proposed mitigation for those impacts, including, but not limited to, potential revegetation, making potentially significant impacts undisclosed, unanalyzed and permanent.[89]

Additionally, the IS/MND fails to address the Project's potentially significant indirect impacts to biological resources, such as indirect impacts to wildlife from noise, dust, or vehicles.[90]

Overall, the County's failure to accurately describe the acreage that will be disturbed by the Project renders it impossible to analyze the Project's potentially significant impacts to biological resources, as required by CEQA. State law requires the County to prepare a revised environmental review document that accurately describes where and how the Project will disturb lands and any impacts resulting therefrom and to recirculate the document for public review and comment.

The Bio Memorandum alleges that the JPR process fully addresses the impacts to disturbed lands; however, it ignores that the JPR process is not complete and would occur outside of the public review process, pursuant to CEQA.[91] Determinations of impacts, including the number of permanently disturbed lands, could change through the JPR process.[92] Additionally, the JPR process only looks at habitat loss, not direct impacts to species, such as those identified by Ms. Owens that may occur during construction or operation of the Project.[93]

C. The IS/MND Fails to Describe the Existing Levels of Impacts to Avian Species on the Project Site

The IS/MND cursorily and summarily concludes that the replacement of 291 existing wind turbines with 14 new, larger wind turbines will lead to less impacts to birds.[94] As Ms. Owens notes, this claim is unsupported by the evidence, since larger

[89] Owens' Comments, pp. 5-6; *see* below, Section VII.
[90] Owens' Comments, p. 7.
[91] Bio Memo, p. 1.
[92] Owens' Response, p. 7.
[93] Owens' Response, p. 7.
[94] IS/MND, p. 35.

wind turbine blades can lead to increased impacts.[95] Any actual determination as to whether there will be increased or decreased impacts to birds is impossible, however, since the County provided no data on avian mortality from the existing project. The County must revise its environmental review document to include actual data on existing avian mortality, studies that model existing avian mortality or some other valid substantial evidence for public review before the County can even consider concluding that the Project would result in no significant impacts to birds.

The Bio Memorandum suggests that previous studies and the CVMSHCP address a baseline for this Project. However, the CH2M Hill Survey, cited in Appendix C, was provided for a different project and only concluded that the other project was designed to avoid impacts to avian species and that risk from collision would decrease, making no such claims for this Project.[96] Also, the CH2M Hill Survey never made any conclusions regarding mortality rates, nor did it provide the mortality rates. Further, the CH2M Hill Survey was unscientific and based off another survey that is too old and insufficient, as described below.

The CVMSHCP provides an assessment of impacts from habitat loss to species but does not evaluate the direct impacts to species from construction and operation of the Project.[97] It also is limited in the number of species it covers, leaving out other special-status birds found in the site, migratory birds, and bats.[98] No substantial evidence is provided, such as a decrease in avian mortality per turbine or kilowatt-hour, for this Project by which to determine that there is a decrease in impacts, as the IS/MND claims.

D. The IS/MND Fails to Adequately Survey and Describe Onsite Biological Resources

The IS/MND does not include any relevant, recent focused or protocol surveys for any special-status species that have a moderate to high potential to occur on the

---

[95] Owens' Comments, pp. 2-3.
[96] IS/MND, Appendix D of Appendix C, p. 7.
[97] Owens' Response, p. 9.
[98] Owens' Response, p. 9.

Project site.[99] The Bio Memorandum contends that our comment ignores the surveys cited as substantial evidence that the County has determined the extent of species at the Project site.[100] The IS/MND relies on the CH2M Hill Survey for a completely different project, which was based on a National Renewable Energy Laboratory ("NREL") survey. In fact, the only survey conducted was a general, one-day field study in March of 2018.[101]

Ms. Owens found that at least 30 different plant and animal species, protected at both the state and federal level, could occur at the Project site and must be assessed and disclosed in a revised environmental review document.[102] For example, the IS/MND completely omits any data on bats in the area and any discussion of the Project's potentially significant impacts to bats.[103]

By failing to require the necessary surveys, the County lacks substantial evidence to support its conclusions in the IS/MND. The County cannot possibly determine whether the Project would result any impacts to biological resources, much less determine whether those impacts are significant and what mitigation is required. The County must require the Applicant to conduct proper surveys and provide actual data on biological resources and must revise and recirculate the environmental review document to the public.

i. The Cited CH2M Hill Survey Does Not Provide an Environmental Setting for the Project

The CH2M Hill Survey, which the IS/MND cites as evidence that avian use at the Project site is low, is too old and unscientific to constitute substantial evidence.[104] Ms. Owens found that the age of the survey leaves it irrelevant for establishing a baseline for this project.[105] After review, Ms. Owens concludes that

