coccidioidomycosis, a potential threat to the health of residents of the arid West.[1–4] Our current knowledge suggests that in Arizona, Mexico, Texas,

and Central and South America, this disease is caused by *C. posadasii*, whereas in the Central Valley of California and as far north as eastern Washington State the disease is caused by *C. immitis*. [5,6] Valley fever starts with inhalation of *Coccidioides* conidia from the environment, yet very little is known about the prevalence of the organism and factors associated with high levels of *Coccidioides* in the environment. Previously, cultures of *C. posadasii*, obtained from soils in Tucson, Arizona, showed the distribution of *Coccidioides* is sporadic and not explained by soil characteristics alone, suggesting a potential role of biotic or other factors in the distribution of the organism in the environment. [7] As soil disturbance is highly correlated with coccidioidomycosis,[8] our knowledge of *Coccidioides* ecology must grow in order to protect public health.

Current culture-based methods of environmental *Coccidioides* detection rely on standard media plate methods to grow the fungus directly from soils, or passage of soil solutions in mice susceptible to coccidioidomycosis and retrieval of viable culture from infected tissue.[5,7,9–13] Both methods have limitations and are cost and labor intensive. Direct culture requires a large number of plates, which is a complicated task in the confines of a biosafety level 3 (BSL3) laboratory, and generally results in low yields of *Coccidioides*.[14] The rapid overgrowth of other fungi that outcompetes *Coccidioides* is frequently stated as the main drawback to this method.[7,14] Mouse passage requires the presence of infectious arthroconidia, which only form at certain times of the *Coccidioides* life cycle, resulting in low success rates. Additionally, this method detects only strains pathogenic to the mice. If nonpathogenic strains exist, mouse passage will not indicate the true distribution of the organism in the environment.

Molecular based assays have been proposed as useful methods to screen soils for the presence of *Coccidioides*.[5,7] Several groups have developed nested PCR applications, targeting the multi-copy internal transcribed spacer (ITS) region common to many fungal species.[14–16] The methodology employs amplification of a conserved region flanking the variable ITS and uses the PCR product as the template for a second, more stringent PCR targeting a *Coccidioides*-specific region, followed by sequencing of the final product. However, the resulting sequence is frequently found to have low or no homology to *Coccidioides*.[15] Additionally, PCR involving the manipulation and further amplification of amplicon DNA is prone to contamination and false positives.[17,18] To improve this process, we developed a TaqMan PCR assay that is highly sensitive and specific to *Coccidioides*. The assay, CocciEnv, is based on the CocciDx assay, which has been validated[19] and recently received FDA clearance (https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpmn/denovo.cfm?ID=DEN170041) as a coccidioidomycosis diagnostic assay.[19] CocciDx has been used for limited soil and air analyses[5,20]; however, additional investigation of the assay and the target for environmental application was needed, and we therefore conducted this study. The assay targets a repetitive region of DNA known only in the *Coccidioides* genus. This method employs a sensitive and specific amplification that can provide results in a few hours after extraction of DNA. In order to further increase assay sensitivity for soil microbe detection, we increased the number of the target alleles captured by the assay, based on newly sequenced isolates of *Coccidioides*, and validated its use for environmental screening. We propose this as a robust method to detect *Coccidioides* DNA in environmental samples and as an indispensable tool for understanding the ecology of this understudied pathogen.

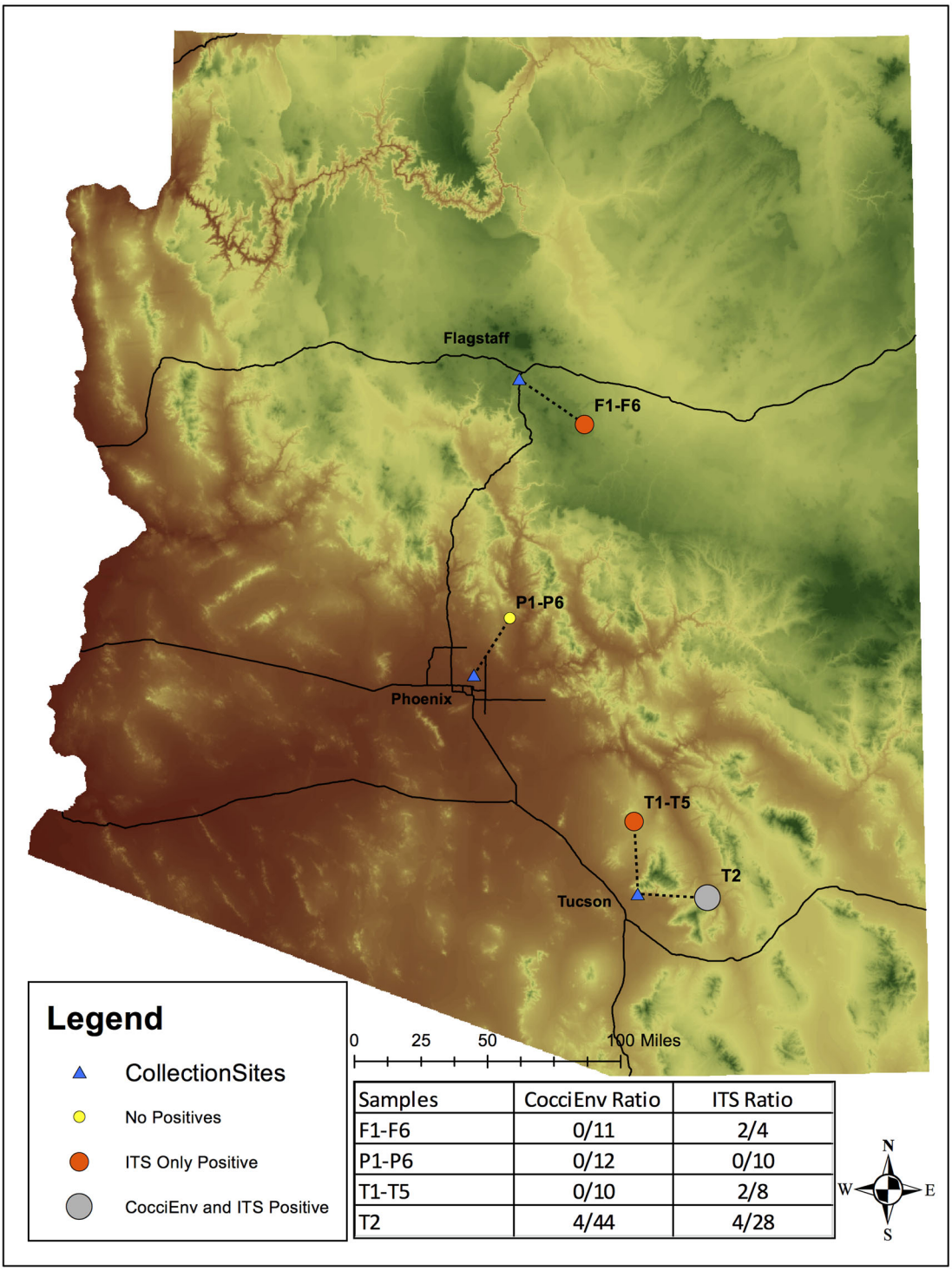
## Methods

### Site description and soil sampling

Soil sampling occurred in September–October, and the following April when the fungus is thought to be actively growing in the soil.[21–23] Several areas in Tucson that were previously identified as culture-positive for *Coccidioides*[7] were sampled as potential positive controls. Additional soil samples in the fall of 2013 were collected from rodent burrows in Phoenix and Flagstaff areas for comparison (Fig. 1, Table S1). Samples were collected from each site as a composite by removing the surface soil and collecting and combining 2 cm to 10 cm depth layers in sample collection bags or sterile 50 ml conical tubes. Implements were decontaminated with 10% bleach and rinsed with distilled water between collections, and samples placed in Ziploc gallon bags and surface-decontaminated with 10% bleach for transport on dry ice and storage at 4°C.

### DNA extraction and preparation

For assay validation, genomic DNA from pure cultures of 562 *Coccidioides* collected from various clinical specimen types from several endemic regions was assayed (Table S2). All DNA samples were whole genome-amplified (WGA) using the REPLI-g Mini Kit (Qiagen, Boston, MA, USA) or illustra Single Cell GenomiPhi DNA Amplification Kit (GE Healthcare, Addison, IL, USA). WGA DNA was diluted 1:1000 before real-time PCR. Genomic DNA from four other Onygenales species, *Amauroascus mutatus* ATCC® 90275, *Amauroascus niger* ATCC® 22339, *Byssoonygena ceratinophila* ATCC® 64724, and *Chrysosporium queenslandicum* ATCC® 4404 was included in a set of genomic DNA from various fungal and bacterial species for




| Samples | CocciEnv Ratio | ITS Ratio |
|---|---|---|
| F1-F6 | 0/11 | 2/4 |
| P1-P6 | 0/12 | 0/10 |
| T1-T5 | 0/10 | 2/8 |
| T2 | 4/44 | 4/28 |

**Figure 1. Map of Arizona sampling locations.** Triangles represent sampling locations. Small yellow circles indicate samples collected from the site were negative for the presence of *Coccidioides* DNA. Medium red circles indicate that sites were positive using amplicon sequencing. Large gray circles indicate samples were positive using both methods.

specificity screening (Table S3). DNA was extracted from the latter isolates using the DNeasy Blood and Tissue Kit (Qiagen) with lytic enzymes appropriate for the species.

For soil samples, cell lysis and DNA extraction was conducted using the PowerSoil® DNA Isolation Kit (MO BIO). For each soil sample, DNA was separately extracted from 1 g of soil taken from two to four different sections of the collection bag to test reproducibility. (These replicates are labeled A, B, C, or D in Table S1.). Extractions were carried out according to manufacturer's instructions, with

**TABLE 1.** CocciDx and CocciEnv real-time PCR assays.

| Assay component | Name | Sequence | Final concentration in PCR ($\mu$M) |
|---|---|---|---|
| CocciDx Assay | | | |
| Forward primer | CocciDx_F1 | GTGTTAGGTAGTCCAACTAGCACCT | 0.6 |
| Forward primer | CocciDx_F2 | GTGTTAGGTAATCCAACCAGCACCT | 0.6 |
| Forward primer | CocciDx_F3 | GTGTTAGGTAATCCAACTAGCACCT | 0.6 |
| Reverse primer | CocciDx_R1 | CTGATGGAGGACTCGTATGCTTGT | 0.6 |
| Reverse primer | CocciDx_R2 | CTGATGGAGGACTTGTACACTTGT | 0.6 |
| Reverse primer | CocciDx_R3 | CTGATGGAGGAATTGTATGCTTGT | 0.6 |
| Reverse primer | CocciDx_R4 | CTGATGGAGGACTTGTATGCTTGT | 0.6 |
| Taqman probe | CDxQ_FAM-MGB | 6FAM-ACCCACATAGATTAGC-MGBNFQ | 0.25 |
| CocciEnv Assay | | | |
| Forward primer | CocciEnv_F1d1 | CGTTGCACRGGGAGCACCT | 0.375 |
| Forward primer | CocciEnv_F2 | AAGCTTTGGATCTTTGTGGCTCT | 0.375 |
| Forward primer | CocciEnv_F3 | AATTGATCCATTGCAAGCACCT | 0.25 |
| Forward primer | CocciEnv_F4 | AATCCAACCTTTGGAACTACACCT | 0.25 |
| Forward primer | CocciEnv_F5 | TTTTCCGGTATGGACTAGCACCT | 0.375 |
| Forward primer | CocciEnv_F6d2 | TGTTAGGTAATCYAACYAGCACCT | 0.125 |
| Forward primer | CocciEnv_F7d2 | TRTTAGGTAATYCAACTAGCACCT | 0.125 |
| Forward primer | CocciEnv_F8d1 | TGTTAGATAATCCAACYAGCACCT | 0.125 |
| Forward primer | CocciEnv_F9d2 | GKTARGTAATCCAACTAGCACCT | 0.125 |
| Forward primer | CocciEnv_F10d2 | TGTTAGGTARTCCAACTAGCAYCT | 0.125 |
| Forward primer | CocciEnv_F11d2 | TGTTAGGTAATCCAACTMGCACYT | 0.125 |
| Reverse primer | CocciEnv_R1 | GATGGAGGACTCTATATGCTTGT | 0.375 |
| Reverse primer | CocciEnv_R2 | ATGGAGGACTCGTTATGCCTGT | 0.375 |
| Reverse primer | CocciEnv_R3 | GGAGGACCCGTATGCTTGTGT | 0.375 |
| Reverse primer | CocciEnv_R4 | TGCTAAATGATGGAGGGCTTGT | 0.375 |
| Reverse primer | CocciEnv_R5 | GATGGAGGCTCGTATGCTTGT | 0.375 |
| Reverse primer | CocciEnv_R6 | AAGGGGTTTGTGGTGAATCCTTA | 0.375 |
| Reverse primer | CocciEnv_R7 | CAGAAAAATAGCCGTATGCTTGT | 0.375 |
| Reverse primer | CocciEnv_R8d2 | TRATGGAGRACTTGTATGCTTGT | 0.125 |
| Reverse primer | CocciEnv_R9d1 | TGATGGAGGACTCGTATGCYTGT | 0.125 |
| Reverse primer | CocciEnv_R10d2 | TGATGGARRACTCATATGCTTGT | 0.125 |
| Reverse primer | CocciEnv_R11d2 | TGATAGAGAACTTGTATRCTTRT | 0.125 |
| Reverse primer | CocciEnv_R12d2 | TGATGAAGAACTTRTATRCTTGT | 0.125 |
| Reverse primer | CocciEnv_R13d2 | TGATRRAGGACTTGTATGCTTGT | 0.125 |
| Reverse primer | CocciEnv_R14 | TGATGGAAAACTTGTATGCTTGT | 0.125 |
| Reverse primer | CocciEnv_R15d2 | TGATGGAGGACTTGTAYAYTTGT | 0.125 |
| Reverse primer | CocciEnv_R16d2 | TGATGGAGGACTTGTAYGCTTRT | 0.125 |
| Reverse primer | CocciEnv_R17d2 | TGATGGAGGACTYATATGCTTRT | 0.125 |
| Reverse primer | CocciEnv_R18d2 | GATGGAGGACTCGTWYGCTTGT | 0.125 |
| Taqman probe | CocciEnv_FMGB | 6FAM-ACCCACATAGATTAGC-MGBNFQ | 0.25 |

one exception: the FastPrep-24 Instrument at 6.5 m/s for 60 s (MP Biomedicals, Santa Ana, CA, USA) was used to bead-beat the sample. DNA was quantified using a NanoDrop 2000 spectrophotometer (ThermoFisher Scientific, Waltham, MA, USA) and diluted to a standard concentration of 100 ng/$\mu$l for PCR assays.

## Real-time PCR assay development and screening

The real-time PCR assay, CocciDx (Table 1), was developed by the Translational Genomics Research Institute (TGen).[5] The CocciDx target was identified by surveying for repeat regions among *Coccidioides* genomes (http://www.broadinstitute.org/scientific-community/science/projects/fungal-genome-initiative/coccidioides-genomes, sequence data now available as Genbank BioProject PRJNA46299. Repeat regions were first identified in the *C. immitis* RS genome by a pairwise BLAST of the genome against itself, using a word size of 50 and a minimum aligned length of 50 bp with 90% sequence identity, then determining which queries hit at multiple loci. These candidate repeat sequences were checked *in silico* for

ubiquity among *Coccidioides* genomes and for specificity to *Coccidioides* by BLAST of the NCBI nucleotide database. One candidate sequence was selected based on its high number of repeats, sensitivity, and specificity. In the NCBI database, the sequence is annotated as a copia-like retrotransposon. Alleles of the repeated region were aligned using SeqMan (DNAStar) and an assay was designed to conserved regions using Primer Express® 3.0 (ThermoFisher Scientific).

After *in silico* development, sensitivity, specificity, and limits of detection of the CocciDx assay were characterized.[19] The assay was optimized on the 7900HT Real-Time PCR System (ThermoFisher Scientific). Each 10 $\mu$l reaction mixture contained 1X PerfeCTa qPCR FastMix II (Quanta Biosciences, Beverly, MA, USA), assay concentrations outlined in Table 1, and 200 ng DNA template. Thermocycling conditions were initial denaturation for 10 min at 95°C, followed by 40 cycles of 15 s at 95°C and 1 min at 60°C.

To validate sensitivity, the CocciDx assay was screened across WGA DNA of 562 unique isolates of *Coccidioides*, including 40 *C. immitis*, 436 *C. posadasii*, and 86 *Coccidioides* species unknown (Table S2). To validate specificity, the assay was screened across a panel of DNA from various species including human, other fungal pathogens, one genetic neighbor, and several bacterial pathogens that may cause similar clinical presentation to coccidioidomycosis (Table S3). For limit of detection experiments a synthesized plasmid control containing one copy of the CocciDx target (Blue Heron Biotech, LLC, Tobermory, ON) was used. In order to precisely quantify copy numbers of the plasmid, serial dilutions of the plasmid, including dilutions down to extinction, were run on a real-time PCR assay that targets the $\beta$-lactamase gene present in the plasmids (Fig. S1). Using the Poisson distribution, plasmid copy number was calculated based on the observed number of amplification events of the lowest dilutions of the plasmid. To determine the limit of detection of CocciDx, 20 replicates of serial dilutions of the quantified plasmid control were screened to determine the lowest number of target copies that resulted in 95% positive results. The process was repeated in 60 replicates for confirmation.

With the recent deposition of new *Coccidioides* genome sequences in public databases,[24] we hypothesized that we could improve the analytical sensitivity of the assay by adding primers to capture more variants of the CocciDx target. Using a local BLAST database of the available *Coccidioides* genomes, we queried for hits with 100% identity to and 100% coverage of the CocciDx Taqman probe sequence. For each hit, we extracted the probe region and flanking sequence and aligned them. We designed 29 new primers to increase the number of alleles of the target captured by the assay (Table 1), and refer to the new environmental sample assay as CocciEnv. The total number of different alleles and copy numbers of the CocciEnv target in *Coccidioides* genomes were estimated bioinformatically (Fig. 2). The new assay was run using the same conditions as for CocciDx, with modifications only to primer concentrations (Table 1).

CocciEnv was subject to a more concise validation than for CocciDx given the extensive validation of CocciDx but included sensitivity and specificity screening across a subset of the DNAs mentioned above, along with DNA from four additional Onygenales species: *Amauroascus mutatus* ATCC® 90275, *Amauroascus niger* ATCC® 22339, *Byssoonygena ceratinophila* ATCC® 64724, and *Chrysosporium queenslandicum* ATCC® 4404 (Table S3). Additionally, CocciDx and CocciEnv were tested by using genomic DNA (not whole genome-amplified) from 23 *Coccidioides* isolates.

CocciEnv was run on soil DNA using the 7900HT Real-Time PCR System (ThermoFisher Scientific). Each 20 $\mu$l reaction contained 1 × PerfeCTa qPCR ToughMix (Quanta Biosciences) with 100 ng total DNA template and assay concentrations outlined in Table 1, with the following

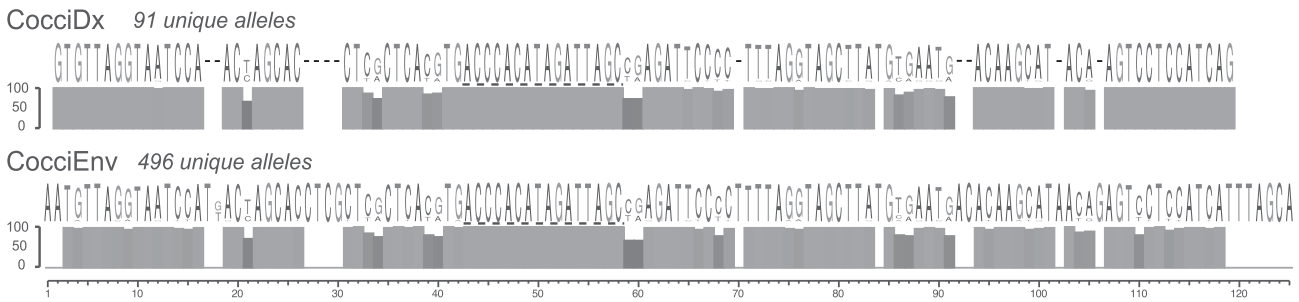



**Figure 2. Consensus sequence comparison illustrating the allele diversity in Coccidioides genomes captured by CocciDx and CocciEnv.** One representative sequence of each allele was included in the consensus (i.e., identical alleles were removed). The height of each nucleotide is proportional to its frequency in that position among the alleles. Gaps in the CocciDx consensus correspond to insertions in alleles captured by CocciEnv that are not captured by CocciDx. The histograms illustrate the percent frequency of each position in all alleles captured by each assay. The Taqman probe sequence is underlined with the dashed line. Figure was created using MegAlign Pro (DNAStar, Inc).

thermocycling conditions: initial denaturation for 10 min at 95°C followed by 40 cycles of 15 s at 95°C and 1 min at 60°C. All reactions were set up in a PCR cabinet to prevent contamination, and three technical replicates were run for each DNA sample. A reaction was considered positive if it showed logarithmic amplification, produced a $C_T$ value of <40, and all controls performed as expected.

### PCR validation of fungal genomic targets in soil

To confirm that soil DNA samples contained fungal DNA and were amenable to PCR, each was screened for fungal DNA using primers ITS1 and ITS4 targeting the ribosomal RNA operon.[25] Each 50 $\mu$l reaction contained 1 × MyFi™ Mix (Bioline) with 21 $\mu$l DNA template and 10 $\mu$M each forward and reverse primers, with the following thermocycling conditions: initial denaturation for 1 min at 95°C followed by 40 cycles of 15 s at 95°C, 20 s at 55°C, and 45 s at 72°C, and a final extension of 10 min at 72°C. PCR products were visualized via agarose gel electrophoresis. If bands were not present for a sample, it was not processed further, and DNA was re-extracted from that soil sample. Samples positive for fungal DNA were screened with CocciEnv, as well as by ITS2 amplicon sequencing (see below).

### Validation of target amplification in soil DNA samples

As soil is a complex sample, Sanger sequencing was employed to confirm the presence of the assay target when detected in a soil sample. PCR was run in 20 $\mu$l reactions that included 100 nM of each primer CocciDx_F3 and CocciDx_R4 (Table 1), 2 ng DNA template, and *Taq* DNA polymerase (ThermoFisher Scientific). Thermocycling conditions consisted of an initial denaturation of 10 min at 95°C followed by 40 cycles of 1 min at 94°C, 30 s at 60°C, and 1 min at 72°C, and a final extension of 10 min at 72°C. PCR products were cleaned using ExoSAP-IT™ (Affymetrix, Santa Clara, CA, USA), and sequenced using the above PCR primers with BigDye® Terminator v3.1 chemistry (ThermoFisher Scientific). Reaction products were analyzed on a 3130xl automated genetic analyzer (ThermoFisher Scientific). Sequencing reaction results were assembled in Seqman (DNAStar).

### ITS2 amplicon sequencing

The ITS2 region in fungal PCR-positive soil samples was amplified in triplicate using published primers.[26] PCR was performed in 8 $\mu$l reactions containing 0.1 U/$\mu$l Phusion Hot Start II DNA polymerase (ThermoFisher Scientific), 1 $\mu$M each primer, 200 $\mu$M dNTPs, and 6% glycerol (v/v). Thermocycling was as follows: 95°C for 2 min, and 25 cycles of 95°C for 30 s, 55°C for 30 s, 60°C for 4 min. Replicate reactions were pooled for indexing. Index PCR conditions and reagents were the same as above except for the indexing primers and 15 PCR cycles were performed. Indexed products were bead-purified,[27] quantified with PicoGreen® fluorescence (ThermoFisher Scientific), and pooled to equimolar concentrations. The final pool was bead-purified and quantified by qPCR using Library Quantification Kit, Illumina/ABI Prism (KAPA Biosystems) and sequenced in 2 × 250 mode on the MiSeq platform (Illumina).

We analyzed amplicon sequencing results using the TGen-developed bioinformatic tool, ASAP.[28,29] ASAP links together several bioinformatic programs with parameters set for customized sequencing analysis and results generation. In this case, ASAP first merged sequence read pairs with PEAR.[30] The reads were then trimmed of Illumina adapter (ligated during the sample library preparation process) and further trimmed based on sequence quality with Trimmomatic.[31] Specifically, a 5 bp sliding window across the read checked for average Phred scores below 20. Any windows that fit that criterion were removed. The full ITS2 *C. posadasii* reference sequence was obtained from the NCBI database (Genbank accession number KF539879) and trimmed to the expected amplicon size (334 bp) to serve as the reference sequence for the first round of ASAP. Trimmed, merged reads were then mapped to the reference sequence with the bowtie2 aligner.[32] Binary alignment map (BAM) files, generated by the aligner (one generated for each sample), were analyzed to determine the breadth and depth of coverage of the reference and identity to the reference. Thresholds to identify whether a sample was positive or negative were set at 100% breadth at 1 × depth of coverage at ≥97% identity (i.e., the full length of the 334 bp ITS2 reference sequence had to have a pair-merged read align with 10 or fewer single-nucleotide polymorphisms [SNPs]). This identity threshold was set according to the lowest identity of all known *Coccidioides* ITS2 sequences in the NCBI nucleotide database. Tablet[33] was used to verify results.

Upon analysis with ASAP, several samples were found for which reads aligned to the *C. posadasii* ITS2 amplicon reference that did not pass the 97% identity filter. To determine what other organisms might be the source of these sequences, any reads that aligned to the ITS2 reference that didn't meet the 97% identity, 100% breadth criteria were binned for analysis. A BLAST analysis of these reads showed hits to several other fungal species. These sequences were added as references for ASAP to determine if CocciEnv could be cross-reacting with other fungal species.

## Results

### CocciDx and CocciEnv assay validation and comparison

The WGA DNA samples from all 562 unique isolates of *Coccidioides* (Table S2) were positive on the CocciDx assay (real-time PCR Ct values were all < 35.0) and all DNA samples from various other species (Table S3) were negative (Ct values were all > 40.0), illustrating 100% sensitivity and 100% specificity. These data reflect the recently published CocciDx clinical validation data, in which sensitivity was 100% and specificity between 93.8% and 100% for DNA extracted from clinical specimens run on the GeneSTAT instrument (DxNA, LLC).[19] Using a serial dilution of a precisely quantified synthetic plasmid standard (Blue Heron Biotech, LLC), the CocciDx assay limit of detection was determined to be 15 target copies/reaction and the linear range was between $10^8$ and $10^1$ copies/reaction (Fig. S1).

On the CocciEnv assay, 45 out of the 45 *Coccidioides* WGA DNA samples tested were positive (Ct values < 35.0), and all 28 of the nontarget DNA samples, which included the Onygenales family members (Table S3), were negative (Ct value > 40.0). A comparison of CocciEnv and CocciDx showed that the CocciEnv assay resulted in an average of 1.8 (range of 1.6 to 2.1) Ct values earlier than those from the CocciDx assay when screened on the same genomic DNA, inferring a limit of detection three to over fourfold lower than that of CocciDx.

Genomes from 84 *Coccidioides* isolates were bioinformatically screened to determine the number of perfect matches to each assay that would result in the expected PCR product. Collectively in all 84 genomes, target alleles that were a perfect match to the CocciEnv assay were found a total of 4,614 times, which makes an average of ~55 copies/genome, while the alleles that were a perfect match to CocciDx were found 471 times, an average of ~6 copies/genome. Although the actual assays would likely capture additional alleles that are close, but not perfect, matches to the primer or probe sequences, thereby exhibiting sensitivity beyond what is described here, this was not further explored. The matches were dereplicated to determine the number of unique alleles that would be captured with a perfect match by each assay. CocciEnv captures 496 different alleles of the target, while CocciDx captures 91 different alleles (Fig. 2).

### CocciEnv soil screening

Soil DNA was tested with CocciEnv in triplicate technical replicates. Results were considered positive if two of the three replicates had Ct values <40. Four samples tested positive out of 73 screened. These four samples were biological replicates of one soil sample collected near an apparently unoccupied large rodent burrow (Table S1), illustrating the reproducibility of both the DNA extraction and the CocciEnv assay.

### ITS2 amplicon sequencing

Presumably, the vast majority of fungal species are not known, and soils have highly complex microorganism composition. We therefore set stringent parameters for determining the presence of *Coccidioides* in soil by ITS2 amplicon sequencing. The number of pair-merged reads that matched the *Coccidioides* ITS2 region reference sequence at ≥97% identity is shown in Table S1. Of the 50 soil samples tested, eight had one or more reads positive for *Coccidioides* (≥97% identity, Table S1, Table 2). Four of these are the four that tested positive by CocciEnv. Unfortunately, we did not have enough material to screen CocciEnv on three of the four other ITS2-positive samples (Table 2). The last sample had one read align and tested negative on CocciEnv.

We also identified by BLAST the closest species match to each pair-merged read that aligned to the *C. posadasii* ITS2 reference that did not pass the 97% identity threshold. The top BLAST hit for each was one of the following: *Chrysosporium keratinophilum*, *Chrysosporium tropicum*, *Aphanoascus verrucosus*, *Aphanoascus canadensis*, *Uncinocarpus reesi*, *Uncinocarpus queenslandicus*, *Arthroderma multifidum*, *Castanedomycs australiensis*, or *C. posadasii* (at <97% identity). The ITS2 sequences from these species were added to ASAP as references and results from this analysis are shown in Table S1. In 12 cases, the best hit of the reads was *C. posadasii*, at <97% identity, which could be indicative of an unknown *Coccidioides* ITS2 sequence or an unknown species. Seven of these 12 samples also had reads pass the 97% identity filter for *C. posadasii*, so were considered positive, suggesting the presence of unknown *Coccidioides* ITS2 sequences. Four of these seven tested positive on CocciEnv, while the other three were not tested. The five samples that did not have additional reads pass the identity filter tested negative on CocciEnv, suggesting the presence of a yet unknown fungal species (Table S1).

## Discussion

Characterizing the natural reservoirs of *Coccidioides* is necessary for coccidioidomycosis epidemiology and public health protection. Unfortunately, a paucity of data exists to address this.[34] It is understood that *Coccidioides* has a sporadic, unpredictable distribution in the environment.[35] Because exposure of a susceptible host to arthroconidia often leads to infection, understanding the environmental

**TABLE 2.** Comparison of CocciEnv and ITS2 sequencing on a subset of soil samples. Data for all soil samples are in Table S1. 97% sequence identity is a common cutoff for species assignment for fungal metagenomics.

| Sample ID | Location | CocciEnv mean $C_t$ value | ITS2 Read counts ≥97% sequence identity | ITS2 Read counts <97% sequence identity |
|---|---|---|---|---|
| F2A | Flagstaff | Not performed | 4 | 13 |
| F2B | Flagstaff | Negative | 0 | 0 |
| F3A | Flagstaff | Negative | 1 | 0 |
| P2A | Phoenix | Negative | 0 | 2 |
| P2B | Phoenix | Not performed | 0 | 0 |
| P3B | Phoenix | Negative | 0 | 0 |
| P4A | Phoenix | Not performed | 0 | 0 |
| T2A | Tucson | Negative | 0 | 11 |
| T2B | Tucson | Negative | 0 | 1 |
| T3A | Tucson | Negative | 0 | 10 |
| T3B | Tucson | Negative | 0 | 6 |
| T4A | Tucson | Not performed | 2 | 3 |
| T4B | Tucson | Not performed | 2 | 3 |
| T5A | Tucson | Negative | 0 | 4 |
| T2-1a | Tucson | Negative | 0 | 2 |
| T2-1c | Tucson | Negative | 0 | 2 |
| T2-2a | Tucson | 32.6 | 7 | 15 |
| T2-2b | Tucson | 31.3 | 14 | 22 |
| T2-2c | Tucson | 32.0 | 8 | 39 |
| T2-2d | Tucson | 32.0 | 22 | 43 |
| T2-4a | Tucson | Negative | 0 | 31 |
| T2-4b | Tucson | Negative | 0 | 12 |
| T2-4c | Tucson | Negative | 0 | 36 |
| T2-4d | Tucson | Negative | 0 | 7 |
| T2-5a | Tucson | Negative | 0 | 17 |
| T2-5b | Tucson | Negative | 0 | 10 |
| T2-5c | Tucson | Negative | 0 | 6 |
| T2-5b | Tucson | Negative | 0 | 13 |
| T2-6a | Tucson | Negative | 0 | 1 |
| T2-10a | Tucson | Negative | 0 | 12 |
| T2-10b | Tucson | Negative | 0 | 12 |
| T2-10c | Tucson | Negative | 0 | 11 |
| T2-10d | Tucson | Negative | 0 | 10 |

reservoir is critical to quantifying the risk of exposure. In fact, a recent study linked rising coccidioidomycosis cases with land use-induced soil disturbances in Antelope Valley in California.[8] With the development of a rapid, inexpensive, and high-performance screening tool, many ecological questions become answerable regarding favorable and unfavorable biotic and abiotic factors, mechanisms of dispersal, seasonality, and locations and persistence of *Coccidioides* foci in the environment.

Coccidioidomycosis is on the rise, and there are several nonexclusive phenomena that might be responsible; including population growth in endemic areas, increase of susceptible populations, heightened awareness of coccidioidomycosis, and increasing rates of exposure to arthroconidia through landscape disturbance.[8,36] Our understanding of the contributions of each of these factors is lacking.[36] A sensitive and specific soil-screening tool would enable studies to elucidate the role that landscape disturbance plays in the incidence of coccidioidomycosis. Additionally, such a screening tool would inform regulatory agencies in endemic regions (e.g., environmental, occupational health, corrections, and public health agencies) of risk of exposure to workers and communities within the vicinity of any proposed project where there is the potential for soil disturbance and dust, and inform remediation efforts. A recent epidemiological investigation of coccidioidomycosis outbreaks in prisons in California's Central Valley did not identify an association of coccidioidomycosis with outdoor activities.[37] Comprehensive soil surveys could pinpoint hotspots of *Coccidioides*, and be highly informative

for investigations such as this, and direct effective mitigation practices.

CocciEnv and its clinical diagnostic counterpart CocciDx are rapid, straightforward, highly sensitive, and inexpensive assays to detect *Coccidioides* DNA in environmental and clinical samples, respectively.[38] CocciDx recently received FDA clearance as a coccidioidomycosis diagnostic test (https://www.tgen.org/news/2017/december/06/tgen-technology-results-in-new-fast-accurate-valley-fever-test/). CocciEnv, with slight differences from CocciDx in primer number and sequence, is designed to be more specific and sensitive than CocciDx making it especially suited for testing environmental samples.

Of note, there were seven samples that contained several reads that matched the known *Coccidioides* ITS2 at ≥97% identity that also contained ITS2 sequences that did not pass the identity filter but whose top BLAST hits were *C. posadasii*. This may be evidence of a more genetically diverse population of *Coccidioides* than is currently described, or an as yet unknown *Coccidioides*-like fungus that cohabits with *Coccidioides*. The majority of sequences deposited in the NCBI database are clinical isolates, thus in-depth studies of *Coccidioides* soil isolates are necessary to determine if sequences detected might represent a non-pathogenic form of *Coccidioides*.

The identification of our highly-repeated assay target as a copia-like retrotransposon is not surprising. Retrotransposons replicate via RNA intermediates, which interact with a self-encoded integrase to integrate into the host genome, leaving the original template intact. In this way retrotransposons continuously increase in number. Eukaryotic genomes have numerous copies of some retrotransposons; the human genome contains more than a million copies of the *alu* retrotransposable element.[39] Thus, targeting a retrotransposon makes for a highly sensitive detection assay. We have targeted a portion of a retrotransposon in the Ty1/Copia superfamily, a superfamily originally defined in *Saccharomyces cerevisiae* and abundant throughout eukaryotic genomes.[40,41] The copia-like element we target with CocciEnv is specific to *Coccidioides*, making an ideal assay for applications requiring maximum sensitivity while maintaining specificity. Heterogeneity among copies of a given copia-like retrotransposon can be significant,[40] as we show here in *Coccidioides*, and is the reason behind the numerous primers in the CocciEnv assay.

The assay presented here addresses many of the limitations that have previously prevented needed fine-scale modeling of *Coccidioides* in the environment: the lack of a high throughput system to screen a large number of soils, the lack of sensitivity of microbiological methods, and the lack of reliable molecular tools. Additionally, CocciEnv obviates culture of *Coccidioides*, a BSL3 organism, and does not preclude the discovery of non-pathogenic strains, as mouse passage does. Our CocciEnv assay is sensitive and specific on the soils we tested, despite the fact that we did not find many positive soils. As the assay was designed using known fungal DNA sequence and validated with DNA from available fungal isolates, it is possible that we could detect unknown fungi resulting in false positive hits. Despite this, we promote the assay as a rapid and cost-effective screening tool to identify soils to more thoroughly investigate. For example, in the current study a majority of samples were negative for the two screening approaches, significantly reducing the number of samples that would be further processed using culture-based methods. Thus, the successful detection of *Coccidioides* with CocciEnv will be used as our screening method for future soil sample collections to identify novel sites for *Coccidioides* ecology research, recovery of viable organisms, and epidemiological information.

## Supplementary material

Supplementary data are available at *MMYCOL* online.