[99] Owens' Comments, p. 7.
[100] Bio Memo, p. 2.
[101] Owens' Comments, p. 7.
[102] Owens' Comments, pp. 7-8.
[103] Owens' Comments, pp. 13-15.
[104] Owens' Response, p. 16.
[105] Owens' Response, p. 16.

the CH2M Hill Survey is merely a summary of other surveys and not a CH2M Hill Survey of the Project site, as claimed by the IS/MND.[106]

The CH2M Hill Survey takes incompatible data from numerous other surveys and improperly treats their data as equitable in order to support its analysis.[107] The CH2M Survey also relies on unscientifically vague determinations, such as describing levels of avian use of the San Gorgonio Pass as "low," despite other surveys providing quantitative data showing otherwise.[108]

Ms. Owens determined that the CH2M Hill Survey contains numerous errors, comes to an erroneous conclusion, and would not be accepted in a peer-reviewed journal.[109] The CH2M Hill Survey lacks scientific rigor, and the County cannot rely on it for substantial evidence to support any determinations of environmental setting or impacts in the IS/MND.

ii. The NREL Survey is Insufficient to Determine the Existing Environmental Setting for This Project

The NREL Survey cited by the Bio Memorandum and relied on by the CH2M Hill Survey does not support the IS/MND claims that risk of avian mortality is low. The NREL Survey concludes that it was not designed to provide data for standardized estimates of avian mortality and subject to high levels of uncertainty.[110] The NREL Survey also relies on flawed analysis, as Ms. Owens notes in her response.[111] Ms. Owens concludes that the NREL Survey would not be accepted in a peer-reviewed journal due to flawed statistics.[112] Any reliance on the NREL Survey is invalid, and the survey does not provide substantial evidence about the existing environmental setting or avian mortality at the Project site.

---

[106] Owens' Response, p. 16.
[107] Owens' Response, pp. 16-17.
[108] Owens' Response, pp. 17-18.
[109] Owens' Response, pp. 16-19.
[110] Owens' Response, p. 14.
[111] Owens' Response, pp. 14-15.
[112] Owens' Response, p. 15.

E. The IS/MND Ignores and Fails to Survey Migratory Birds Protected Under California Law

The IS/MND does not provide any analysis for migratory birds, except those included in the insufficient special-status survey or CVMSHCP, citing recent USFWS determinations that the Migratory Bird Treaty Act ("MBTA") does not apply to incidental take.[113] This ignores that migratory birds identified in the MBTA are still subject to incidental take prohibitions under California law.[114] This position has recently been affirmed by Attorney General Xavier Becerra, noting in his memo on the MBTA that "[California Department of Fish and Wildlife] and the Attorney General will continue to enforce California law to protect these birds."[115]

California law regarding the MBTA did not change with the USFWS opinion cited in the IS/MND. The IS/MND thus fails to properly consider whether the Project may contribute to the take of migratory birds in the area.[116] The IS/MND must be withdrawn and recirculated with studies determining the extent to which birds covered under the MBTA may be present in the area and with existing levels of mortality for migratory birds.

F. The IS/MND Relies on an Outdated and Improperly Conducted Survey for Golden Eagles

The abundance of research supports the fact that wind turbines can kill Golden Eagles, which are fully protected under California law.[117] As a result, proper studies are needed to determine if the Project will lead to eagle mortality.

---

[113] IS/MND, p. 34.
[114] Fish and Game Code § 3513.
[115] California Department of Fish and Wildlife and Attorney General Xavier Becerra, Advisory Affirming California's Protections for Migratory Birds (Nov. 29, 2018), p. 3.
[116] Owens' Response, p. 13.
[117] Fish and Game Code § 3511(b)(7).

i. The January 11, 2012 Wildlife Research Institute, Inc. Survey is Too Old, Does Not Cover the Project Site, and Was Improperly Conducted and Cannot Provide an Adequate Description of the Existing Environmental Setting

The County references a Wildlife Research Institute, Inc. survey for Golden Eagles in the IS/MND, but the survey does not accurately inventory habitat and potential impacts to eagles for numerous reasons. The survey data is too old to represent current conditions for the Golden Eagle.[118] More recent data is needed since breeding status for a nest territory is based on whether it is being used in the current year.[119] All breeding sites in an area with eagles demonstrating pair bonding activities are deemed occupied.[120] A seven year old study cannot possibly determine whether breeding Golden Eagles are present at the proposed Project site; a focused study must be completed.[121]

The IS/MND lacks any detail on Golden Eagle prey on or near the Project site.[122] Golden Eagle presence is highly correlated with prey abundance, further limiting the description of Golden Eagle habitat at the site.[123]

The study referenced is too limited in scope to be adequate to assess the Project's potentially significant impacts. Admittedly, it does not provide complete coverage of the Project site.[124] Admittedly, it failed to follow the United States Fish and Wildlife Service Protocol Guidelines.[125]

---

[118] Owens' Comments, p. 8.
[119] Owens' Comments, p. 8.
[120] Owens' Comments, p. 9.
[121] Owens' Comments, pp. 8-9.
[122] Owens' Comments, p. 9.
[123] Owens' Comments, p. 9.
[124] Owens' Comments, p. 10.
[125] Owens' Comments, p. 10.

The survey provided is technically invalid, since the author of the study, Dave Bittner, was working without a California state permit since 2000.[126] The memo notes that Mr. Bittner lied to probation officials, failed to provide required data to wildlife agencies, and accepted $600,000 in payment from wind facilities developers.[127] Mr. Bittner conducted an unpermitted helicopter study of eagle nests in 2011, which may be the study cited in the IS/MND.[128]

Because the study cited in the IS/MND is too old to assess impacts to this species, is invalid and lacks relevance, among other problems, the County's IS/MND lacks any evidence to support its description of existing Golden Eagle activity at or near the Project site. The County must revise and recirculate the document with accurate studies to determine whether Golden Eagle habitat is present at the Project site.

The Bio Memorandum argues that our previous comment does not provide evidence that impacts to Golden Eagles *will be* significant.[129] This misstates the law. As stated above, an EIR is required when there is substantial evidence that a project *may* have a potentially significant impact. The Golden Eagle is a California Fully Protected Species and no take may be authorized[130]; the take of one Golden Eagle would be significant. We provided evidence, based on expert observation, that Golden Eagles are present near the Project site, that raptors prefer flying heights that would place them within the rotor-swept area of the Project, and that the IS/MND does not provide substantial evidence to support a claim that there will be no Golden Eagle take.[131]

---

[126] East County Magazine, Eagle Expert Bittner Sentenced to Probation, Ordered to Turn Over Missing Data (Aug. 2013) *available at* https://www.eastcountymagazine.org/eagle-expert-bittner-sentenced-probation-ordered-turn-over-missing-data.
[127] *Id.*
[128] *Id.*
[129] Bio Memo, p. 2.
[130] Fish and Game Code § 3511.
[131] *See* Owens' Comment.

VI. SUBSTANTIAL EVIDENCE SUPPORTS A FAIR ARGUMENT THAT THE PROJECT MAY RESULT IN SIGNIFICANT IMPACTS THAT REQUIRE THE COUNTY TO PREPARE AN EIR

Under CEQA, a lead agency must prepare an EIR whenever substantial evidence in the whole record before the agency supports a fair argument that a project may have a significant effect on the environment.[132] The fair argument standard creates a "low threshold" favoring environmental review through an EIR, rather than through issuance of a negative declaration.[133] An agency's decision not to require an EIR can be upheld only when there is no credible evidence to the contrary.[134] Substantial evidence can be provided by technical experts or members of the public.[135] "If a lead agency is presented with a fair argument that a project may have a significant effect on the environment, the lead agency shall prepare an EIR even though it may also be presented with other substantial evidence that the project will not have a significant effect."[136]

A. The IS/MND Fails to Adequately Disclose, Analyze and Mitigate the Project's Potentially Significant Public Health Risks.

The IS/MND fails as an information disclosure document under CEQA by failing to adequately disclose, analyze, and mitigate the Project's public health

---

[132] Pub. Resources Code § 21082.2; CEQA Guidelines § 15064(f), (h); *Laurel Heights II, supra,* 6 Cal. 4th at p. 1123; *No Oil, Inc. v. City of Los Angeles* (1974) 13 Cal. 3d 68, 75, 82; *Stanislaus Audubon Society, Inc. v. County of Stanislaus* (1995) 33 Cal.App.4th 144, 150-151; *Quail Botanical, supra,* 29 Cal.App.4th at pp. 1601-1602.

[133] *Citizens Action to Serve All Students v. Thornley* (1990) 222 Cal.App.3d 748, 754.

[134] *Sierra Club v. County of Sonoma* (1992) 6 Cal.App.4th, 1307, 1318; *see also Friends of B Street, supra,* 106 Cal.App.3d at p. 1002 ("If there was substantial evidence that the proposed project might have a significant environmental impact, evidence to the contrary is not sufficient to support a decision to dispense with preparation of an [environmental impact report] and adopt a negative declaration, because it could be 'fairly argued' that the project might have a significant environmental impact").