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### Declaration of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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# EXHIBIT B

HOUSE
AGRICULTURAL
CONSULTANTS

1105 Kennedy Place
Suite 1
Davis, California 95616

telephone +1 530 753 3361
fascimile +1 707 583 7861
www.houseag.com

January 12, 2022

Kelilah D. Federman
Adams Broadwell Joseph & Cardozo
601 Gateway Boulevard, Suite 1000
South San Francisco, CA 94080

Re: Estrella Substation and Paso Robles Area Reinforcement Project Revised DEIR
Review of Mitigation Measures Proposed for Agriculture and Forestry Resource

Dear Ms. Federman,

The Revised DEIR does not address the issues I raised last year. These are as follows:

## I. Mitigation Measure AG-1, "Provide Compensation for Loss of Agricultural Land"

Mitigation Proposal AG-1 falls short of a thorough or even credible mitigation plan for the permanent loss of agricultural land from this project

### A. The DEIR proposes a 1:1 ratio for land mitigation.

The placing of conservation easement at a 1:1 ratio to land permanently lost to agriculture is recognized in the DEIR to "not fully offset the significant impact because it does not create any new Important Farmland."

In my previous letter I noted that other jurisdictions, one right in San Luis Obispo County, to wit, the City of Arroyo Grande, which have dealt with this issue by requiring more than a 1:1 ration. See https://sustainablecitycode.org/brief/offsetting-agricultural-land-loss-stemming-from-new-development-3/#:~:text=The%20ordinance%20requires%20mitigation%20at%20a%203%3A1%20ratio,as%20affordable%20housin g%20projects%2C%20parks%2C%20and%20schools.%20T.

I also mentioned that *additional funds, more than the market value* of the land to be converted, could be donated to a local land trust such as the Land Trust of San Luis Obispo County.

### B. The proposed land mitigation fee will be "based on market price for commensurate agricultural land."

There is no description as to how this will be done. Unless a qualified, licensed certified appraiser determines the value of the converted land using a peer-reviewed methodology, there is no guarantee that the mitigation fee will truly be commensurate. "Commensurate" should be defined by metrics such

as soil quality (Storie Index or USDA Capability Class rating) equivalent supply of water for irrigation, and other factors which are described and utilized in the LESA model. The mitigation land should have an equal or better LESA score than the land lost. Who monitors the mitigation – is it San Luis Obispo County, LAFCo, USDA Natural Resource Conservation Service, or the local Resource Conservation District?

**2. The proposed land mitigation fee will be contributed to the California Farmland Conservancy Program.**

To be effective, the plan should identify a legal entity that can receive the mitigation fees and utilize them for the intended purpose, to wit, to acquire a permanent conservation easement on "commensurate" land. This would be a local agricultural land trust or San Luis Obispo County.

**3. "In lieu" mitigation fees can be misused or misapplied**

There should be a definite time frame in which the in-lieu fees are used to purchase the intended conservation easement. I mentioned before that contributing money in an amount commensurate with the value of the land lost is problematic in that there is no guarantee that the original intention of the mitigation can be fulfilled, i.e. to conserve farmland. Such money can lose its purchase power through time lapse and administration costs, or even be diverted to other uses. These effects have been seen throughout the country with in-lieu fees, and have been a ongoing criticism of in-lieu mitigation fees.

The best way to avoid these problems is to require that the DEIR directly identify and purchase the conservation easement with the oversight and approval of an appropriate jurisdiction. This way the specific intent of the law can be met directly and effectively.

## II. Mitigation Measure AG-2, "Restore Agricultural Land Temporarily Impacted by Construction Activities"

The activities are described as:

- temporary staging and storage areas
- installation of underground fiber optic cable
- installation of 230 kV interconnection structures
- preparation and temporary use of pull sites and crossing guard structures
- preparation and use of helicopter landing zones

and the mitigation is described as restoring the sites to pre-project conditions by:

- removal of rock or material imported to stabilize the site
- replacement of topsoil
- de-compacting any soil that has been compacted by heavy equipment

- replanting of agricultural crops

None of my comments were mentioned or considered in the revised DEIR. I repeat them here below.

**A. Commentary**
Perhaps the most significant problem with this proposed mitigation measure is its almost complete lack of specificity as to how these measures will be accomplished. In all likelihood the real impacts are not fully known or understood, and this paragraph is just a cipher or placeholder to acknowledge that something will need to be done after the construction is completed. Below I will discuss the proposed mitigation measures and offer commentary and suggestions. I will assume that the measures will be performed in the sequence as presented in the DEIR.

**1. Removal of rock or material imported to stabilize the site**
To fully remove these materials will require scraping into the topsoil, and thus remove some if not most of the native topsoil in the process. This is probably being acknowledged by the proposal to replace the topsoil. While it is theoretically possible to remove all the placed rock and other imported materials, in practice this is generally economically infeasible, and it may as well be acknowledged that a 95% cleanup job is about the best likely outcome, thus this aspect of the temporary construction will not be fully restored to pre-construction conditions. This so-called "temporary" impact may well be a permanent impact in reality.

**2. Replacement of topsoil**
As noted above, undoubtedly topsoil will be scraped away with the placed rock. The Soil Survey of San :Luis Obispo County, Paso Robles Area (USDA Soil Conservation Service, 1983) notes that the topsoil for the principle soils at theses sites is approximately 10 inches deep. Thus, removal of even two inches of topsoil is a 20% loss, and in all likelihood about 4 inches 40%, will be scraped away. The plan does not state how the topsoil will be replaced, but assuming it will be purchased from a landscape materials yard somewhere in San Luis Obispo County, imported to the site and spread by dump truck, the replacement topsoil should match, as close as possible, the pale brown fine sandy loam found naturally at the various temporary construction sites. The amount of topsoil removed should be replaced by an equal amount, recognizing that when applied the topsoil will be unsettled and less compact than the original site condition; thus more appropriate topsoil should be applied than the amount measured as removed with the end result that the settled ten inches or so is replaced.

It is commonly known that just replacing topsoil with fresh fill is insufficient to restore a landscape to its original condition. Problems include soil erosion, lack of fertility, and a minimized soil biology. The plan should require that the soil be conditioned through re-establishment of ground vegetation at each site. This could be accomplished by planting a grass-forb-mix cover crop, with a species mix that is similar or identical to that which was removed. The Soil Survey describes the rangeland species as "soft chess, wild oats and burclover," but the DEIR gives a longer list of "non-native grasses" in section 4.4.3. In the tilled crop land areas, specific cover crops to condition the soil and provide other ecosystem services are warranted. It is common for the land between the vineyard rows to be planted to a variety of cover crop species; a description of this practice has been published by Cal Poly Center for Sustainability at https://cfs.calpoly.edu/cphealthysoils.

Note also that restoring soil to its pre-project condition will likely take more than one year to accomplish and a plan to monitor the site and continue with restoration practices for two to three years will probably be necessary to achieve the stated goal of restoring soil to its pre-project condition.

**3. De-compacting soil that has been compacted by heavy equipment**

Once the topsoil has been "replaced," but before planting cover crops or other vegetation, the plan calls for de-compacting the soil. No further description is provided, so I assume that the typical practice of using a crawler tractor or bulldozer fitted with ripper shanks is the proposed operation. To do this effectively, the compacted layer must be broken in several directions, and the ripper shank must penetrate to a depth slightly below the compacted zone. Monitoring of the efficacy of the operation is paramount if the compaction is to be remedied. This tillage should be done when the soil profile is dry enough to fracture; ripping in wet soil only causes additional damage. Again, ripping compacted soil is a standard practice and while it can't fully recreate the original conditions of a natural soil profile, ripping is the prescribed method to alleviate compacted soils. As with the top soil/vegetation/life-of-the-soil aspect discussed earlier, these measures may not bring the soil system back into balance or a semblance of what existed prior to the project activities. Establishing vegetation is key to re-balancing.

**4. Replanting of agricultural crops**

Annual crops such as hay or row crops are easy to restore in the sense that in one year the crop rotation can be put back into place. Even for the annual crops, however, the cover cropping immediately after (as a soil conditioner prior to planting the commercial agricultural crop) the "de-compacting" must be an added requirement to this mitigation plan.

For grape vineyards, the vines take more than one year to reach crop bearing age. It is therefore necessary for the mitigation that the act of replanting of the grape vines encompasses the several years (typically 3 to 5 years) it takes to develop mature grape vines. The University of California Cooperative Extension publishes studies on the costs to establish wine grape vineyards, and these studies can form an objective basis for the full cost and time period required for the replanting mitigation

**5. Additional observations**

a. Soil disturbance.

The degree of soil disturbance for each proposed project activity is not stated, and may actually be unknown at this time. Depending on the particular project operation, the depth of disturbance through excavation or severe compaction may make it impracticable to reasonably fully restore the so-disturbed site to pre-project conditions, and thus fail to mitigate these activities.

b. Hazardous materials.

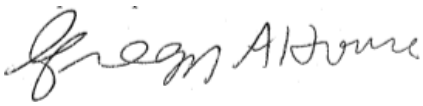
There is no discussion of the use of hazardous materials on the temporary construction sites; however this is a real concern; prevention and containment measures must be part of the plan, along with contingency plans for hazardous waste cleanup if needed.

c. Restoration of slopes and contours.

The temporary construction sites are located on undulating land with slopes up to 15%, according to the Soil Survey. Such topography is prone to soil erosion from rainfall; the mitigation plan must restore the temporary construction sites to their original slopes and contours for proper surface water drainage. Drainage pipes and other conveyance or water calming structures may be required to prevent water erosion on sloping land. Satellite LIDAR mapping is likely available to establish the original slopes and contours.

I appreciate your interest in hearing once again my comments on this project, in defense of agriculture.

Sincerely,



House Agricultural Consultants
Gregory A. House
Accredited Farm Manager
Accredited Rural Appraiser
Certified Crop Advisor
Certified Professional Agronomist
Certified General Appraiser, California License # AG 001999

# Gregory A. House

Agricultural Consultant
Agronomist
Professional Farm Manager
Rural Appraiser
Farmer

## Experience

**Agricultural Consultant**, House Agricultural Consultants, providing agricultural science, economics, management, and appraisal services, 1983–present

**Farmer**, 1987–present. Organic apples, peaches, cherries, apricots, field and seed crops

**Corporation Secretary & Consulting Agronomist**, Hannesson, Riddle & Associates, Inc., 1977–1983.

## Professional Affiliations

- American Society of Farm Managers & Rural Appraisers
- American Society of Agronomy
- Crop Science Society of America
- Soil Science Society of America
- California Certified Organic Farmers
- California Farm Bureau

## Accreditations

- Accredited Farm Manager (AFM), American Society of Farm Managers & Rural Appraisers, Certificate #501
- Certified Professional Agronomist (CPAg), American Registry of Certified Professionals in Agronomy, Crops. & Soils, Ltd. Certificate # 2319
- Certified Crop Advisor CCA), American Registry of Certified Professionals in Agronomy, Crops. & Soils, Ltd.
- Accredited Rural Appraiser (ARA), American Society of Farm Managers & Rural Appraisers, Certificate #749
- Certified General Appraiser, State of California License # AG 001999

  These credentials have continuing education requirements with which I am in compliance.

# Qualifications of Gregory A. House, continued

## Education

- B.S., Crop Ecology, University of California, Davis, 1975, with Honors
- Numerous courses from the University of California Extension in agricultural economics, crop management, real estate, & hazardous waste management
- Courses of the American Society of Farm Managers and Rural Appraisers:

  Principles of Rural Appraisal
  Advanced Rural Appraisal
  Eminent Domain
  Report Writing School
  Economics of Farm Management
  Principles of Farm Management
  Standards and Ethics
  Permanent Plantings Seminar
  Standards and Ethics for Farm Managers
  ASFMRA Code of Ethics
  National Uniform Standards of Professional Appraisal Practice

  Courses of the Appraisal Institute:

  Basic Valuation Procedures
  Real Estate Statistics and Valuation Modeling
  Advanced Income Capitalization
  Valuation of Conservation Easements Certificate Program
  Condemnation Appraising: Principles and Applications
  Appraising the Appraisal

## Expert Witness Court Testimony

- Superior Court Qualified Expert Witness in the following California counties: Alameda, Colusa, Kern, Fresno, Madera, Merced, Monterey, Orange, Riverside, San Joaquin, San Luis Obispo, Santa Barbara, Santa Cruz, Solano, Sonoma, Sutter, Yolo
- United States Tax Court Qualified Expert Witness
- United States Bankruptcy Court Qualified Expert Witness

A list of depositions and trial appearances is available upon request

# Qualifications of Gregory A. House, continued

## Awards

- CCOF Presidential Award, California Certified Organic Farmers, February, 2001
- Meritorious Service in Communications, American Society of Farm Managers and Rural Appraisers, November 2004
- H.E. Buck Stalcup Excellence in Education Award, American Society of Farm Managers and Rural Appraisers, October, 2011

## Appointments & Activities

- Adjunct Lecturer, Farm Management Courses ARE 140 & ARE 198, University of California, Davis, Department of Agricultural & Resource Economics, current
- Instructor, "Principles of Farm Management", an Internet course of the American Society of Farm Managers and Rural Appraisers, 1996 to 2007
- President, California Chapter American Society of Farm Managers & Rural Appraisers 1994–1995; Secretary-Treasurer, 1984 to 1990
- Board of Directors, Yolo Land Trust, 1993–2001
- Board of Directors, American Red Cross, Yolo County Chapter 1987–1989
- Member, Yolo County Right to Farm Grievance Committee 1992–1995
- Vice Chairman, Management Education Committee, American Society of Farm Managers and Rural Appraisers, 1998–2000 (committee member since 1986)
- Yolo County LAFCo Agricultural Forum LESA subcommittee, 1999
- California Certified Organic Farmers: Treasurer of the Board of Directors, 1998–2003; Executive Director, 1999-2000; Chairman of Certification Committee, Yolo Chapter, 1993-2005; Member of the Finance Committee, 1998-current
- CCOF Foundation Going Organic Program, Management Team member and Chapter Leader, 2006-current
- USDA Organic Grant Panel member, 2002
- City of Davis Open Space and Habitat Commission, 2006–current, Chairman, 2007-2009
- Member, Fruit Orchard Technical Advisory Group, Filoli Gardens, Woodside, California
- Member, Organic and Sustainable Agriculture Program Steering Committee, University of California Cooperative Extension, Yolo and Solano Counties, California, 2008-2013

# Qualifications of Gregory A. House, continued

## Speaking Engagements

- Guest Lecturer, University of California at Davis, Agricultural Economics 145, Farm and Rural Resources Appraisal, on professional farm appraisal (1985–1997)
- Guest Lecturer, University of California at Davis, Agricultural Economics Department, Course 140, "Farm Management", on adoption of new technologies, farm budgeting, cash flow management, cost accounting, etc. (1985–present)
- Guest Lecturer, University of Florida at Gainesville, Vegetable Crops Department, seminar on transition to organic agriculture, (November, 1994)
- Featured Program Speaker, 1995 Eco-Farm Conference, Asilomar, California , on economics of organic apple production
- Guest Speaker, Community Alliance with Family Farmers, on farm management and agricultural economics, 1996 and 1997
- Instructor, American Society of Farm Managers and Rural Appraisers, Course M-12, "Standards and Ethics for Professional Farm Managers", March, 1997
- Guest Speaker, American Horticultural Society, "Challenges of Organic Stone Fruit Production", Sacramento, California, July 2001
- Organizer and Presenter, Going Organic Kickoff Meetings, November 2005 and December 2006
- Master of Ceremonies, California Certified Organic Farmers, Annual Meeting, February, 2006, Sacramento, California
- Featured Program Speaker, 2012 Eco-Farm Conference, Asilomar, California, "Imitating Natural Systems: Towards an Indigenous Agro-forestry"
- Seminar presentation: "What Makes for Comparable Sales in Condemnation Appraisal" , Rpid Fire Seminar, American Society of Farm Managers and Rural Appraisers, Reno , NV, October 2013.

## Publications

- "Principles of Farm Management", Course M-10, a 40-hour professional credit Internet educational offering of the American Society of Farm Managers & Rural Appraisers
- "Conservation Issues in Agriculture", a unit of Course M-25, a 15-hour professional credit Internet educational offering of the American Society of Farm Managers & Rural Appraisers
- "A Primer on Organic Agriculture," an article in *2006 Trends in Agricultural Land and Lease Values*, a publication of the California Chapter of the American Society of Farm Managers & Rural Appraisers
- "Case Study: Using Indigenous Agroforestry Management Techniques to Support Sustainability in Production Agriculture", a paper-poster presented at Harlan II, An International Symposium on Biodiversity in Agriculture: Domestication, Evolution and Sustainability, September 14-18, 2008, University of California, Davis

# House Agricultural Consultants
# Partial Listing of Clients Served

Allied Insurance Group

American Farmland Trust

Balverne Winery & Vineyards
Sonoma County, California

Bank of America

Best, Best & Kreiger, LLP
Riverside, California

California Giant Berry Farms

California Department of Fish & Game
Wildlife Conservation Board

California Department of Justice

City of Davis

City of Fairfield

City of Morgan Hill

City of Sacramento, City Attorney

Continental Casualty Company
Chicago, Illinois

County of Solano

County of Yolo

Downey, Brand, Seymour & Rohwer
Sacramento, California

Glenn-Colusa Irrigation District

Hamel Ranch Partnership
Davis, California

Harris Farms, Inc.

Farmers' Home Administration (U.S.D.A.)
Sacramento, California

Internal Revenue Service, District Counsel
San Francisco, California

McMahon-Graf Partners
Winters, California

Morrison & Foerster
San Francisco, California

Oakdale Irrigation District

Pajaro Valley Water Management Agency
Watsonville, California

Phillips 66 Company

Republic Indemnity Company of America
San Francisco, California

Royal & Sun Alliance

Sacramento Valley Conservancy

Sacramento Valley Farm Credit Banks

San Andreas Farms
Fresno County, California

San Joaquin Council of Governments

San Luis Delta Mendota Water Authority

Sanwa Bank, N.A.
Sacramento, California

Solano Land Trust

Stanford Management Company
Stanford University

The Nature Conservancy

The Prudential Agricultural Group
Sacramento, California

The Travelers Insurance Company

The Trust for Public Land

U. S. Fish & Wildlife Service

U. S. Departments of Justice & Treasury

University of California, Davis

Yolo Land Trust

Wells Fargo Bank, N.A.

# EXHIBIT C

February 11, 2021

Ms. Kelilah D. Federman
Adams Broadwell Joseph & Cardozo
601 Gateway Boulevard, Suite 1000
South San Francisco, CA 94080

**Subject: Comments on the Draft Environmental Impact Report for the Estrella Substation and Paso Robles Area Reinforcement Project**

Dear Ms. Federman:

This letter contains my comments on the Draft Environmental Impact Report ("DEIR") prepared by the California Public Utilities Commission ("CPUC") for the Estrella Substation and Paso Robles Area Reinforcement Project ("Project" or "Proposed Project"). Horizon West Transmission, LLC and Pacific Gas and Electric Company (collectively referred to as the "Applicants") have proposed a project that involves construction and operation of a new 230 kilovolt (kV)/70 kV substation, a new 7-mile-long 70 kV power line, and replacement and reconductoring of approximately 3 miles of an existing 70 kV power line. The Proposed Project also would provide for the future establishment of three new distribution feeders from the proposed Estrella Substation, including construction of roughly 1.7 miles of new distribution line and additional reconductoring activities. All of these facilities would be located within the City of Paso Robles or immediately adjacent areas within unincorporated portions of San Luis Obispo County.