[135] See, e.g., *Citizens for Responsible and Open Government v. City of Grand Terrace* (2008) 160 Cal.App.4th 1323, 1340 (substantial evidence regarding noise impacts included public comments at hearings that selected air conditioners are very noisy); *see also Architectural Heritage Assn. v. County of Monterey*, 122 Cal.App.4th 1095, 1117-1118 (substantial evidence regarding impacts to historic resource included fact-based testimony of qualified speakers at the public hearing); *Gabric v. City of Rancho Palos Verdes* (1977) 73 Cal.App.3d 183, 199.

[136] CEQA Guidelines § 15062(f).

impacts. The County concludes that "the toxics impact related to construction would be less than significant."[137] The County lacks substantial evidence to support this conclusion. Instead, Dr. Fox provides substantial evidence that the public health risk may be significant.[138]

CEQA requires lead agencies to prepare risk assessments to evaluate the nature and extent of the health hazards posed by exposure to toxic materials released by a project. CEQA Guidelines section 15126.2(a) expressly requires a CEQA document to discuss the "health and safety problems caused by the physical changes that a project will precipitate."[139] Numerous cases have held that CEQA must analyze human health impacts. For example, in *Communities for a Better Environment v. South Coast Air Quality Management District,*[140] the Supreme Court held that a Mitigated Negative Declaration for a refinery was inadequate for failure to analyze nitrogen oxide emissions, pollutants known to have significant effects on human health.[141]

The Courts of Appeal have repeatedly held that a CEQA document must analyze impacts of projects on human health. In *Communities for a Better Environment v. City of Richmond,* the court held that a CEQA document is inadequate where it "does not address the public health or other environmental consequences of processing heavier crude [thereby emitting Toxic Air Contaminants ("TAC")], let alone analyze, quantify, or propose measures to mitigate those impacts."[142] In *Bakersfield Citizens for Local Control v. City of Bakersfield,*[143] the court held that an EIR for a commercial shopping center was inadequate because it failed to correlate adverse air quality impacts to resulting adverse health impacts on surrounding communities. The court explained:

---

[137] DEIR, § 4.2, p. 31.
[138] Fox Comments, p. 2.
[139] CEQA Guidelines, § 15126.2(a).
[140] *Communities for a Better Environment v. South Coast Air Quality Management District,* (2010) 48 Cal. 4th 310, 317.
[141] 48 Cal.4th at 317.
[142] *Communities for a Better Environment v. City of Richmond* (2010) 184 Cal.App.4th 70, 82. *See also Californians for Alternatives to Toxics v. Cal. Dep't of Food & Agric.* (2006) 136 Cal.App.4th 1, 16, (EIR on statewide application of pesticide was inadequate when it failed to independently evaluate risks of toxic exposure.)
[143] (2004) 124 Cal.App.4th 1184, 1219-20 ("on remand, the health impacts resulting from the adverse air quality impacts must be identified and analyzed in the new EIR's.").

> [The] City's failure to...correlate the adverse air quality impacts to resulting adverse health consequences, cannot be dismissed as harmless or insignificant defects. As a result of these omissions, meaningful assessment of the true scope of numerous potentially serious adverse environmental effects was thwarted. No discrete or severable aspects of the projects are unaffected by the omitted analyses; the defects relate to the shopping centers in their entirety, not just to one specific retailer. These deficiencies precluded informed public participation and decision making.[144]

In *Berkeley Keep Jets Over the Bay Com. v. Bd. of Port Comrs.*,[145] the court held that an EIR must include a "human health risk assessment."[146] In *Berkeley Jets*, the Port of Oakland approved a development plan for the Oakland International Airport. The EIR admitted that the Project would result in an increase in the release of TACs, which were known to cause both carcinogenic and adverse noncarcinogenic health effects.[147] The EIR adopted mitigation measures to reduce TAC emissions but failed to perform a health risk assessment to quantify the Project's impacts on human health. The court held that the mitigation measures alone were insufficient, and that the Port had a duty to analyze the health risks associated with exposure to TACs:

> The Port has not cited us to any reasonably conscientious effort it took either to collect additional data or to make further inquiries of environmental or regulatory agencies having expertise in the matter. These failures flout the requirement that the lead agency consult "with all responsible agencies and with any other public agency which has jurisdiction by law over natural resources affected by the project . . . ." (§ 21080.3, subd. (a).) At the very least, the documents submitted by the public raised substantial questions about the project's effects on the environment and the unknown health risks to the area's residents...the Port has not offered any justification why more definitive information could not have been provided....The EIR's approach of simply labeling the effect "significant" without accompanying analysis of the project's impact on the health of the Airport's employees and nearby

---

[144] *Id.*, at 1220-21.
[145] *Berkeley Keep Jets Over the Bay Com. v. Bd. of Port Comrs.* ("*Berkeley Jets*") (2001) 91 Cal.App.4th 1344.
[146] *Id.*, at 1369.
[147] *Id.*, at 1364.

residents is inadequate to meet the environmental assessment requirements of CEQA.[148]