I am an environmental biologist with 28 years of professional experience in wildlife biology and natural resources management. I have served as a biological resources expert for over 125 projects in California. My experience and scope of work in this regard has included assisting various clients with evaluations of biological resource issues, reviewing environmental compliance documents prepared pursuant to the California Environmental Quality Act ("CEQA") and the National Environmental Policy Act ("NEPA"), and submitting written comments in response to CEQA and NEPA documents. My work has included the preparation of written and oral testimony for the California Energy Commission, CPUC, and Federal courts. My educational background includes a B.S. in Resource Management from the University of California at Berkeley, and a M.S. in Wildlife and Fisheries Science from the Pennsylvania State University. A copy of my curriculum vitae is attached hereto.

The comments herein are based on my review of the environmental documents prepared for the Project, a review of scientific literature pertaining to biological resources known to occur in the Project area, consultations with other biological resource experts, and the knowledge and experience I have acquired during my 28-year career in the field of natural resources management.

**PROJECT DESCRIPTION**

The DEIR fails to provide a clear description of the vegetation management activities that would be implemented to comply with: (a) CPUC General Order ("G.O.") 95, and (b) PG&E and HWT wildfire mitigation plans (required under CPUC Code, Chapter 6, Section 8386). For example, the Project Description states:

> An approximately 10-foot radius (approximately 314 square feet) may be maintained around new 70 kV power poles depending on location and equipment installed as required by applicable law, including CPUC G.O. 95. Project proponents may, therefore, keep these areas clear of natural vegetation. Vegetation growing too close to conductors within the easement would be trimmed or removed for safety. Herbicides may be used for some vegetation maintenance activities.[1]

This description is too vague to understand the environmental impacts of the Project. The EIR needs to clearly articulate: (1) the vegetation management activities that would be conducted between power poles and the distance those activities would extend from the power lines (conductors); (2) the methods that would be used to remove, trim, or otherwise manipulate vegetation (e.g., masticators, chainsaws, loppers, etc.); (3) the herbicide products that may be used; (4) the frequency (return interval) of vegetation management activities (by vegetation community, if applicable); (5) the vegetation communities that may be manipulated to comply with G.O. 95; (6) whether the 10-foot radius would be limited to vegetation that grows within 10 horizontal feet of any conductor (as indicated on DEIR p. 4.4-53), or whether it also would include vegetation within 10 vertical feet; and (7) why numerous oak trees along the 70 kV route, but not within a 10-foot radius of the power poles, would be trimmed or removed.[2]

PGE's Wildfire Mitigation Plan states:

> In 2018, PG&E began a fuel reduction program, performing ground-to-conductor vegetative fuel reduction work (i.e. under and adjacent to power lines) in select locations. The goal of the fuel reduction work is to create "fire defense zones" which enhance defensible space for communities, properties, and buildings. These "fire defense zones" can also mitigate the spread of an ignition if one were to occur under or adjacent to PG&E powerlines. As such PG&E will continue to conduct fuel reduction work when appropriate, in select locations.[3]

Fuel reduction programs can cause significant environmental impacts that were not analyzed in the DEIR. For example, fuels reduction treatments in coastal scrub communities promote invasion by non-native plants and may cause type conversion (i.e., one vegetation type is converted into another vegetation type), especially if the treatments exceed the historical disturbance regime frequency.[4] Therefore, the CPUC and Applicants need to clarify whether a

[1] DEIR, p. 2-87.
[2] *See* DEIR, Figure 3-7.
[3] PG&E. 2020 Feb 28. 2020 Wildfire Mitigation Plan Report. p. 5-187.
[4] Keeley JE. 2006. Fire management impacts on invasive plants in the Western United States. Conservation Biology 20(2):375-384.

fuel reduction program would (or might) be implemented as part of the Project. If a fuel reduction program might be implemented as part of the Project, the EIR must disclose and analyze the environmental impacts of that program.

## ENVIRONMENTAL SETTING

### Golden Eagle

Project impacts have the potential to be especially severe on golden eagles due to the species': (a) intolerance of anthropogenic forms of disturbance, and (b) susceptibility to collision with, and electrocution from, power lines.[5] As result, robust information on golden eagle nest territories and important eagle-use areas[6] is critical to assessing impacts of the Proposed Project and various Project alternatives. According to the DEIR:

> Multiple active and inactive nests have been identified in the vicinity, including one near the Cava Robles RV Resort and several in the vicinity of the Alternative SE-PLR-2 alignment. Known golden eagle nests are shown in Figure 4.4-5. Expansive grasslands and open oak woodlands within and around the Proposed Project, reasonably foreseeable distribution components, and alternatives areas provide suitable hunting and nesting habitat for this species. Multiple sightings of golden eagles have been recorded within Paso Robles city limits between 1982 and 2015, with the closest observation to the project site being at Cuesta College North Campus just north of SR 46 (eBird 2020b). Horizon biologists also observed golden eagle individuals during March and July 2019 surveys (Horizon 2019a, 2019c).[7]

As described below, additional information is needed to evaluate the sufficiency of the DEIR's description of the environmental setting, and thus, the DEIR's impact assessment and proposed mitigation:

1. It appears the Applicants' biological resource consultant did not conduct protocol-level surveys for eagle nests.[8] Therefore, please identify the methods that were used to obtain information on golden eagle nests in the vicinity of the Proposed Project and Project alternatives.
2. DEIR Figure 4.4-5 does not distinguish between active and inactive nests. Therefore, please clarify whether Figure 4.4-5 depicts all active and inactive nests, or only the active nests.

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[5] U.S. Fish and Wildlife Service, Division of Migratory Bird Management. 2009. Final Environmental Assessment, Proposal to Permit Take as Provided Under the Bald and Golden Eagle Protection Act. Washington: Dept. of Interior. *See also* U.S. Fish and Wildlife Service. 2013 Apr. Eagle Conservation Plan Guidance: Module 1—Land-based Wind Energy, Ver 2. pp. ii and iii.

[6] Important eagle-use area is defined as: "an eagle nest, foraging area, or communal roost site that eagles rely on for breeding, sheltering, or feeding, and the landscape features surrounding such nest, foraging area, or roost site that are essential for the continued viability of the site for breeding, feeding, or sheltering eagles" (as defined at 50 CFR 22.3).

[7] DEIR, Table 4.4-1.

[8] *See* Pagel JE, Whittington DM, Allen GT. 2010 Feb. Interim Golden Eagle inventory and monitoring protocols; and other recommendations. Division of Migratory Birds, United States Fish and Wildlife Service.

3. It can be very difficult to classify the status of an eagle nest. In addition, many inactive nests become active nests in subsequent years. Therefore, please: (a) explain the methods that were used to confirm a nest was inactive, and (b) identify the year(s) each nest was last surveyed to determine its status.
4. California Natural Diversity Database ("CNDDB") staff often have a backlog of occurrence data that have not been entered into the database. This appears to be the case for golden eagle nest records. Therefore, please clarify whether the information provided in the DEIR includes unprocessed data that can be obtained by contacting CNDDB staff and the USFWS.
5. The eBird database has multiple records of golden eagles within the Paso Robles city limits between 2016 and 2020. Therefore, please clarify why the DEIR suggests there have not been sightings of golden eagles within the Paso Robles city limits since 2015.
6. The USFWS recommends surveys for occupied nesting territories within two miles of the area where take may occur.[9] Therefore, please provide information on any protocol-level eagle nest surveys that have been conducted within two miles of the Proposed Project and various Project alternatives.

## PROJECT IMPACTS

### Sensitive Natural Communities

The DEIR provides the following analysis of impacts to sensitive natural communities:

> The proposed Estrella Substation site is currently in agricultural production and there are no riparian habitats or sensitive natural communities within the site. The Proposed Project's 70 kV power line route, by contrast, would span several riparian corridors, including those along Huer Huero Creek and other unnamed ephemeral drainages in the area (see Figure 4.4-1). Additionally, three vegetation communities observed in the vicinity of the Proposed Project power line route (blue oak woodland, Central Coast cottonwood-willow riparian forest, and coastal and valley freshwater marsh) are considered sensitive communities under the City of Paso Robles General Plan (2011). Five vegetation communities (blue oak woodlands, central [Lucian] coastal scrub, Central Coast cottonwood-willow riparian forest, coastal and valley freshwater marsh, and sandy wash) are considered sensitive natural communities by CDFW.
>
> As described in Impact BIO-1, the Proposed Project has been designed to avoid all riparian habitats. APM HYDRO-1 requires that permanent structures, staging and work areas, and access roads be sited/routed through uplands and outside of existing drainage features to the extent feasible. Prior to construction, sensitive aquatic features slated for avoidance would be identified in the field and clearly marked. As a result, riparian areas would be avoided and no direct impacts to riparian areas would occur as a result of Proposed Project construction. Similarly, the Proposed Project has been designed to avoid central coastal scrub, Central Coast cottonwood-willow riparian forest, coastal and valley freshwater marsh, and sandy wash vegetation communities; however, up to 0.13

[9] U.S. Fish and Wildlife Service. 2020. Updated Eagle Nest Survey Protocol. Available at: <https://www.fws.gov/migratorybirds/pdf/management/EagleNestSurveyGuidanceUpdated.pdf>

> acre of direct permanent impacts to blue oak woodlands would occur as a result of pole and tower installation, vegetation removal, and clearing activities. This would include up to three oak trees that would need to be removed for Proposed Project construction. Further, approximately 6.41 acres of blue oak woodlands would be temporarily affected from construction activities. As described in Chapter 2, Project Description, all areas temporarily disturbed by the Proposed Project would be restored to the extent practicable, following construction.[10]

The 70 kV power line would cross a number of drainage features[11] that qualify as "riparian areas."[12] The DEIR points to APM HYDRO-1 to justify the statement that: "riparian areas would be avoided and no direct impacts to riparian areas would occur as a result of Proposed Project construction."[13] However, APM HYDRO-1 only requires that permanent structures, staging and work areas, and access roads be sited outside of existing drainage features *to the extent feasible*. The DEIR does not discuss factors that would make it infeasible to avoid impacts to riparian areas, nor does it explain why it was impractical for the CPUC to conduct the feasibility analysis prior to publication of the DEIR. Because avoidance of riparian areas is contingent on an undefined level of feasibility, it is impossible for the public to understand the likelihood that Project impacts to riparian areas would indeed be avoided. Similarly, because the DEIR does not discuss factors that would make restoration impracticable, it is impossible for the public to understand the likelihood that ecological functions within temporary impact areas would indeed be restored. This issue is compounded by the lack of ecological performance standards for restoration of habitats in temporary impact areas (except those containing blue oak woodland).

Blue Oak Woodland

The DEIR states: "up to 0.13 acre of direct permanent impacts to blue oak woodlands would occur as a result of pole and tower installation, vegetation removal, and clearing activities. This would include up to three oak trees that would need to be removed for Proposed Project construction. Further, approximately 6.41 acres of blue oak woodlands would be temporarily affected from construction activities."[14] The DEIR's statement that permanent impacts to oak trees would be limited to removal of "up to three oak trees" does not appear to be accurate for several reasons. First, it is inconsistent with DEIR Figure 3-7, which depicts numerous locations along the reconductoring segment that would require "oak tree trimming/removal."[15] This suggests the Applicants have yet to determine how many oak trees require removal. Second, it does not appear to account for tree removal activities associated with implementation of G.O. 95. Third, it does not appear to account for tree removal or mortality in the Project's "temporary" impact areas. According to DEIR:

[10] DEIR, p. 4.4-51.
[11] DEIR, p. 4.4-53.
[12] Riparian areas in the Project area are not limited to the Central Coast cottonwood-willow riparian forest vegetation community discussed in the DEIR. *See definition in* National Research Council 2002. Riparian Areas: Functions and Strategies for Management. Washington, DC: The National Academies Press. p. 3.
[13] DEIR, p. 4.4-51.
[14] *Ibid*.
[15] It is unclear if the proposed alignment (and MRV) for the 70-kV route between the Estrella Substation and North River Road would require additional trimming/removal of oak trees because unlike the detailed maps of the Project alternatives, the detailed map of the Proposed Project does not depict locations requiring oak tree trimming/removal.

> Proposed Project construction would require establishment of temporary staging areas, structure work areas, conductor pull and tension sites, and helicopter landing areas. Construction of temporary access roads also would be required. The range of site preparation for these areas would include site leveling and grading, fencing, placement of gravel, vegetation removal, tree trimming/removal and/or vine removal, and placement of temporary rock bedding.[16]

The DEIR fails to analyze how these construction activities would affect oak trees and the long-term viability of the blue oak woodland. Oak trees are extremely sensitive to disturbance activities within the root zone, which is approximately one third greater than the distance between the tree and the outermost edge of the tree's foliage (e.g., if the tree's foliage extends 30 feet, the root zone extends 40 feet).[17] Any construction activities that occur in the root zone have the potential to kill the oak tree.[18] This includes grading, trenching, soil compaction, deposition of gravel or rock, and potentially other construction activities in the "temporary" work areas.[19] In addition, any construction activities that causes changes in soil moisture levels or drainage around an oak can kill the tree.[20] The temporary construction activities described in the DEIR are likely to cause permanent impacts to oak trees and the associated oak woodland community, especially in absence of: (a) mitigation to protect the root zone and existing soil properties, and (b) performance standards for survival of oak trees within temporary impact areas.

To facilitate proper understanding of the Project's impacts, the CPUC needs to: (1) provide maps that depict the oaks and oak woodland habitat that would be permanently impacted by the Project; (2) identify and map the specific Project activities that would temporarily impact 6.41 acres of blue oak woodlands; (3) explain the rationale for classifying the impacts as temporary; (4) clarify the maximum number of oak trees that might be removed as a result of the Project; and (5) clarify the extent of impacts associated with implementation of G.O. 95 (and any other vegetation management activities designed to reduce the wildfire risk).

**Special-Status Wildlife Habitat**

The DEIR states:

> Construction of the proposed Estrella Substation and the 70 kV power line would involve vegetation clearing, excavation, grading, and related ground-disturbing activities. Additionally, access roads would be improved and/or established to allow for access to work areas. Helicopters would be used for a variety of tasks during the construction period and approximately 6 helicopter landing zones would be established and utilized in the Proposed Project area. These activities would have potential to impact special-status species both directly (e.g., crushing from mechanical equipment) and indirectly (e.g., habitat degradation, water quality impacts, etc.).[21]

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[16] DEIR, p. ES-6.
[17] University of California Integrated Hardwood Range Management Program. 2010. Living Among the Oaks: A Management Guide for Landowners. Division of Agriculture and Natural Resources Publication #21538.
[18] *Ibid.*
[19] *Ibid.*
[20] *Ibid.*
[21] DEIR, p. 4.4-40.

The DEIR provides an estimate of the Project's impacts to blue oak woodlands and it states that impacts to other sensitive natural communities would be avoided. However, the DEIR fails to quantify the extent of Project impacts to other habitat types in the Project area (e.g., grassland, agricultural, ruderal). This precludes the ability to understand the severity of the Project's direct and indirect impacts on special-status species associated with those habitat types.

**Crotch's Bumble Bee**

The DEIR provides the following rationale for the CPUC's conclusion that Project impacts to the Crotch's bumble bee would be less than significant:

> Pre-construction surveys required under APM BIO-1 and Mitigation Measure BIO-1 would identify Crotch's bumble bee individuals or nests that could be present within the Proposed Project footprint. Additionally, implementation of APMs BIO-3 and GEN-1 would further reduce potential for any impacts to Crotch's bumble bee during construction. As a State candidate endangered species, the Applicants would be required to notify and coordinate with CDFW regarding any Crotch's bumble bee nests or individuals identified during pre-construction surveys or during the course of construction activities. If necessary, the Applicants may be required to obtain regulatory approval to relocate the nest. Given implementation of these measures, impacts to special-status invertebrates during construction would be less than significant with mitigation.[22]

Crotch's bumble bees typically construct nests underground.[23] The DEIR fails to provide evidence that Crotch's bumble bee nests can be successfully relocated. It also fails to explain how notifying and coordinating with CDFW would reduce impacts to less than significant levels. As a result, potentially significant impacts to the Crotch's bumble bee remain unmitigated.

**Golden Eagle (and other Special-Status Birds)**

The DEIR recognizes the Project poses an electrocution and collision hazard to birds, and that bird injuries and fatalities are a potentially significant impact.[24] The DEIR then states that the impact would be mitigated to a less than significant level because:

1. The conductors would be specular (i.e., shiny) and more visible to birds upon initial installation, allowing them time to adjust to the new facilities.
2. The Applicants would implement the avian protection measures outlined in *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006* (APLIC 2006), which include solutions such as spacing phase conductors (e.g., greater than the width of birds' wingspans) such that electrocution hazards are minimized.
3. Mitigation Measure BIO-3 also would be implemented, which would require that the Applicants incorporate guidance in *Reducing Avian Collisions with Power Lines: State of the Art in 2012* (APLIC 2012) and develop an Avian Protection Plan.

[22] DEIR, p. 4.4-42.
[23] DEIR, Table 4.4-1.
[24] DEIR, pp. 4.4-49 and -50.

4. The Applicants would implement a minor route variation ("MRV") prior to construction to avoid a potential golden eagle nest along Huer Huero Creek at Union Road if this nest is determined to be occupied or is expected to be used by golden eagles in future nesting seasons (based on prior observations and the species' nest site fidelity).[25]

As discussed below, these measures do not ensure avian collisions and electrocutions are mitigated to less than significant levels.

Specular Conductors

The DEIR provides no evidence that specular conductors reduce avian collisions, nor could I find any evidence in the scientific literature. Even if specular conductors reduce avian collisions, their efficacy as a mitigation measure would be short-lived because the conductors become less shiny in the course of a few seasons after installation.[26]

Avian Protection Plan

The DEIR fails to explain how the Avian Protection Plan ("APP") would help mitigate impacts to less than significant levels. Development of an APP in itself does not reduce avian collisions and electrocutions. The only information the DEIR provides regarding the APP is that it would incorporate "relevant project-specific guidelines found in APLIC's and USFWS' 2005 Avian Protection Plan Guidelines." In this case, it is impossible to assess the value of the APP in reducing avian fatalities because the DEIR does not provide a draft of the APP, nor does it identify the specific guidelines that the Applicants and CPUC consider to be "relevant" to the Project.

The DEIR states: "[a]s part of the Avian Protection Plan development, HWT and PG&E shall work with USFWS to determine the need for installation of bird diverters in areas near known golden and bald eagle nests."[27] The DEIR does not discuss the efficacy of bird diverters in reducing eagle collisions with power lines. However, bird diverters do not eliminate power line collisions; a considerable amount of mortality still occurs at lines with bird diverters. Barrientos et al. (2012) conducted the largest worldwide experiment to date on the effectiveness of bird diverters.[28] The researchers reported: "[w]e observed a small (9.6%) but significant decrease in the number of casualties after line marking [with diverters] compared to before line marking in experimental lines. This was not observed in control lines."[29] Thus, bird diverters resulted in a statistically significant reduction in avian mortalities, but the total number of avian mortalities at lines with diverters was still biologically significant.[30] In addition, the researchers noted that bird diverters were ineffective for many species, especially species that have high collision risks.