Here, the County is required to conduct an assessment of the Project's potentially significant public health impacts. As in *Berkeley Jets*, there is no dispute that the Project will use off-road diesel construction equipment and on-road heavy-duty diesel trucks that generate Diesel Particulate Matter ("DPM") emissions.[149] The IS/MND identifies DPM as the main TAC of concern.[150] Construction would occur near sensitive receptors[151] over a period of approximately 18 months.[152] There is also no dispute that the County did not prepare an assessment of the health risks associated with that exposure. This violates CEQA's requirement that the lead agency correlate the adverse air quality impacts generated by a project to their resulting adverse health consequences.[153]

The courts may not look for "perfection" in a CEQA document, but do expect "adequacy, completeness, and a good faith effort at full disclosure [in an EIR]."[154] The County has failed to meet these requirements. Dr. Fox explains that health risk assessments are routinely performed for construction projects and due to the proximity to sensitive receptors and duration of construction.[155] The failure to prepare a health risk assessment is a glaring omission. The County must prepare a health risk assessment to adequately disclose, analyze, and mitigate the Project's public health risks and disclose those significant risks in a revised and recirculated document.

The Response Memorandum suggests that Dr. Fox did not provide evidence to show a need for a health risk assessment by arguing that the South Coast Air Quality Management District ("SCAQMD") does not have a recommendation or

---

[148] *Id.* at 1370-71.
[149] Fox Comments, p. 2.
[150] Fox Comments, p. 2.
[151] Fox Comments, p. 2 (some sensitive receptors are less than 25 meters from excavation work).
[152] DEIR, § 4.2, p. 31.
[153] *Berkeley Jets,* 91 Cal.App.4th at 1370-71; DEIR, § 4.2, pp. 23-24 (identifying significant unmitigated construction emissions)
[154] CEQA Guidelines, § 15151.
[155] Fox Comments, p. 5.

threshold at which a health risk assessment should be performed.[156] This suggestion, however, ignores Dr. Fox's previous comments citing the Office of Environmental Health Hazard Assessment's ("OEHHA") guidance for determining when a health risk assessment must be completed.[157] Further, since 2002 SCAQMD guidance has also recommended that mobile source health risk assessments should be prepared for all projects involving vehicular trips. SCAQMD's *Health Risk Assessment Guidance for Analyzing Cancer Risks from Mobile Source Diesel Emissions* explain that "in the event that the proposed project generates or attracts vehicular trips, especially heavy-duty diesel-fueled vehicles, it is recommended that the lead agency perform a mobile source health risk assessment." The SCAQMD mobile source guidance does not create any exception for projects that comply with CARB regulations.[158]

The Response Memorandum cites a "screening health risk assessment," which provides an estimate of impacts below SCAQMD's thresholds for cancer impacts.[159] Dr. Fox notes that OEHHA requires a formal health risk assessment, not a "screening health risk assessment."[160] Dr. Fox also finds that the assessment in the Response Memorandum was not publicly evaluated, uses improper model inputs, only evaluated DPM and no other TACs, used inappropriate risk factors, did not include acute exposure, and did not address cumulative impacts.[161]

Dr. Fox did prepare an assessment using OEHHA procedures which determined that there is a medium to high cancer risk from construction activities on the Project site, thus meeting the OEHHA threshold to require a formal health risk assessment, which the County was required to provide prior to Project approval.[162]

---

[156] Response Memo, p. 1.
[157] Fox Response, p. 1.
[158] *See* "Mobile Source Toxics Analysis," SCAQMD, (Aug. 2002) *available at:* http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook/mobile-source-toxics-analysis.
[159] Response Memo, p. 1.
[160] Fox Response, p. 2.
[161] Fox Response, pp. 2-4.
[162] Fox Response, p. 4.

B. The IS/MND Fails to Adequately Disclose, Analyze and Mitigate the Project's Potentially Significant Odor Impacts.

Rather than conduct an adequate analysis of odor impacts from construction, the IS/MND merely concludes that odor impacts would be less than significant. The County's conclusion is flawed for several reasons.

First, CEQA requires a lead agency to identify all potentially significant environmental effects. Significant effects may be "both short-term and long-term."[163] Thus, even temporary Project impacts may have significant effects on the environment that require mitigation.[164] CEQA does not permit the County to dismiss odor impacts on the basis that they are "temporary."

Second, the County lacks substantial evidence to support its less-than-significant impact conclusion. Project construction will result in diesel exhaust.[165] As Dr. Fox explains, the odors associated with diesel exhaust "are characterized by offensive odors."[166] Yet, the IS/MND does not contain any analysis at all to support its conclusion that odor impacts would not be significant.[167] The only way to conclude that odor impacts are insignificant is to use air dispersion modeling to estimate ambient concentrations of DPM at nearby sensitive receptors and compare the resulting concentrations to DPM odor thresholds.[168] In any case, the County conducted no analysis whatsoever. Thus, the IS/MND fails as an informational document under CEQA and the County lacks substantial evidence to support its conclusion.