[25] DEIR, p. 4.4-50.
[26] DEIR, p. 2-54.
[27] DEIR, pp. 4.4-50 and -51.
[28] Barrientos R, Ponce C, Palacin C, Martin CA, Martin B, Alonso JC. 2012. Wire Marking Results in a Small but Significant Reduction in Avian Mortality at Power Lines: A BACI Designed Study. PLoS ONE 7(3):e32569.
[29] *Ibid.*
[30] *Ibid. See also* Savereno AJ, Savereno LA, Boettcher R, Haig SM. 1996. Avian Behavior and Mortality at Power Lines in Coastal South Carolina. Wildlife Society Bulletin 24(4):636-648.

One reason bird diverters may not be effective for golden eagles is that golden eagles are adapted to flying in open airspace clear of hazards. Because golden eagles attack prey from above, their vision during flight is usually directed at the ground where prey are located—not at the airspace ahead of them where foreign hazards (with or without bird diverters) might be located.

Minor Route Variation (MRV)

According to the DEIR: "the Applicants would implement an MRV prior to construction to avoid a potential golden eagle nest along Huer Huero Creek at Union Road if this nest is determined to be occupied or is expected to be used by golden eagles in future nesting seasons (based on prior observations and the species' nest site fidelity)."[31] The criteria that would trigger the MRV are vague. Specifically, the DEIR fails to explain how "prior observations and the species' nest site fidelity" would be evaluated to determine whether the nest "is expected to be used by golden eagles in future nesting seasons," and thus, whether an MRV is needed. Furthermore, if the decision to implement an MRV would be based on "prior observations," there is no need for the CPUC to defer decision on the MRV until after CEQA review of the Project.

Most golden eagle territories have up to six nests, although eggs are laid in only one of the nests during a given year (unless the initial nesting attempt fails).[32] The territorial pair is likely to alternate nest sites among years, and they may add new material to alternative nests they do not use during a given nesting season.[33] Scientific literature indicates alternative nests are biologically significant, and that it is very likely the nest along Huer Huero Creek will be re-used for nesting at some time in the future.[34] Therefore, reducing the potential for significant impacts to golden eagles requires an MRV, regardless of whether eagles occupy the nest prior to Project construction.[35]

The DEIR does not explain how the proposed MRV would reduce impacts on golden eagles. The MRV involves shifting a portion of the 70-kV route slightly north, such that it would be located adjacent to a relatively isolated and dense strip of oak woodland (Figure 1). The trees in the woodland provide perches for golden eagles, and they may contain alternative nests. Whereas the MRV may reduce the potential for construction related impacts (e.g., due to noise and human activity near the nest site), installing the power lines immediately adjacent to the woodland is likely to increase the potential for operations related impacts because it would place power lines in close proximity to an attractive habitat feature, thus increasing the risk of collisions (e.g., as eagles approach or depart perches or nests in the woodland).

[31] DEIR, p. 4.4-50.
[32] Pagel JE, Whittington DM, Allen GT. 2010 Feb. Interim Golden Eagle inventory and monitoring protocols; and other recommendations. Division of Migratory Birds, United States Fish and Wildlife Service.
[33] Millsap BA, Grubb TG, Murphy RK, Swem T, Watson JW. 2015. Conservation significance of alternative nests of golden eagles. Global Ecology and Conservation 3:234-241.
[34] *Ibid*.
[35] *See* DEIR, p. 2-16: "[t]his MRV would only be implemented if a possible golden eagle nest along Huer Huero Creek in this location is confirmed to have eagles present prior to Project construction."


**Figure 1.** Approximate location of proposed MRV (red line) in relation to the proposed route (blue line). Although the MRV would increase the distance between the power line and the golden eagle nest along Huer Huero Creek, it would place the power line in close proximity to perch (and potentially nest) sites in the oak woodland.

APLIC Guidelines

Implementation of the avian protection measures outlined in the APLIC guidelines (2006 and 2012) is a valuable mitigation measure. However, implementation of the APLIC guidelines would not eliminate the potential for avian collisions and electrocutions.[36] This is especially true for the Project's steel structures, because utility structures made of steel are self-grounded and require just one contact with an energized conductor to be lethal.[37]

Electrocution from, and collision with, power lines is one of the leading causes of golden eagle mortality.[38] The golden eagle population is extremely sensitive to additive mortality because: (a) golden eagles occur at very low densities, (b) a relatively high percentage of juveniles do not survive to breeding age (typically the 4th or 5th year of life), and (c) the population is already

[36] Lehman RN, Savage JA, Kennedy PL. Harness RE. 2010. Raptor Electrocution Rates for a Utility in the Intermountain Western United States. Journal of Wildlife Management 74(3):459-470. *See also* APLIC 2006 and APLIC 2012.

[37] *Ibid. See also* Avian Power Line Interaction Committee (APLIC). 2006. Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006. Edison Electric Institute and APLIC. Washington, D.C. pp. 81 and 82.

[38] U.S. Fish and Wildlife Service, Division of Migratory Bird Management. 2009. Final Environmental Assessment, Proposal to Permit Take as Provided Under the Bald and Golden Eagle Protection Act. Washington: Dept. of Interior. *See also* Avian Power Line Interaction Committee (APLIC). 2018. Eagle Risk Framework: A Practical Approach for Power Lines. Edison Electric Institute and APLIC. Washington, DC. p. 4.

declining.[39] For these reasons, the USFWS has determined that the golden eagle population cannot withstand *any* additional level of take.[40] Consequently, death (or injury) of even one golden eagle due to the Project would constitute a significant impact under CEQA. In addition, any Project-related take of a golden eagle would violate the Bald and Golden Eagle Protection Act if the Applicants do not first obtain an eagle take permit from the U.S. Fish and Wildlife Service. The DEIR does not require the Applicants to obtain an eagle take permit, nor does it suggest the Applicants intend to apply for one.

The DEIR fails to disclose or analyze how many eagles the Project might kill (or injure) even after implementation of the MRV, APLIC guidelines, and other mitigation measures proposed in the DEIR. In addition, the DEIR does not require fatality monitoring, nor does it require remedial actions (e.g., compensatory mitigation) if eagle fatalities are incidentally discovered. For these reasons, Project impacts on the golden eagle remain potentially significant.

The DEIR indicates undergrounding the Project's power lines would reduce impacts to special-status birds by reducing the potential for avian collision and electrocutions.[41] In addition, the DEIR indicates undergrounding would substantially reduce the wildfire risk and associated ecological consequences.[42] Nevertheless, the DEIR's analysis of undergrounding is limited to Alternative PLR-3, which would involve undergrounding a relatively short segment of the power line route in the Golden Hill Road area north of SR 46. The DEIR provides the following rationale for Alternative PLR-3:

> Alternative PLR-3: Strategic Undergrounding would involve undergrounding the portion of the Proposed Project's new 70 kV power line which has the greatest potential for aesthetic and other environmental impacts. During scoping for the Proposed Project, and based on CPUC staff and consultant's preliminary analysis of the Proposed Project's potential impacts, it was determined that the portion of the line that passes through the Golden Hill Road area north of SR 46 had the greatest potential for impacts because this area does not have existing aboveground transmission or distribution electrical infrastructure and is an up-and-coming area with new commercial development, recreational uses, and existing single-family residential development.[43]

The benefits of Alternative PLR-3 in reducing the risks of wildfire and avian impacts would be relatively limited because the majority of the Proposed Project's 70-kV route would be above ground, including in areas that currently do not have existing aboveground transmission or distribution electrical infrastructure. The DEIR provides no evidence that the risks of wildfire and avian impacts are greater in the Golden Hill Road area north of SR 46 relative to other portions of the Proposed Project's 70-kV route. Therefore, if the objective of undergrounding is to reduce "aesthetic and other environmental impacts," the CPUC needs to analyze a Project alternative that involves undergrounding the 70-kV power line along its entire route.

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[39] *Ibid.*
[40] U.S. Fish and Wildlife Service. 2016. Bald and Golden Eagles: Population demographics and estimation of sustainable take in the United States, 2016 update. Division of Migratory Bird Management, Washington D.C., USA.
[41] DEIR, Table 5-1.
[42] DEIR, p. 4.20-18.
[43] DEIR, p. 3-74.

**Amphibians**

The DEIR provides the following analysis of Project impacts to the California red-legged frog ("CRLF") and western spadefoot toad:

> As discussed above, the Proposed Project has been designed to avoid sensitive aquatic features, which would include any features that would provide suitable aquatic breeding and aquatic non-breeding habitat for these species. Nevertheless, there would be potential for direct significant impacts to CRLF and western spadefoot toad if individuals were present in upland areas where Proposed Project construction activities would occur….Implementation of APM BIO-1 and Mitigation Measure BIO-1 would reduce potential for undetected western spadefoot toad or CRLF individuals in Proposed Project areas to be directly impacted at the start of construction. Likewise, monitoring of initial ground-disturbing activities under APM BIO-3 and Mitigation Measure BIO-1 (through pre-construction surveys, biological monitoring, the monitor's stop-work authority, and exclusion fencing) would ensure that CRLF and western spadefoot toad individuals are not present during these activities, such that they could be directly impacted. Implementation of the WEAP under APM GEN-1 also would minimize potential for adverse direct impacts to special-status amphibians. Further, APM BIO-4 and Mitigation Measure BIO-1 would require that all trenches and excavations in excess of 2 feet deep have a sloped escape ramp or be covered at the end of the day, which would minimize potential for CRLF or western spadefoot toad individuals to become entrapped in Proposed Project construction areas.[44]

Western spadefoot toads spend the majority of the year below ground and are only detectable during a few weeks (or months) of the year.[45] CRLF that disperse from aquatic habitat seek shelter under objects (e.g., rocks, logs) or in small mammal burrows.[46] Terrestrial movements of both species generally occur at night.[47] As a result, detection of western spadefoot and CRLF requires special survey techniques. APM BIO-1 and Mitigation Measure BIO-1 do not require those survey techniques.[48]

The biological monitoring required under APM BIO-3 assumes CRLF and western spadefoot would be visible to the biological monitor. This is not a valid assumption because terrestrial (aboveground) movements of CRLF and western spadefoot occur at night, whereas construction would occur during the day. The DEIR references exclusion fencing as one of the measures that would ensure CRLF and western spadefoot toad individuals are not present during construction activities. However, neither APM BIO-3 nor Mitigation Measure BIO-1 requires installation of an exclusion fence around construction work areas. For these reasons, there is no basis for the

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[44] DEIR, p. 4.4-43.
[45] U.S. Fish and Wildlife Service. 2005. Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon. U.S. Fish and Wildlife Service, Portland, Oregon. pp. II-220 through -235.
[46] U.S. Fish and Wildlife Service. 2002. Recovery Plan for the California Red-legged Frog (*Rana aurora draytonii*). U.S. Fish and Wildlife Service, Portland, Oregon. p. 14.
[47] U.S. Fish and Wildlife Service. 2005. Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon. U.S. Fish and Wildlife Service, Portland, Oregon. pp. II-220 through -235. *See also* Fellers GM, Kleeman PM. 2006. Diurnal versus Nocturnal Surveys for California Red-Legged Frogs. Journal of Wildlife Management 70(6):1805-1808.
[48] The USFWS has issued a survey protocol for the CRLF. *See* U.S. Fish and Wildlife Service. 2005 Aug. Revised Guidance on Site Assessments and Field Surveys for the California Red-legged Frog. 26 pp.

DEIR's claim that APM BIO-3 and Mitigation Measure BIO-1 "would ensure that CRLF and western spadefoot toad individuals are not present during these activities, such that they could be directly impacted."

The CRLF and western spadefoot are small animals. Therefore, the threat that trenches pose to these species (and other amphibians) is not limited to trenches in excess of 2 feet deep. Although the measures required under APM BIO-4 and Mitigation Measure BIO-1 would reduce mortality associated with trenches, mortality may still occur, especially if mitigation is limited to escape ramps (i.e., trenches are not covered) as allowed under APM BIO-4 and Mitigation Measure BIO-1.[49] Whereas inspecting the trenches at the beginning of the workday would be effective for CRLF, it would not be effective for western spadefoots, which burrow under soil during the day.[50]

**Invasive Plants**

Invasive plants threaten native diversity, alter ecosystem processes,[51] and can cause extinction of native species.[52] Indeed, next to habitat loss, invasive species pose the greatest threat to the nation's biodiversity and natural resources.[53] Three things are required for an invasive plant to become established in an area:

1. A vector for transporting the plant or its propagules from one place to another. Some vectors are natural (e.g., wind, water, and wildlife); however, most are related to human activities. Tools, equipment, vehicles, livestock, clothing, and boots are potential vectors for the spread of invasive plants.
2. Suitable conditions for invasive plant colonization. Soil and vegetation disturbance create suitable conditions for the establishment of invasive plants.
3. A suitable environment for the invasive plant to survive, reproduce, and spread. Many invasive species possess a competitive advantage over native species in an area. As a result, invasive species can reproduce and spread exponentially, especially if the ecosystem lacks a mechanism for keeping them in check.[54]

The Project has the potential to facilitate the colonization and spread of invasive plants because construction and operation activities: (a) provide vectors for transporting invasive plant

[49] Doody JS, West P, Stapley J, et al. 2003. Fauna by-catch in pipeline trenches: conservation, animal ethics, and current practices in Australia. Australian Zoologist 32(3):410-419.
[50] U.S. Fish and Wildlife Service. 2005. Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon. U.S. Fish and Wildlife Service, Portland, Oregon. pp. II-220 through -235.
[51] Vitousek P. 1990. Biological invasions and ecosystem processes: towards an integration of population biology and ecosystem studies. Oikos 57:7–13. *See also* Theoharides KA, Dukes JS. 2007. Plant invasion across space and time: factors affecting nonindigenous species success during four stages of invasion. New Phytologist 176:256-273.
[52] Gurevitch J, Padilla DK. 2004. Are invasive species a major cause of extinctions? Trends in Ecology and Evolution 19(9):470-474.
[53] U.S. Department of the Interior, Office of Congressional and Legislative Affairs. 2013. Invasive Species Management. Statement for the Record: U.S. Department of the Interior Before the House Natural Resources Subcommittee on Public Lands and Environmental Regulation's oversight hearing on "Invasive Species Management on Federal Lands."
[54] California Department of Food and Agriculture, California Invasive Weed Awareness Coalition. 2005. California Noxious & Invasive Weed Action Plan. California Dept. of Food and Agriculture, Sacramento, CA.

propagules, (b) involve soil and vegetation disturbance, and (c) would be conducted in an environment susceptible to invasion.[55] The DEIR does not disclose this issue, nor does it provide any analysis of potentially significant impacts that could occur as the result of Project activities that facilitate the colonization or spread of invasive plants.

**Cumulative Impacts**

According to the DEIR:

1. The Project would result in significant impacts on a suite of sensitive biological resources.[56]
2. Impacts from the Proposed Project (and all alternatives), in combination with impacts from other projects, would result in a significant cumulative impact on biological resources.[57]
3. There is potential for the Project to have a cumulatively considerable incremental contribution to the significant cumulative impact.[58]

Despite these determinations, the DEIR concludes: "the Proposed Project, reasonably foreseeable distribution components, and alternatives would not make a cumulatively considerable contribution to this significant cumulative impact. The contribution of the Proposed Project, reasonably foreseeable distribution components, and alternatives cumulative impact would be less than significant with mitigation."[59] The CPUC's rationale for this conclusion is that: (a) the Project's significant impacts would be reduced to a less-than-significant level with implementation of the APMs and mitigation measures identified in Section 4.4 of the DEIR; and (b) these measures would ensure that impacts on protected species, communities, and habitats are reduced to a level that would protect their continued existence.[60] The CPUC's rationale is flawed because the APMs and mitigation measures are designed to reduce significant impacts, not eliminate the impacts entirely. Thus, there would be residual impacts. For example, because the DEIR's compensatory habitat requirement is limited to impacts to blue oak woodland, there would be residual impacts to special-status species associated with grasslands and agricultural lands.[61] Similarly, there could be residual impacts on the golden eagle and other special-status birds because the DEIR does not require compensatory mitigation for fatalities caused by electrocutions and collisions with the new power line facilities. Whereas these residual impacts may not rise to the level of significance at the Project level, they may be significant at the cumulative level when combined with the residual impacts of other projects. For example, the DEIR notes that the impact on avian fatalities would not be limited to the Project, but rather, that the Project would incrementally increase a fatality risk that already exists in the area.[62] The

[55] The cumulative impacts section of the DEIR (pp. 6-6 and -7) identifies "introduction of nonnative plant and animal species" as one of the past and present actions that has most strongly influenced existing conditions in the Project area.
[56] DEIR, p. 6-22.
[57] *Ibid*.
[58] DEIR, Table 6-3.
[59] DEIR, p. 6-22.
[60] *Ibid*.
[61] *See* DEIR, Table 4.4-1.
[62] DEIR, p. 4.4-50.

Project's contribution to this potentially significant cumulative impact is cumulatively considerable because it would place seven miles of new power lines in an area that supports foraging raptors, and that has multiple golden eagle nests.[63]

According to CEQA Guidelines § 15130(a)(3):

> An EIR may determine that a project's contribution to a significant cumulative impact will be rendered less than cumulatively considerable and thus is not significant. A project's contribution is less than cumulatively considerable if the project is required to implement or fund its fair share of a mitigation measure or measures designed to alleviate the cumulative impact. The lead agency shall identify facts and analysis supporting its conclusion that the contribution will be rendered less than cumulatively considerable.

In this case, none of the DEIR's biological resource mitigation measures are designed to alleviate the cumulative impact; they are all specific to the Proposed Project and Project alternatives. Therefore, they do not address potentially significant cumulative impacts, and the CPUC has no basis for its conclusion that the Project's contribution to those cumulative impacts would be less than cumulatively considerable.

**MITIGATION ISSUES**

**APM BIO-1 and MM BIO-1 (Special-Status Animal Species)**

The mitigation strategy proposed in Mitigation Measure ("MM") BIO-1 and APM BIO-1 consists of: (a) pre-construction surveys prior to initial vegetation clearance, grubbing, and ground-disturbing activities; (b) a pre-construction survey report that is submitted to the CPUC for review and approval; and (c) delineation of habitat that must be avoided. These measures do not mitigate potentially significant impacts to special-status animals for the following reasons:

First, the DEIR fails to establish standards for the pre-construction survey methods to ensure they are adequate for detection of special-status animals. Many of the special-status species that have the potential to occur in the Project area require special survey techniques (e.g., live-trapping for Salinas pocket mouse, raking the substrate for legless lizards, aerial surveys for eagle nests). In addition, some species are generally only detected at night (e.g., bats, western spadefoot), or require multiple, protocol-level surveys to acquire reliable information on their presence.[64] MM BIO-1 fails to require the survey methods necessary for detection of special-status animal species; the only standards it establishes are that the surveys be conducted by an approved biologist no earlier than 30 days prior to surface disturbance. This issue is exacerbated by the DEIR's failure to establish standards for the survey area. For example, although the DEIR states that the standard buffer distance for golden eagle nests is 2,640 feet, MM BIO-1 does not require pre-construction surveys that extend 2,640 feet from Project work areas.

[63] DEIR, Table 4.4-1.

[64] The USFWS and CDFW have issued survey protocols for the following species that may occur in the Project area: vernal pool fairy shrimp, California red-legged frog, golden eagle, burrowing owl, Swainson's hawk, and San Joaquin kit fox. Scientific organizations have issued survey protocols for legless lizards, bats, American badger, tricolored blackbird, and other bird species.

Second, some of the special-status species that have the potential to occur in the Project area are only detectable during certain times of year (e.g., Crotch's bumble bee, western spadefoot, Swainson's hawk). Surveys that are limited to "no earlier than 30 days prior to surface disturbance" fail to account for these species and could cause false-negative survey results, which in turn could result in significant impacts. For example, western spadefoots are only detectable at night shortly after rains in the winter and spring; at all other times they are completely surrounded by soil in underground burrows (which are undetectable to humans).[65] As a result, pre-construction surveys in August (for example) would fail to reveal any evidence of the species, when in fact there might be hundreds of spadefoots buried in the soil. Because spadefoots burrow in sandy or gravelly soils, they would be susceptible to being crushed or entombed by soil compaction caused by Project vehicles or machinery.[66]

Third, the DEIR fails to ensure adequate mitigation for special-status that are detected during the pre-construction survey. According to the DEIR, buffers would installed around bird nests. However, mitigation for all other terrestrial wildlife species has be deferred to the pre-construction survey report, which would identify the "anticipated impacts and proposed mitigation."[67] This approach does not comply with CEQA, which prohibits deferral of: (a) the impact assessment; and (b) the mitigation (unless the lead agency establishes specific performance criteria for the mitigation and explains why it was impractical for the lead agency to identify the mitigation in the EIR).

MM BIO-1 states: "[s]ensitive habitat areas, plus a minimum 5-foot buffer for wetlands and waters of the U.S., that will be avoided by construction shall be fenced with orange safety fencing."[68] There are two problems with this measure. First, the DEIR identifies wetlands and blue oak woodlands as sensitive habitats.[69] However, it fails to identify the criteria that would be used to define "sensitive habitat areas." Many of the special-status species that have the potential to occur in the Project area are associated with grasslands or special habitat elements (e.g., burrows). As a result, sensitive habitat areas are not equivalent to sensitive natural communities.

Second, a 5-foot buffer around wetlands waters of the U.S. would not be sufficient to avoid impacts to species associated with wetlands and other aquatic habitat types. Special-status species associated with wetlands (and other aquatic habitat types) in the Project area include the California red-legged frog, western spadefoot, western pond turtle, tricolored blackbird, and yellow warbler. These species use terrestrial habitats that extend well beyond the 5-foot buffer proposed in MM BIO-1. For example, western pond turtles use terrestrial habitat for nesting, resting, refuge, and overland dispersal.[70] Rathbun et al. (2002) examined the distances pond turtles moved away from aquatic habitat for refuge, nesting, and resting. Mean maximum travel

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[65] U.S. Fish and Wildlife Service. 2005. Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon. U.S. Fish and Wildlife Service, Portland, Oregon. pp. II-220 through -235.
[66] *Ibid.*
[67] DEIR, p. 4.4-47.
[68] *Ibid.*
[69] *Ibid.*
[70] Rathbun GB, Scott NJ Jr, Murphey TG. 2002. Terrestrial Habitat Use by Pacific Pond Turtles in a Mediterranean Climate. Southwestern Naturalist 47(2): 225-235. *See also* Jennings MR, Hayes MP. 1994. Amphibian and Reptile Species of Special Concern in California. Final Report to the California Department of Fish and Game.

distances were 49.7 meters, 93.7 meters, and 12.0 meters, respectively.[71] However, western pond turtles have been reported ranging as far as 500 meters (1,640 feet) from a watercourse to find suitable nesting habitat.[72] Nests are typically located in open, grassy areas,[73] such as those that occur in the Project area.

Mitigation for Impacts to Habitat

The DEIR requires compensatory mitigation for the Project's permanent impacts on blue oak woodland. However, it does not require compensatory mitigation for the Project's permanent impacts on other habitat types that support special-status species.

The DEIR states:

> All areas temporarily disturbed by the Project would be restored to the extent practicable, following construction. These disturbed areas include staging areas and access roads, work areas around each tower/pole, and the areas used for conductor stringing and staging. Postconstruction restoration activities would include returning areas to their original contours and drainage patterns in accordance with stormwater pollution prevention plan best management practices and as prearranged through landowner agreements, where applicable.[74]

The DEIR fails to incorporate restoration of temporarily disturbed areas as an enforceable mitigation measure. Furthermore, the DEIR fails to establish performance standards or monitoring requirements for the restoration efforts. For these reasons, the Project's impacts on habitat for special-status animals remain potentially significant.

**APM BIO-4 (Special-Status Species Protection)**

Open pipes pose a mortality hazard to wildlife. Birds, small mammals, and reptiles enter the pipes to nest or find shelter, but the smooth interior and tight confines of the pipes prevent individuals from escaping, leading to death. The DEIR identifies open pipes (or conduit) as a potentially significant mortality hazard to birds.[75] APM BIO-4 is designed to mitigate the potentially significant impact. APM BIO-4 states: "open-ended project-related pipes 4 inches or greater in diameter will be capped if left overnight or inspected for wildlife prior to being moved." The mortality hazard associated with open pipes is not limited to pipes 4 inches or

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[71] *Ibid.*

[72] Reese DA, Welsh HH Jr. 1997. Use of Terrestrial Habitat by Western Pond Turtles, Clemmys marmorata: Implications for Management. Pp. 352-357. In J. Van Abbema (ed.), Conservation, Restoration, and Management of Tortoises and Turtles, An International Conference WCS Turtle Recovery Program and the New York Turtle and Tortoise Society, New York.

[73] Holland DC. 1994. The Western Pond Turtle: Habitat and History. Final Report. Portland, OR: U.S. Department of Energy, Bonneville Power Administration. *See also* Ernst CH, Lovich JE. 2009. Turtles of the United States and Canada. Second edition. Johns Hopkins University Press. 827 pp.

[74] DEIR, p. 2-86.

[75] DEIR, p. 4.4-44.

greater in diameter.[76] As a result, APM BIO-4 does not ensure avoidance of potentially significant levels of mortality associated with open pipes.

**MM BIO-2 (Special-Status Plants)**

MM BIO-2 states:

> If avoidance of special-status plants is not feasible, HWT and PG&E shall implement measures to compensate for impacts to special-status plants. Compensation may be provided by purchasing credits at a CDFW-approved mitigation bank (provided at a minimum 1:1 ratio [mitigation to impact]), or through transplanting perennial species and collecting and dispersing seed of annual species (i.e., salvage and relocation) under the direction of CDFW. Where salvage and relocation is demonstrated to be feasible and biologically preferred by the CDFW, it shall be conducted pursuant to a CPUC- and CDFW-approved salvage and relocation plan that details the methods for salvage, stockpiling, and replanting, as well as the characteristics of the receiver sites.

There do not appear to be any CDFW-approved mitigation banks in San Luis Obispo County (or surrounding counties) that sell credits for special-status plants.[77] Therefore, compensation for impacts to special-status plants would require the "salvage and relocation" option. MM BIO-2 does not provide any information on potential mitigation (receiver) sites, nor does it establish criteria for their selection (e.g., geographic location, history of land use, management scheme). This is important because relocating plants to a non-local ecotype may cause significant ecological impacts (e.g., genetic contamination) at the receptor site.[78] Even if plants are relocated to a local ecotype, their long-term viability will depend on the specific characteristics (e.g., soils, topography, adjacent land uses) of the receptor site. In addition to failing to establish selection criteria for the mitigation site, the DEIR fails to establish: (a) a mechanism (e.g., conservation easement) that would ensure the mitigation site is protected in perpetuity after the 5-year monitoring period terminates, (b) a funding mechanism (e.g., endowment), and (c) a management mechanism (e.g., management plan and authority) that ensures the mitigation site is appropriately managed in perpetuity to maintain viability of the special-status plants.

It is unclear whether the 1:1 mitigation ratio proposed in MM BIO-2 would be based on acreage impacted or number of plants impacted. While the DEIR's initial reference to the 1:1 ratio suggests it would be based on acreage, the DEIR's proposed success criteria suggest it would be based on the number of plants.

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[76] Harris M, Clucas B, Stanek J, Whitfield M. 2019. Wildlife Mortalities in Open-Topped Pipes in Central California. Western Wildlife 6:50–60. *See also* American Bird Conservancy. 2014. More Evidence That Open Pipes Kill Birds in the West. Bluebird 37(1):12.

[77] California Department of Fish and Wildlife. 2021. Conservation and Mitigation Banks Established in California by CDFW [webpage]. Available at: <https://wildlife.ca.gov/conservation/planning/banking/approved-banks#r4>. (Accessed 2021 Jan 17).

[78] Longcore T, Mattoni R, Pratt G, Rich C. 2000. On the perils of ecological restoration: Lessons from the El Segundo blue butterfly. Pages 281-286 *in* Keeley JE, Baer-Keeley M, Fotheringham CJ, editors. 2nd Interface Between Ecology and Land Development in California. U.S. Geological Survey Open-file Report 00-62. U.S. Geological Survey, Sacramento, CA.

The DEIR proposes two success criteria, the first of which is: "[a] surveyed plant population size count roughly equal to or greater than the number of individuals transplanted (this total may include both transplanted individuals that have survived, as well as any additional supplemental plantings following the initial transplantation that have survived at least two growing seasons)." This success criterion is inappropriate because it does not address annual plants (which would entail dispersal of seed), and the criterion for perennial plants is contingent on the number of individuals transplanted, for which there is no standard (i.e., would all perennial plants within impact areas be transplanted?). Although the success criterion suggests supplemental plantings may be required, the DEIR does not identify where the supplemental plantings (or seeds of annual species) would come from. As stated above, the introduction of non-local genes into an area can have negative impacts on the ecological community at the receptor site.[79]

The second success criterion is: "[l]ess than 5 percent cover of invasive weeds within the restoration area." This criterion is confusing because restoration involves returning an ecosystem to a close approximation of its condition prior to disturbance.[80] However, MM BIO-2 entails translocation or relocation of plants, not restoration. Therefore, it is unclear whether MM BIO-2 applies to off-site mitigation for the Project's permanent impacts, on-site mitigation for the Project's temporary impacts, or both. Nevertheless, the adequacy of the proposed success criterion cannot be evaluated without corresponding information on invasive plant cover prior to the restoration efforts. For example, the success criterion would be appropriate if invasive plants currently cover 50 percent of the mitigation site; however, it would be inappropriate if invasive plants are currently absent from the mitigation site.[81]

**MM BIO-4 (Blue Oak Woodland)**

The DEIR concludes that Mitigation Measure BIO-4 would reduce Project impacts on blue oak woodland to less than significant levels because: (a) the Applicants would develop and implement a Habitat Restoration Plan, which would include replacement of permanently impacted blue oak woodland at a ratio of 1.1:1; and (b) oak trees that are removed would be replaced in accordance with provisions of the City of Paso Robles' Oak Tree Ordinance.

The 1.1:1 mitigation ratio proposed in the DEIR would not mitigate the Project's significant impacts on blue oak woodland because it does not account for: (a) uncertainty in the ability to fully replace habitat functions that are impacted, (b) temporal loss (i.e., the lag time between habitat functions lost at the impact site and habitat functions gained at the mitigation site),[82] and

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[79] *Ibid. See also* California Native Plant Society. 2001. CNPS Guidelines for Landscaping to Protect Native Vegetation from Genetic Degradation. Available at: <https://www.cnps.org/wpcontent/uploads/2018/04/landscaping.pdf>. (Accessed 2021 Jan 17).

[80] *See* Longcore T, Mattoni R, Pratt G, Rich C. 2000. On the perils of ecological restoration: Lessons from the El Segundo blue butterfly. Pages 281-286 *in* Keeley JE, Baer-Keeley M, Fotheringham CJ, editors. 2nd Interface Between Ecology and Land Development in California. U.S. Geological Survey Open-file Report 00-62. U.S. Geological Survey, Sacramento, CA.

[81] Only some nonnative plants are invasive. Lists of invasive plants in California are maintained by the California Invasive Plant Council (https://www.cal-ipc.org/plants/inventory/) and the California Department of Food and Agriculture (https://www.cdfa.ca.gov/plant/IPC/encycloweedia/weedinfo/winfo_table-sciname.html).

[82] Moilanen A, van Teeffelen AJA, Ben-Haim Y, Ferrier S. 2009. How Much Compensation is Enough? A Framework for Incorporating Uncertainty and Time Discounting When Calculating Offset Ratios for Impacted Habitat. Restoration Ecology 17(4):470-478.

(c) indirect impacts. In this case, there is considerable uncertainty in whether the habitat compensation required under MM BIO-4 would adequately replace the habitat impacted at the Project site because the only standard the DEIR establishes for the mitigation site is that 65 percent of the oak plantings survive for 5 years. In addition, the duration of temporal loss would be considerable, and the Project's indirect impacts are likely to result in as least some level of oak mortality (e.g., due to root damage caused by construction activities or pathogens caused by tree trimming). Moreover, it is unclear if MM BIO-4 requires 1.1 acres of blue oak woodland creation (or restoration) for each acre of blue oak woodland permanently impacted by the Project, or merely planting of blue oaks across 1.1 acres of existing blue oak woodland (for each acre permanently impacted by the Project).

MM BIO-4 states: "[b]lue oak woodland restoration or compensation may be completed at the work area, in the vicinity, or at a conservation bank with a service area that covers the Proposed Project or selected alternative." There do not appear to be any conservation banks that sell credits for impacts to blue oak woodland.[83] Thus, the mitigation would occur "at the work area [or] in the vicinity." The DEIR fails to establish mechanisms that would ensure a mitigation site "at the work area [or] in the vicinity" would be protected and managed in perpetuity to maintain the blue oak woodland compensation habitat.

Compliance with the City's Oak Tree Ordinance does not mitigate the impact to oak trees because it only applies to trees that have a diameter at breast height ("DBH") of 6 inches or greater, and it only requires replacement at a ratio of 25 percent of the diameter of trees that are removed. In addition, MM BIO-4 only requires 65 percent of the replacement trees to survive beyond 5 years. Thus, MM BIO-4 does not require replacement of small oaks (< 6 inches DBH), but it allows the Applicants to replace large oaks with small ones.[84] This would not mitigate the impacts because small oaks do not provide the same ecological values as large ones, and even if the replacement trees survive to maturity (most do not), it would take decades for them replace the ecological values associated with the trees that are removed.

Blue oak woodlands are comprised of slow growing, long-lived trees.[85] Even at the best sites, it takes blue oaks at least 50 years to reach maturity.[86] Large, mature oak trees are especially important to wildlife because they provide key structural elements and characteristics (e.g., cavities, caching sites, and suitable substrates for raptor nests, among other habitat values) that are unavailable in smaller trees.[87] Verner and Boss (1980) provided data on wildlife use in blue oak savannahs of the western Sierra Nevada. They found that 29 species of amphibians and reptiles, 57 species of birds, and 10 species of mammals find mature stages of blue oak suitable

[83] California Department of Fish and Wildlife. 2021. Conservation and Mitigation Banks Established in California by CDFW [webpage]. Available at: <https://wildlife.ca.gov/conservation/planning/banking/approved-banks#r4>. (Accessed 2021 Jan 17).
[84] Under the City's Oak Tree Ordinance, replacement trees may be as small as 1.5-inch (trunk caliper) in size.
[85] California Wildlife Habitat Relationships System. 2005 [update]. Wildlife Habitats: Blue Oak Woodland. California Department of Fish and Game. California Interagency Wildlife Task Group. Available at: <https://www.wildlife.ca.gov/Data/CWHR/Wildlife-Habitats>.
[86] *Ibid*.
[87] CalPIF (California Partners in Flight). 2002. Version 2.0. The oak woodland bird conservation plan: a strategy for protecting and managing oak woodland habitats and associated birds in California (S. Zack, lead author). Point Reyes Bird Observatory, Stinson Beach, CA.

or optimum for breeding, assuming that other special habitat requirements are met.[88] Most blue oak woodlands are not regenerating naturally, which means most of the mature trees will not be replaced when they die. This heightens the significance of each mature oak tree that is removed by the Project.

The success criterion proposed in MM BIO-4 (i.e., "a minimum of 65 percent survival of woody plantings after 5 years") provides no assurances that the replacement trees are likely to survive, or that they will ever provide structural elements and characteristics comparable to the trees that are removed. Blue oak seedlings are especially vulnerable to mortality factors when they are young and small. Phillips et al. (2007) reported that blue oak seedlings died at an average age of 6.4 years.[89] Once seedlings had grown for approximately a decade and become established, the chances were good that they would remain alive. However, many grew extremely slowly or even diminished in height. Indeed, Phillips et al. (1996) concluded that blue oak seedlings that were only 6.5 inches tall could well have been older than 26 years.[90] Based on these studies, the CPUC should not assume blue oak plantings have a reasonable likelihood of replacing impacted trees until the plantings: (a) are at least 10 years old, (b) have reached the sapling stage, and (c) are protected from herbivory by cattle and deer.

**Invasive Plants**

The California Invasive Plant Council has published guidelines for preventing the spread of invasive plants.[91] The best management practices ("BMPs") described therein are feasible and should be incorporated as required mitigation measures. The DEIR does not incorporate any mitigation measures for invasive plants, nor does it establish performance standards for invasive plants in the "restoration" areas (unless those areas are being used for special-status plant mitigation). As a result, potentially significant impacts associated with the colonization or spread of invasive plants remains unmitigated.

[88] *See* California Wildlife Habitat Relationships System. 2005 [update]. Wildlife Habitats: Blue Oak Woodland. California Department of Fish and Game. California Interagency Wildlife Task Group. Available at: <https://www.wildlife.ca.gov/Data/CWHR/Wildlife-Habitats>.
[89] Phillips RL, McDougald NK, McCreary D, Atwill ER. 2007. Blue oak seedling age influences growth and mortality. California Agriculture 61(1):11-15.
[90] Phillips RL, McDougald NK, Standiford RB, Frost WE. 1996. Blue oak seedlings may be older than they look. California Agriculture 50(3):17-19.
[91] Cal-IPC. 2012. Preventing the Spread of Invasive Plants: Best Management Practices for Land Managers (3rd ed.). Cal-IPC Publication 2012-03. California Invasive Plant Council, Berkeley, CA.