Whereas the IS/MND lacks substantial evidence to support its conclusion, Dr. Fox provides substantial evidence based on her expert opinion that odor impacts will be significant.[169] The County admits that the primary source of odor anticipated from the construction of the proposed Project would be exhaust emissions from the diesel equipment. Dr. Fox comments, "[b]ased on my personal

---

[163] CEQA Guidelines, § 15126.2(a).
[164] CEQA Guidelines, § 15126.2(a).
[165] Fox Comments, p. 5.
[166] Fox Comments, p. 6.
[167] Fox Comments, p. 6.
[168] Fox Comments, p. 7.
[169] CEQA Guidelines, § 15384.

experience at construction sites, residential areas are close enough to Project construction sites for residents to smell noxious diesel and other exhaust fumes."[170] Furthermore, mitigation is available and should be required to reduce the significant odor impact from all construction within at least 1,000 feet of sensitive receptors.[171] For example, the construction equipment can be equipped with diesel oxidation catalysts, which eliminate odors.[172]

The IS/MND fails as an information disclosure document by failing to adequately analyze and disclose the Project's potentially significant odor impacts. Consequently, the County must revise and recirculate the analysis in a draft EIR to adequately disclose, analyze and mitigate the Project's significant odor impact.

The Response Memorandum suggests that odors were analyzed in accordance with the CEQA Guidelines and SCAQMD's thresholds of significance.[173] However, the IS/MND does not contain any odor analysis at all.[174] The Response Memorandum identifies various uncited studies to argue that sulfur oxides are the primary source of odors from diesel engines, and that sulfur oxide emissions have been greatly reduced.[175] Dr. Fox counters this unfounded assertion with a published study that shows that aldehydes are the primary source of odor from diesel engines.[176] Rules cited by SCAQMD and the California Air Resources Board are also inapposite since they do not apply until after emissions occur, or do not account for running emissions, respectively.[177]

C. The IS/MND Underestimates Potentially Significant Construction Emissions

The IS/MND contains numerous flaws in its air quality analysis, rendering the analysis unreliable and the impacts underestimated. The County must revise

[170] Fox Comments, p. 6.
[171] Fox Comments, p. 8.
[172] Fox Comments, p. 8.
[173] Response Memo, p. 2.
[174] Fox Response, p. 4.
[175] Response Memo, p. 2.
[176] Fox Response, p. 5.
[177] Fox Response, p. 5.

the air quality analysis to account for all sources of construction emissions and operational emissions in a recirculated environmental document.

The IS/MND omits highly relevant information from its air quality analysis. As a result, the IS/MND underestimates construction emissions. Dr. Fox explains that the CalEEMod fails to account for all sources of PM10 and PM2.5 construction emissions.

First, CalEEMod omits windblown dust from graded areas and storage piles and fugitive dust from off-road travel.[178] As Dr. Fox explains, these emissions must be separately calculated using a different tool, the U.S. EPA Compilation of Air Pollution Emissions Factors AP-42.[179] Once separately calculated, those emissions must be added to the CalEEMod total.[180] Dr. Fox provides substantial evidence that windblown dust from graded areas and storage piles and fugitive dust from off-road travel can be the major sources of PM10 and PM2.5 emissions from construction projects.[181]

Dr. Fox adds that dust emissions during construction are unique to individual sites. Here, the Project is sited on desert land in Coachella Flats, which will create greater particulate matter emissions than default conditions.[182] As such, the default conditions should have been calibrated to reflect the actual site.[183]

The IS/MND omits sources of emissions from cutting up and dismantling 291 existing wind turbines. The only source of emissions from decommissioning listed in the IS/MND addresses off-road construction impacts. A major source of emissions has been left out of decommissioning from fibers that can be released during cutting up of turbine blades, and any industrial equipment used during decommissioning.[184]

---

[178] Fox Comments, p. 12.
[179] Fox Comments, p. 12.
[180] Fox Comments, p. 12.
[181] Fox Comments, p. 12.
[182] Fox Comments, p. 13.
[183] Fox Comments, p. 13.
[184] Fox Comments, p. 13.

The IS/MND states that the existing turbine blades will be recycled. No analysis is provided including the emissions from disposal of the cut-up blades.[185] If they can be recycled, then the IS/MND must determine emissions of moving the material to the recycling center.[186]

Finally, the IS/MND severely underestimates emissions from moving the large new turbines to the site. These turbines would require non-standard heavy-duty transportation, including ships, barges, rail, trucks, or a combination thereof.[187] No analysis is attempted to determine the impacts from this activity.[188]

This underestimation of construction emissions fails to provide the public with accurate information regarding the scope and severity of potentially significant impacts to air quality. The County must correct its analysis and recirculate the revised analysis to reflect these potentially significant impacts.