**CONCLUSION**

Substantial evidence demonstrates that the Project could have significant, unmitigated impacts on sensitive biological resources. The DEIR that was prepared for the Project does not adequately disclose and analyze those impacts, nor does it provide the mitigation necessary to ensure significant impacts are reduced to less than significant levels.

Sincerely,

Scott Cashen, M.S.
Senior Biologist

# Scott Cashen, M.S.
**Senior Wildlife Biologist**

Scott Cashen has 28 years of professional experience in natural resources management. During that time he has worked as a field biologist, forester, environmental consultant, and instructor of Wildlife Management. Mr. Cashen focuses on CEQA/NEPA compliance issues, endangered species, scientific field studies, and other topics that require a high level of scientific expertise.

Mr. Cashen has knowledge and experience with numerous taxa, ecoregions, biological resource issues, and environmental regulations. As a biological resources expert, Mr. Cashen is knowledgeable of the various agency-promulgated guidelines for field surveys, impact assessments, and mitigation. Mr. Cashen has led field investigations on several special-status species, including ones focusing on the yellow-legged frog, red-legged frog, desert tortoise, steelhead, burrowing owl, California spotted owl, northern goshawk, willow flycatcher, Peninsular bighorn sheep, red panda, and various forest carnivores.

Mr. Cashen is a recognized expert on the environmental impacts of renewable energy development. He has been involved in the environmental review process of over 100 solar, wind, biomass, and geothermal energy projects. Mr. Cashen's role in this capacity has encompassed all stages of the environmental review process, from initial document review through litigation support. Mr. Cashen provided expert witness testimony on several of the Department of the Interior's "fast-tracked" renewable energy projects. His testimony on those projects helped lead agencies develop project alternatives and mitigation measures to reduce environmental impacts associated with the projects.

Mr. Cashen was a member of the independent scientific review panel for the Quincy Library Group project, the largest community forestry project in the United States. As a member of the panel, Mr. Cashen was responsible for advising the U.S. Forest Service on its scientific monitoring program, and for preparing a final report to Congress describing the effectiveness of the Herger-Feinstein Forest Recovery Act of 1998.

## AREAS OF EXPERTISE

- CEQA, NEPA, and Endangered Species Act compliance issues
- Comprehensive biological resource assessments
- Endangered species management
- Renewable energy development
- Scientific field studies, grant writing and technical editing

## EDUCATION

M.S. Wildlife and Fisheries Science - The Pennsylvania State University (1998)
Thesis: *Avian Use of Restored Wetlands in Pennsylvania*
B.S. Resource Management - The University of California, Berkeley (1992)

# PROFESSIONAL EXPERIENCE

## Litigation Support / Expert Witness

Mr. Cashen has served as a biological resources expert for over 125 projects subject to environmental review under the California Environmental Quality Act (CEQA) and/or the National Environmental Policy Act (NEPA). As a biological resources expert, Mr. Cashen reviews CEQA/NEPA documents and provides his clients with an assessment of biological resource issues. He then submits formal comments on the scientific and legal adequacy of the project's environmental documents (e.g., Environmental Impact Report). If needed, Mr. Cashen conducts field studies to generate evidence for legal testimony, or he can obtain supplemental testimony from his deep network of species-specific experts. Mr. Cashen has provided written and oral testimony to the California Energy Commission, California Public Utilities Commission, and U.S. district courts. His clients have included law firms, non-profit organizations, and citizen groups.

REPRESENTATIVE EXPERIENCE

**Solar Energy**

- Abengoa Mojave Solar Project
- Avenal Energy Power Plant
- Beacon Solar Energy Project
- Blythe Solar Power Project
- Calico Solar Project
- California Flats Solar Project
- Calipatria Solar Farm II
- Carrizo Energy Solar Farm
- Catalina Renewable Energy
- Fink Road Solar Farm
- Genesis Solar Energy Project
- Heber Solar Energy Facility
- Imperial Valley Solar Project
- Ivanpah Solar Electric Generating
- Maricopa Sun Solar Complex
- McCoy Solar Project
- Mt. Signal and Calexico Solar
- Panoche Valley Solar
- San Joaquin Solar I & II
- San Luis Solar Project
- Stateline Solar Project
- Solar Gen II Projects
- SR Solis Oro Loma
- Vestal Solar Facilities
- Victorville 2 Power Project
- Willow Springs Solar

**Geothermal Energy**

- Casa Diablo IV Geothermal
- East Brawley Geothermal
- Mammoth Pacific 1 Replacement
- Orni 21 Geothermal Project
- Western GeoPower Plant

**Wind Energy**

- Catalina Renewable Energy
- Ocotillo Wind Energy Project
- SD County Wind Energy
- Searchlight Wind Project
- Shu'luuk Wind Project
- Tres Vaqueros Repowering Project
- Tule Wind Project
- Vasco Winds Relicensing Project

**Biomass Facilities**

- CA Ethanol Project
- Colusa Biomass Project
- Tracy Green Energy Project

**Other Development Projects**

- Cal-Am Desalination Project
- Carnegie SVRA Expansion Project
- Lakeview Substation Project
- Monterey Bay Shores Ecoresort
- Phillips 66 Rail Spur
- Valero Benecia Crude By Rail
- World Logistics Center

## Project Management

Mr. Cashen has managed several large-scale wildlife, forestry, and natural resource management projects. Many of the projects have required hiring and training field crews, coordinating with other professionals, and communicating with project stakeholders. Mr. Cashen's experience in study design, data collection, and scientific writing make him an effective project manager, and his background in several different natural resource disciplines enable him to address the many facets of contemporary land management in a cost-effective manner.

REPRESENTATIVE EXPERIENCE

*Wildlife Studies*

- Peninsular Bighorn Sheep Resource Use and Behavior Study: (*CA State Parks*)
- "KV" Spotted Owl and Northern Goshawk Inventory: (*USFS, Plumas NF*)
- Amphibian Inventory Project: (*USFS, Plumas NF*)
- San Mateo Creek Steelhead Restoration Project: (*Trout Unlimited and CA Coastal Conservancy, Orange County*)
- Delta Meadows State Park Special-Status Species Inventory: (*CA State Parks, Locke*)

*Natural Resources Management*

- Mather Lake Resource Management Study and Plan – (*Sacramento County*)
- Placer County Vernal Pool Study – (*Placer County*)
- Weidemann Ranch Mitigation Project – (*Toll Brothers, Inc., San Ramon*)
- Ion Communities Biological Resource Assessments – (*Ion Communities, Riverside and San Bernardino Counties*)
- Del Rio Hills Biological Resource Assessment – (*The Wyro Company, Rio Vista*)

*Forestry*

- Forest Health Improvement Projects – (*CalFire, SD and Riverside Counties*)
- San Diego Bark Beetle Tree Removal Project – (*SDG&E, San Diego Co.*)
- San Diego Bark Beetle Tree Removal Project – (*San Diego County/NRCS*)
- Hillslope Monitoring Project – (*CalFire, throughout California*)

## Biological Resources

Mr. Cashen has a diverse background with biological resources. He has conducted comprehensive biological resource assessments, habitat evaluations, species inventories, and scientific peer review. Mr. Cashen has led investigations on several special-status species, including ones focusing on the foothill yellow-legged frog, mountain yellow-legged frog, desert tortoise, steelhead, burrowing owl, California spotted owl, northern goshawk, willow flycatcher, Peninsular bighorn sheep, red panda, and forest carnivores.

REPRESENTATIVE EXPERIENCE

*Biological Assessments/Biological Evaluations ("BA/BE")*

- Aquatic Species BA/BE – Reliable Power Project (*SFPUC*)
- Terrestrial Species BA/BE – Reliable Power Project (*SFPUC*)
- Management Indicator Species Report – Reliable Power Project (*SFPUC*)
- Migratory Bird Report – Reliable Power Project (*SFPUC*)
- Terrestrial and Aquatic Species BA – Lower Cherry Aqueduct (*SFPUC*)
- Terrestrial and Aquatic Species BE – Lower Cherry Aqueduct (*SFPUC*)
- Terrestrial and Aquatic Species BA/BE – Public Lands Lease Application (*Society for the Conservation of Bighorn Sheep*)
- Terrestrial and Aquatic Species BA/BE – Simon Newman Ranch (*The Nature Conservancy*)
- Draft EIR (Vegetation and Special-Status Plants) - Wildland Fire Resiliency Program (*Midpeninsula Regional Open Space District*)

*Avian*

- Study design and Lead Investigator - Delta Meadows State Park Special-Status Species Inventory *(CA State Parks: Locke)*
- Study design and lead bird surveyor - Placer County Vernal Pool Study *(Placer County: throughout Placer County)*
- Surveyor - Willow flycatcher habitat mapping *(USFS: Plumas NF)*
- Surveyor - Tolay Creek, Cullinan Ranch, and Guadacanal Village restoration projects *(Ducks Unlimited/USGS: San Pablo Bay)*
- Study design and Lead Investigator - Bird use of restored wetlands research *(Pennsylvania Game Commission: throughout Pennsylvania)*
- Study design and surveyor - Baseline inventory of bird species at a 400-acre site in Napa County *(HCV Associates: Napa)*
- Surveyor - Baseline inventory of bird abundance following diesel spill *(LFR Levine-Fricke: Suisun Bay)*

- Study design and lead bird surveyor - Green Valley Creek Riparian Restoration Site *(City of Fairfield: Fairfield, CA)*
- Surveyor - Burrowing owl relocation and monitoring *(US Navy: Dixon, CA)*
- Surveyor - Pre-construction burrowing owl surveys *(various clients: Livermore, San Ramon, Rio Vista, Napa, Victorville, Imperial County, San Diego County)*
- Surveyor - Backcountry bird inventory *(National Park Service: Eagle, Alaska)*
- Lead surveyor - Tidal salt marsh bird surveys (*Point Reyes Bird Observatory: throughout Bay Area*)
- Surveyor – Pre-construction surveys for nesting birds (*various clients and locations)*

*Amphibian*

- Crew Leader - Red-legged frog, foothill yellow-legged frog, and mountain yellow-legged frog surveys *(USFS: Plumas NF)*
- Surveyor - Foothill yellow-legged frog surveys *(PG&E: North Fork Feather River)*
- Surveyor - Mountain yellow-legged frog surveys *(El Dorado Irrigation District: Desolation Wilderness)*
- Crew Leader - Bullfrog eradication *(Trout Unlimited: Cleveland NF)*

*Fish and Aquatic Resources*

- Surveyor - Hardhead minnow and other fish surveys *(USFS: Plumas NF)*
- Surveyor - Weber Creek aquatic habitat mapping (*El Dorado Irrigation District: Placerville, CA*)
- Surveyor - Green Valley Creek aquatic habitat mapping *(City of Fairfield: Fairfield, CA)*
- GPS Specialist - Salmonid spawning habitat mapping *(CDFG: Sacramento River)*
- Surveyor - Fish composition and abundance study (*PG&E: Upper North Fork Feather River and Lake Almanor*)
- Crew Leader - Surveys of steelhead abundance and habitat use *(CA Coastal Conservancy: Gualala River estuary)*
- Crew Leader - Exotic species identification and eradication *(Trout Unlimited: Cleveland NF)*

*Mammals*

- Principal Investigator – Peninsular bighorn sheep resource use and behavior study (*California State Parks: Freeman Properties*)

- Scientific Advisor –Study on red panda occupancy and abundance in eastern Nepal *(The Red Panda Network: CA and Nepal)*
- Surveyor - Forest carnivore surveys *(University of CA: Tahoe NF)*
- Surveyor - Relocation and monitoring of salt marsh harvest mice and other small mammals *(US Navy: Skagg's Island, CA)*
- Surveyor – Surveys for Monterey dusky-footed woodrat. Relocation of woodrat houses (*Touré Associates: Prunedale*)

*Natural Resource Investigations / Multiple Species Studies*

- Scientific Review Team Member – Member of the scientific review team assessing the effectiveness of the US Forest Service's implementation of the Herger-Feinstein Quincy Library Group Act.
- Lead Consultant - Baseline biological resource assessments and habitat mapping for CDF management units *(CDF: San Diego, San Bernardino, and Riverside Counties)*
- Biological Resources Expert – Peer review of CEQA/NEPA documents (*various law firms, non-profit organizations, and citizen groups)*
- Lead Consultant - Pre- and post-harvest biological resource assessments of tree removal sites *(SDG&E: San Diego County)*
- Crew Leader - T&E species habitat evaluations for Biological Assessment in support of a steelhead restoration plan *(Trout Unlimited: Cleveland NF)*
- Lead Investigator - Resource Management Study and Plan for Mather Lake Regional Park *(County of Sacramento: Sacramento, CA)*
- Lead Investigator - Biological Resources Assessment for 1,070-acre Alfaro Ranch property *(Yuba County, CA)*
- Lead Investigator - Wildlife Strike Hazard Management Plan *(HCV Associates: Napa)*
- Lead Investigator - Del Rio Hills Biological Resource Assessment *(The Wyro Company: Rio Vista, CA)*
- Lead Investigator – Ion Communities project sites (*Ion Communities: Riverside and San Bernardino Counties*)
- Surveyor – Tahoe Pilot Project: Validation of California's Wildlife Habitat Relationships (CWHR) Model *(University of California: Tahoe NF)*

## Forestry

Mr. Cashen has five years of experience working as a consulting forester on projects throughout California. Mr. Cashen has consulted with landowners and timber operators on forest management practices; and he has worked on a variety of forestry tasks including selective tree marking, forest inventory, harvest layout, erosion control, and supervision of logging operations. Mr. Cashen's experience with many different natural resources enable him to provide a holistic approach to forest management, rather than just management of timber resources.

REPRESENTATIVE EXPERIENCE

- Lead Consultant - CalFire fuels treatment projects *(SD and Riverside Counties)*
- Lead Consultant and supervisor of harvest activities – San Diego Gas and Electric Bark Beetle Tree Removal Project *(San Diego)*
- Crew Leader - Hillslope Monitoring Program *(CalFire: throughout California)*
- Consulting Forester – Forest inventories and timber harvest projects *(various clients throughout California)*

## Grant Writing and Technical Editing

Mr. Cashen has prepared and submitted over 50 proposals and grant applications. Many of the projects listed herein were acquired through proposals he wrote. Mr. Cashen's clients and colleagues have recognized his strong scientific writing skills and ability to generate technically superior proposal packages. Consequently, he routinely prepares funding applications and conducts technical editing for various clients.

### PERMITS

U.S. Fish and Wildlife Service Section 10(a)(1)(A) Recovery Permit for the Peninsular bighorn sheep

### PROFESSIONAL ORGANIZATIONS / ASSOCIATIONS

The Wildlife Society

Cal Alumni Foresters

Mt. Diablo Audubon Society

### OTHER AFFILIATIONS

Scientific Advisor and Grant Writer – *The Red Panda Network*

Scientific Advisor – *Mt. Diablo Audubon Society*

Grant Writer – *American Conservation Experience*

## TEACHING EXPERIENCE

Instructor: Wildlife Management - The Pennsylvania State University, 1998

Teaching Assistant: Ornithology - The Pennsylvania State University, 1996-1997

## PUBLICATIONS

Gutiérrez RJ, AS Cheng, DR Becker, S Cashen, et al. 2015. Legislated collaboration in a conservation conflict: a case study of the Quincy Library group in California, USA. Chapter 19 *in*: Redpath SR, et al. (eds). Conflicts in Conservation: Navigating Towards Solutions. Cambridge Univ. Press, Cambridge, UK.

Cheng AS, RJ Gutiérrez RJ, S Cashen, et al. 2016. Is There a Place for Legislating Place-Based Collaborative Forestry Proposals?: Examining the Herger-Feinstein Quincy Library Group Forest Recovery Act Pilot Project. Journal of Forestry.

# EXHIBIT D

1. Is Estrella needed to solve distribution system problems?

a. Is Estrella needed to meet DPA peak loads?

No. The applicants have repeatedly claimed that summer peak loads in the Paso Robles Distribution Planning Area ("DPA") are expected to exceed the DPA capacity of 212.55 Mw in the next 5 to 15 years (Revised PEA, Appendix G; 2018 update to Appendix G; 2019 updated DPA forecast). The DEIR repeats PG&E's claim that the Paso Robles DPA loads "will exceed the available capacity of the Paso Robles system within 5 to 15 years (see Figure 2-5)." (DEIR, p. 2012). But the very figure the DEIR cites contradicts PG&E's conclusion. DEIR Figure 2-5 shows that, while forecasts made in 2017-19 did indeed show Paso Robles DPA load exceeding its capacity by no later than 2024, the more recent load forecast for the Paso Robles DPA shows no such thing. Paso Robles DPA actual loads in 2019 were only 168 Mw, lower than in 2007, and some 44 MVA below DPA capacity (DEIR, p. 2-13). That 44 MVA margin was the largest since 2011 (DEIR, p. 2-13). The resultant 2020 forecast, even though it is based on 1-year-in-10 hot weather, shows peak loads well below DPA capacity throughout the 2020s. DPA loads grow only 5 Mw from 2020 through 2029, and in 2029 they are still 10 Mw below DPA capacity (DEIR, p. 2-12; note that the DPA capacity already includes a 5% derating of total DPA capacity compared to individual substation capacity, to allow for difficulties in matching loads to the substations with the most spare capacity). At that rate, DPA loads will not exceed the DPA capacity of 212.55 Mw for another 18 years after the last forecast year, or not until 2047. Estrella is not needed to meet a DPA capacity problem that does not exist today, is not projected to exist in this decade, and is on trend to not exist until well into the 2040s.

b. Is Estrella needed to improve distribution system reliability by reducing outages?

No. The DEIR contains language (taken from the applicant's PEA and its Appendix G) indicating that, in theory, longer distribution lines have worse reliability, and that Estrella, by enabling shorter lines will improve reliability (DEIR, p. 2-6). But the actual data do not support the theory. Estrella is proposed to be built in an area now served by distribution circuit Templeton 2109. The data show that the Templeton 2109 distribution circuit has reliability no worse than other Templeton circuits, other Paso Robles DPA circuits, or other circuits in the PG&E service area as a whole. Of the 6 Templeton distribution circuits, the 2012-2017 data in the DEIR shows that Templeton 2109 had the fewest momentary outages and the third-fewest sustained outages, an average of exactly one per year (DEIR, p. 2-8; note that the listing of individual outages on the following pages excludes the Templeton 2113 circuit, the one with the most outages in the 2012-17 period).

Even accounting for the larger number of customers affected by the worst outage on the Templeton 2109 circuit, it still had an annual average outage duration per customer of only 46-58

minutes.[1] That is comparable to the other Templeton circuits (annual average of 49.5 minutes, per DEIR, p. 2-10). It is better than the annual average for other Paso Robles DPA circuits (79.7 minutes, per DEIR, p. 2-11) or other circuits throughout the PG&E service area (67.4 minutes, per DEIR, p. 2-11). Estrella is not needed to improve reliability on a circuit that already has above-average reliability.