The Response Memorandum argues that the CalEEMod analysis used includes Santa Ana wind gusts up to 50 mph and that SCAQMD's Fugitive Dust rules apply.[189] It continues to assert that the IS/MND includes fugitive dust emissions from work on unpaved roads.[190]

Dr. Fox notes that the CalEEMod analysis used for the project assumed a 7.5 mph wind speed, which is well below gusts up to 50 mph.[191] The SCAQMD rules do not apply until wind speeds reach 25 mph, therefore impacts from gusts between 7.5 and 25 mph were not included.[192] The IS/MND ignores the fact that the CalEEMod explicitly states that fugitive dust from construction is not included.[193] Dr. Fox has provided substantial evidence that the model also does not include decommissioning

[185] Fox Comments, pp. 13-14.
[186] Fox Comments, p. 14.
[187] Fox Comments, p. 14.
[188] Fox Comments, p. 14.
[189] Response Memo, p. 2.
[190] Response Memo, p. 3.
[191] Fox Response, p. 6.
[192] Fox Response, pp. 5-6.
[193] Fox Response, p. 6.

of the existing facilities.[194] The IS/MND does not include all sources of emission, and thus underestimates impacts.

D. The IS/MND Underestimates the Project's Potentially Significant Valley Fever Impacts and Lacks Appropriate Mitigation

The IS/MND summarily dismisses the Project's threat of Valley Fever to workers and sensitive receptors in the project area, while failing to implement feasible mitigation measures to lessen its impact. Valley Fever is a disease that can spread when people are exposed to spores during ground disturbance, such as this Project's construction.[195] Impacts to human health are severe, including possible death, and there is no known cure.[196] Sensitive receptors near the Project site, including workers and those who live nearby are at risk from exposure from disturbed dust, both during construction and during high-wind events.[197]

Despite this risk, the IS/MND does not include any mitigation to protect the public.[198] Dr. Fox has identified several mitigation measures that can feasibly be implemented to reduce the Project's potentially significant public health impacts from Valley Fever, including:

1) Reevaluating and updating the Injury and Illness Prevention Program to ensure Valley Fever safeguards are included,

2) Training all employees on Valley Fever related issues,

3) Controlling dust exposure,

4) Preventing transporting deadly spores out of endemic areas, and

[194] Fox Response, p. 6.
[195] Fox Comments, p. 20.
[196] Fox Comments, p. 22.
[197] Fox Comments, p. 21.
[198] Fox Comments, pp. 24-25.

5) Improving medical surveillance for all employees.[199]

The County's lack of adequate analysis of potentially significant impacts from the Project exposing people to Valley Fever and feasible mitigation for Valley Fever renders the IS/MND insufficient under CEQA. The County must revise and recirculate an EIR to disclose and mitigate these serious impacts.

The Response Memorandum contends that Riverside County is not "highly endemic" for Valley Fever, compliance with SCAQMD rules would reduce exposure, and that general regulations on exposure from the California Department of Industrial Relations ("CDIR") would sufficiently protect workers.[200]

Dr. Fox provides substantial evidence that it does not matter how endemic Riverside County is to risk exposing workers to Valley Fever, but that simply being endemic is sufficient.[201] The County has no evidence to support the claim that there will not be exposure of Valley Fever to workers. Regardless, in this case, an EIR is required because substantial evidence shows a significant impact may occur. SCAQMD fugitive dust rules cited only address PM 2.5 and 10, which are larger than Valley Fever spores, and thus insufficient.[202] Dr. Fox also found that CDIR regulations have been in existence on numerous other sites where Valley Fever exposure occurred, thus demonstrating that they are insufficient to fully protect workers.[203] Dr. Fox has provided feasible mitigation measures to protect workers, which must be applied to this project.

E. The IS/MND Incorrectly Assumes No Potentially Significant Impacts to Birds and Bats from Taller Wind Turbines

As stated above, the County in the IS/MND fails to describe the existing environmental setting for avian and bat mortality. Instead, the County concludes, without any evidence, that a smaller number of turbines means less impacts. Ms.

---

[199] Fox Comments, pp. 25-27.
[200] Response Memo, pp. 3-4.
[201] Fox Response, p. 7.
[202] Fox Response, p. 7.
[203] Fox Response, pp. 7-8.