2. Is Estrella needed to mitigate reliability impacts of transmission level outages?

a. Is Estrella needed to mitigate the impacts of an outage of the Templeton-Paso Robles 70 kV transmission line?

The proposed Estrella substation is not needed for this purpose, but a new 70 kV circuit would be needed, as has apparently been true for some 20+ years. Paso Robles substation is served by two 70 kV lines. An outage of one of those lines (also known as an "N-1" or P1 outage, or as a Category B outage prior to 2015), means that the entire Paso Robles load would need to be served via the remaining line.

Paso Robles peak loads in 2017 reached 72 Mw (2/23/18 letter from CAISO to CPUC). Of the two lines into Paso Robles, the Templeton-Paso Robles line is capable of delivering over 100 Mw, so an outage of the San Miguel-Paso Robles line would mean the remaining line could easily serve the full Paso Robles load, even at summer peak levels. However, the Coalinga-San Miguel-Paso Robles 70 kV line has a maximum summer capacity of just 42 Mw under N-1 conditions, and some of that capacity is used to serve San Miguel loads before the line continues on to Paso Robles. The net capacity that is available for delivery to Paso Robles from Miguel after an N-1 event is thus only about 27 Mw (only 20 Mw per PG&E, response to DR3, p. 3; 27 Mw based on 42 Mw line capacity minus San Miguel peak load of 15 Mw. The 6/20/18 revised PEA Appendix G, Table 4, shows San Miguel load flat at 15 Mw in every year from 2017-26, inclusive). Thus, an outage of the Templeton-Paso Robles line would cause the San Miguel-Paso Robles line to overload after an outage of the Templeton-Paso Robles line, any time that the Paso Robles load was above 27 Mw.

If Paso Robles peak load reached 72 Mw in 2017, then it must have been above 27 Mw for many years before that. The installation of a UVLS in 2006 (cDR) suggests it was already above 27 Mw then. Indeed, if Paso Robles peak load was less than 27 Mw in 2006, then it grew over 9.3 percent per year from 2006 to 2017 ((72/27)^(1/11)=1.093), a period when PG&E system peak demand was falling (DM data base, using CAISO OASIS data, showing PG&E peak demand of

[1] The DEIR does not say how many customers are served by the Templeton 2109 circuit. At a minimum, there are 4305, the number affected by the May 2012 outage (DEIR, p. 2-9). Multiplying the duration times the affected customers for each Templeton 2109 outage (as shown in the DEIR, p. 2-9), and summing, there were 1.24 million customer minute of outage over the 2012-17 period. Dividing that by 4305 customers yields an annual average of 57.7 minutes per year per customer, which is a worst case. If the actual number of customers is 25 percent higher, because the number of customers grew after 2012 and because the 2012 outage did not affect 100% of the customers on the circuit (which is likely), then the annual average is 46.2 minutes per year per customer.

22,650 Mw in 2006 and 21,713 Mw in 2018). That seems unlikely. If Paso Robles load growth has been "only" 5 percent per year in the years before 2017, then it must have reached 27 Mw in the year 1997. So it would appear that there has been a need for a transmission line with a greater capacity than the Coalinga-San Miguel-Paso Robles line for over 20 years.

The Estrella project is one way to solve the reliability risk due to a Templeton-Paso Robles outage, but it is not the only one. Estrella solves the problem by replacing the low capacity San Miguel-Paso Robles line with a higher capacity Estrella-Paso Robles line with a line capacity of up to 100 MVA (summer normal rating) or 118 MVA (summer emergency rating)(ratings based on CAISO, 2013-2014 Transmission Plan, calling for minimum summer normal/emergency ratings of 825/975 amperes). But the alternate of a 2nd Templeton-Paso Robles 70 kV line, described in the DEIR, would do the same thing, and be considerably shorter and, according to the DEIR, cheaper (DEIR, p. 5-17).

A further potential option, not discussed at all in the DEIR, would be to use the San Miguel-Unionpage 70 kV line mentioned in both a CAISO presentation as part of its 2020-2021 Transmission Plan development (CAISO, 9/23/20 presentation, pdf p. 29 of 247) and the associated model outputs (CAISO, final reliability assessment results for CCLP, pdf pp. 7-9 and 11 of 14), coupled with reconductoring of the entire San Miguel-Paso Robles line (not just the 3 miles already proposed for reconductoring and analyzed in the DEIR). Assuming the San Miguel-Unionpage line exists, is the same size as the San Miguel-Coalinga line, and could be fully loaded after an outage of the Templeton-Paso Robles line, then 84 MVA could be delivered to San Miguel after such an outage. Subtracting the 15 MVA needed to meet San Miguel loads, that would leave 69 MVA deliverable to Paso Robles substation over a reconductored San Miguel-Paso Robles line. 69 MVA is very close to the peak Paso Robles load of 72 MVA experienced in 2017. That 72 MVA peak was, and may well be higher than the reduced Paso Robles substation load forecast that must underlie the reduced 2020-2029 Paso Robles DPA load forecast shown in the DEIR (DEIR, Table 2-5; the DEIR does not provide the 2020-2029 forecast for Paso Robles substation which underlies the 2020-2029 DPA forecast). If this option were indeed viable, it would mean that no new transmission lines would be needed

b. Is Estrella needed to mitigate the impacts of an outage of the Templeton 230/70 kV transformer?

Perhaps, but it is not clear, and is certainly not demonstrated by the DEIR.

An outage of the Templeton transformer would require loads at Templeton, Paso Robles and San Miguel substations to all be met with imports over two 70 kV lines, one from either he southwest (Templeton-Atascadero) and one from the northeast (Coalinga-San Miguel). The normal rating of the Templeton-Atascadero line was increased to 100 MVA by a reconductoring in 2008 (CAISO 2008 Transmission Plan, p. 120, Table A-1). The typical emergency rating of a 100 MVA line (i.e., after an N-1 outage such as a Templeton transformer outage) is 118 Mw. The

emergency rating of the Coalinga-San Miguel line is 42 Mw (CAISO letter to CPUC, 2/23/18). (Note that this is a summer rating; the winter rating is much higher). Thus, if the combined loads of San Miguel, Paso Robles, and Templeton were over 160 Mw, an outage of the Templeton transformer would cause overloads of the Coalinga-San Miguel and/or Atascadero-Templeton lines. (Note that the CAISO has recently also referred to another 70 kV line to San Miguel besides the Coalinga-San Miguel and Paso Robles-San Miguel lines, a San Miguel - Unionpgae line. See CAISO, 9/23/20 presentation re 2020-21 Transmission Plan, pdf. p. 29 of 247. This line, if it exists but is no larger than the San Miguel-Coalinga line, could deliver another 42 MVA to the Paso Robles DPA.)

The most recent load forecast for the Paso Robles DPA shows peak summer loads of 193-203 Mw during the 2020s, with the maximum of 203 Mw in 2028 (DEIR, p. 2-12, Figure 2-5). The Paso Robles DPA includes Atascadero substation, with forecast loads of 29.74 Mw in 2028 in an older DPA forecast in which total DPA load was 221.57 Mw during the 2020s (PG&E, response to DR4, p. 4). Put another way, Atascadero loads were 13.42 percent of 2028 Paso Robles DPA loads in the 2019 forecast (29.74/221.57). Assuming the reduced DPA forecast of 2020 includes a proportional reduction for Atascadero substation, then the currently forecasted loads for San Miguel plus Paso Robles plus Templeton reach a peak value of 203 x .8658 = 176 Mw in 2028. That means that there would be an overload of at least 10 percent on one or both of the Coalinga-San Miguel and Atascadero-Templeton lines after an outage of the Templeton 230/70 kV transformer in 2028 at the time of the summer peak.

To mitigate this potential outage, there are at least three options. The first is to drop load, using the existing UVLS which has been in place since 2006 but has never yet needed to operate. That would protect the electrical system, but not its customers, just as the UVLS today protects the Coalinga-San Miguel-Paso Robles line from overloading after an N-1 outage of the Templeton-Paso Robles 70 kV line. The second option is to build a second 230/70 kV transformer feeding the 70 kV lines in the Paso Robles DPA. That second transformer could be the one proposed for Estrella, or the one suggested in the DEIR at an alternate substation location adjacent to Templeton substation (DEIR, Appendix B, p. 3-31), or one at a different alternate substation location 2 miles northeast of Templeton (see below), a location ignored in the DEIR. It apparently could not be at the Templeton substation itself, due to space considerations (DEIR, Appendix B, p. 3-36). The third option is local generation located within the Paso Robles DPA. Such generation would only need to be large enough to mitigate overloads during peak load conditions; during off-peak conditions when loads are lower, the existing 70 kV system would be adequate; during non-summer months, 70 kV line ratings would be higher and overloads would also not occur after a transformer outage. A potential 4th option is to use deliveries over a San Miguel-Unionpgae 70 kV line, probably coupled with reconductoring of the existing San Miguel-Paso Robles line, as described above as possible mitigation for an outage of the Templeton-Paso Robles line.

The applicants may argue that the option of relying upon the UVLS to protect the electrical system from undervoltages after a Templeton transformer outage is inappropriate because it means dropping load after an N-1 contingency. It would indeed, but that has also been true for years with regard to an N-1 outage of the Templeton-Paso Robles 70 kV line. The DEIR should explain why the UVLS alternative has been OK for Paso Robles in the past, but has ceased to be acceptable.

With regard to the alternative of a second 230/70 kV transformer, the DEIR is clear that a new transformer located near the Templeton substation would be electrically suitable as a source of supply for a new 70 kV transmission line to Paso Robles. The DEIR does not explain why the new 230/70 kV substation could not be located 2 miles farther northeast, still adjacent to the existing 230 kV lines, and thus shorten the required 70 kV line by 2 miles. Relocating the 230/70 kV substation farther from Templeton substation would also increase the claimed distribution benefits of the new substation, should it ever be used as a distribution substation, by moving it closer to Paso Robles and farther from Templeton.

With regards to generation alternatives to a new 230/70 kV transformer, it is not clear whether the DEIR has addressed how long it would take after a Templeton transformer outage for loads to fall to the level at which the existing 70 kV transmission system would be adequate, and what generation alternatives would exist to supplement the 70 kV system during the high load hours when they would be needed. Given that the needed generation resources might be as low as 16 Mw under the latest DPA load forecast, and that the highest load summer hours are hours when solar power is likely to be available, it might take as little as 30-40 Mw of installed solar capacity to mitigate the risk of an on-peak failure of the Templeton transformer during the 2020s. A BESS alternative would also be an option if it would only be needed for a few hours until loads dropped overnight, and could then be recharged before the following afternoon's peak loads (assuming a transformer outage took more than 24 hours to repair).

With regards to the possible 4th option, if it exists (see discussion above regarding mitigation for an outage of the Templeton-Paso Robles 70 kV line), then in concert with reconductoring of the San Miguel-Paso Robles line, it would allow up to 84 MVA to be imported into the Paso Robles DPA under emergency conditions after an outage of the Templeton 230/70 kV line. Together with up to 118 MVA via the Atascadero-Templeton line, that would be a total of 202 MVA, more than the projected peak load of 176 MVA in 2028 for San Miguel plus Paso Robles plus Templeton. The DEIR never discusses the existence of a San Miguel-Unionpage line, or its possible contribution to meeting the reliability issues driving the proposed Estrella project.

c. Is Estrella needed to mitigate the impacts of an N-2 (Category C) outage of both 230 kV lines that connect to the Templeton 230/70 kV transformer?

No. Reliability rules allow load to be dropped after the outage of two separate transmission lines. A double 230 kV line outage on the lines feeding Templeton would make the Templeton

transformer unusable, and thus cause overloads on the underlying 70 kV system during high load periods, but that is irrelevant. Indeed, even if Estrella were built as proposed, Paso Robles would still face a blackout after an N-2 outage of the Estrella-Paso Robles and Templeton-Paso Robles 70 kV lines. The same is true for the environmentally preferred alternative described in the DEIR. Paso Robles is currently at risk of blackouts from a double transmission line outage, and Estrella would not change that fact. The CAISO's original authorization of Estrella was based on mitigating N-1 contingencies, and Estrella cannot be justified by its impact on N-2 contingencies.

In any case, even if it were appropriate to build new facilities just to mitigate the consequences of an N-2 outage, it is unclear that Estrella would be adequate. The year after Estrella was approved, the CAISO concluded that the proposed new Estrella-Paso Robles line would overload after an N-2 outage of the two 230 kV lines connected to the Templeton substation (CAISO, 9/24/14 presentation, pdf p. 91 of 162).

3. Is Estrella needed to mitigate reliability issues at and around the Cholame substation?

No. Although there are about 1500 Cholame-area customers at risk for scheduled outages every 1-2 years for maintenance work on the 70 kV line feeding Cholame substation, those outages are not a violation of NERC or CAISO or PG&E reliability criteria. PG&E has stated clearly that it has no plans to use the proposed Estrella substation as a source for a new 70 kV line to Cholame to supplement the existing single line there. ( **Electric Distribution Resources Plan Application 2015 Rulemaking 14-10-003 Application 15-07-006, data request ED_019-Q01-18_Rev01, response to question 4)**.

On the other hand, in this proceeding the applicants filed a revised Appendix G to their PEA which states that "The proposed project provides a future opportunity to add an additional transmission line to Cholame Substation to create a looped circuit to improve reliability and operational flexibility on the 70 kV system. This line would likely be constructed within 2 to 3 years after Estrella Substation is built" (Appendix G to PEA, 6/20/18, p. UG-27). To the extent that building Estrella **would** lead to construction of a new 70 kV (or 21 kV) from Estrella to Cholame, the DEIR should have addressed that result; to do otherwise would be the kind of piecemealing that CEQA forbids.

4. The DEIR misstates the cost of the proposed project

The CAISO approved the Estrella project with an estimated cost of $35-45 million (CAISO, 2013-14 Transmission Plan), in 2014 dollars (CAISO, 21013-2014 Transmission Plan, 7/16/14, Appendix F, pdf p. 5 of 22). The project that the CAISO approved included all facilities above 50 kV, the threshold of CAISO jurisdiction. In particular, it included the short bits of 230 kV line which would connect the existing 230 kV line to the north and south ends of the proposed substation (to be built by PG&E), the 230/70 kV substation (to be built by HWT), and the 70 kV transmission line and line reconductoring (to be built by PG&E). It did not include 70/21 kV transformers or 21 kV distribution lines, which would be built by PG&E subject to CPUC

jurisdiction. The DEIR errs when it says that the $35-45 million estimate is just for the 230/70 kV substation to be built by HWT (DEIR, p. 5-16, fn. 2).

The DEIR also appears to err when it says the estimated total cost of the project is $150 million. CAISO-jurisdictional transmission projects with a capital cost over $50 million require CAISO Board approval, which the Estrella project has never received, since it was described to the CAISO in 2013-14 as having a $35-45 million total cost. If the $150 million figure in the DEIR were correct, then unless the distribution components cost over $100 million, that would mean the CAISO-jurisdictional transmission components will cost over $50 million.

The DEIR needs to be corrected to show current cost estimates for each of it three main components - the transmission level parts to be built by HWT, the transmission level parts to be built by PG&E, and the distribution level parts (if any, given the lack of need discussed above) to be built by PG&E.

# RESUME

**DAVID I. MARCUS** **April 2014**
**1541 Juanita Way**
**Berkeley, CA 94702-1136**

**Employment**

**Self-employed, March 1981 - Present**

**Consultant on energy and electricity issues. Clients have included Imperial Irrigation District, the cities of Albuquerque and Boulder, the Rural Electrification Administration (REA), BPA, EPA, the Attorney Generals of California and New Mexico, the California Public Utilities Commission, alternative energy and cogeneration developers, environmental groups, labor unions, other energy consultants, and the Navajo Nation. Projects have included economic analyses of utility resource options and power contracts, utility restructuring, utility bankruptcy, coal and nuclear power plants, non-utility cogeneration plants, and offshore oil and hydroelectric projects. Experienced user of production cost models to evaluate utility economics. Very familiar with western U.S. grid (WSCC) electric resources and transmission systems and their operation and economics. Have also performed EIR/EIS reviews and need analyses of proposed coal, gas and hydro powerplants, transmission lines, substations, and coal mines. Have presented expert testimony before FERC, the California Energy Commission, the Public Utility Commissions of California, New Mexico, and Colorado, the Interstate Commerce Commission, and the U.S. Congress.**

**Environmental Defense Fund (EDF), October 1983 - April 1985**

**Economic analyst, employed half time at EDF's Berkeley, CA office. Analyzed nuclear power plant economics and coal plant sulfur emissions in New York state, using ELFIN model. Wrote critique of Federal coal leasing proposals for New Mexico and analysis of southwest U.S. markets for proposed New Mexico coal-fired power plants.**

**California Energy Commission (CEC), January 1980 - February 1981**

**Advisor to Commissioner. Wrote "California Electricity Needs," Chapter 1 of Electricity Tomorrow, part of the CEC's 1980 Biennial Report. Testified before California PUC and coauthored CEC staff brief on alternatives to the proposed 2500 megawatt Allen-Warner Valley coal project.**

**CEC, October 1977 - December 1979**

**Worked for CEC's Policy and Program Evaluation Office. Analyzed supply-side alternatives to the proposed Sundesert nuclear power plant and the proposed Point Concepcion LNG terminal. Was the CEC's technical expert in PG&E et. al. vs. CEC lawsuit, in which the U.S. Supreme Court ultimately upheld the CEC's authority to regulate nuclear powerplant siting.**

**Energy and Resources Group, U.C. Berkeley, Summer 1976**

**Developed a computer program to estimate the number of fatalities in the first month after a major meltdown accident at a nuclear power plant.**

**Federal Energy Agency (FEA), April- May 1976**

**Consultant on North Slope Crude. Where To? How?, a study by FEA's San Francisco office on the disposition of Alaskan oil.**

**Angeles Chapter, Sierra Club, September 1974 - August 1975**

**Reviewed EIRs and EISs. Chaired EIR Subcommittee of the Conservation Committee of the Angeles Chapter, January - August 1975.**

**Bechtel Power Corporation (BPC), June 1973 - April 1974**

**Planning and Scheduling Engineer at BPC's Norwalk, California office. Worked on construction planning for the Vogtle nuclear power plant (in Georgia).**

## Education

**Energy and Resources Group, U.C. Berkeley, 1975 - 1977**

**M.A. in Energy and Resources. Two year master's degree program, with course work ranging from economics to engineering, law to public policy. Master's thesis on the causes of the 1972-77 boom in the price of yellowcake (uranium ore). Fully supported by scholarship from National Science Foundation.**

**University of California, San Diego, 1969 - 1973**

**B.A. in Mathematics. Graduated with honors. Junior year abroad at Trinity College, Dublin, Ireland.**

## Professional Publications

**"Rate Making for Sales of Power to Public Utilities," with Michael D. Yokell, in Public Utilities Fortnightly, August 2, 1984.**