Owens explains that the County's statement is unsupported and incorrect since other repowering projects have resulted in increased impacts to species.[204]

Although the IS/MND does not provide substantial evidence to support its claim. Ms. Owens provides substantial evidence based on data and her expert opinion that the Project's impacts from avian and bat mortality may be significant. There is an increase in mortality with an increase in wind turbine hub heights.[205] Many raptors, including Golden Eagles, prefer higher flight paths between 300-600 feet, which would be above the height of the existing wind turbines, but directly in the range of the proposed Project's wind turbines.[206] Because Golden Eagles are fully protected under the Fish and Game code, take of just one would be significant, thus the increased collision risk from the new turbines is potentially significant.

Bat mortality can also vary greatly depending on which species are present because of differences in foraging and migrating.[207] The County cannot support its claim in the IS/MND that there will not be any impacts to bats, since the County never analyzed any bat species which could occur near the Project.

The Bio Memorandum suggests that our previous comments do not provide evidence that the project may have a potentially significant impact to bats. Ms. Owens has provided expert evidence that the Project will cause bat mortality. Bats can be present at the Project site because they fly, forage, and migrate through the area.[208] Bats are attracted to lights, which must be installed on the Project.[209]

Ms. Owens provides additional expertise that turbine siting is critical for limiting impacts to species.[210] Specifically, birds tend to return to places of birth for future breeding.[211] If turbines are sited closer to nests, instinct of birds to avoid human activities can adversely impact their success at breeding in their traditional

---

[204] Owens' Comments, p. 2.
[205] Owens' Comments, p. 2.
[206] Owens' Comments, p. 3.
[207] Owens' Comments, p. 3.
[208] Owens' Response, p. 24.
[209] Owens' Response, p. 24.
[210] Owens' Response, p. 9.
[211] Owens' Response, p. 9.

homes.[212] The Project proposes new turbines further north than before, into the foothills.[213] No analysis has been done to determine any impacts from turbines being located in these areas. [214]

The County in the IS/MND fails to provide the public with accurate information regarding the scope and severity of the Project's potentially significant impacts from avian and bat mortality. The County must provide analysis supported by substantial evidence and must recirculate the revised analysis to disclose, analyze and mitigate these potentially significant impacts.

F. The IS/MND Fails to Adequately Disclose, Analyze and Mitigate the Project's Potentially Significant Impacts to Special-Status Species

The County lacks any data to support its claims in the IS/MND that the Project will not impact sensitive species that may occur at or near the Project site, since the County never actually analyzed whether those species may exist on the Project site or impacted area. Instead, the County only suggests that the Project would be consistent with the CVMSHCP, which does not address every special status species that may be found on the site.[215]

Ms. Owens notes that a Biological Technical Report is normally provided with an environmental review document, prepared pursuant to CEQA, since the environmental review document is required to contain detailed analyses of species that may occur and a baseline from which to determine a Project's potentially significant impacts.[216] Without a biological technical report that covers all special-status species that may occur on the Project site, there is no substantial evidence to support the County's conclusion that the Project will not have potentially significant impacts to the many sensitive plant and animal species that are found near the site.

---

[212] Owens' Response, p. 10.
[213] Owens' Response, p. 9.
[214] Owens' Response, p. 10.
[215] Owens' Comments, p. 12.
[216] Owens' Comments, p. 12.

The Bio Memorandum responds by suggesting that Appendix C is a Biological Technical Report that complies with CEQA.[217] This report did not actually conduct any focused surveys on species or habitat present on the project site, nor did it provide any specific data to support its claims.[218] Ms. Owens points out that the California Natural Diversity Database ("CNDD") identifies 145 sensitive species that can occur in the region, however Appendix B only lists 43 species.[219]

The Bio Memorandum also states that the adherence to the CVMSHCP will ensure that impacts to sensitive species are reduced to a less-than-significant level.[220] As stated above, the JPR process has not concluded, so this determination could not have been made at the time of Project approval. Additionally, the CVMSHCP only addresses impacts to habitat for certain species, while Ms. Owen's research and the CNDD provide evidence that more species may be present, and those species may be harmed by project construction and operation.

Under CEQA, the burden is on the County to investigate a Project's impacts to species when the County is made aware that there are endangered species and suitable habitat at the Project site.[221] The County must conduct focused surveys to determine the extent to which the project may impact special-status species, independent of the single day survey that was conducted.[222]

In addition to avian and bat mortality, Ms. Owens' expert opinion supported by data provides substantial evidence that there may be potentially significant impacts to special-status species, such as Coachella Fringe-Toed Lizards, Swainson's Hawk, and Burrowing Owls, particularly during Project construction.[223] Noise, dust, and vehicles can kill or harass sensitive species that are found at or

---

[217] Bio Memo, pp. 2-3.
[218] Owens' Comments, pp. 11-12
[219] Owens' Comments, p. 11; IS/MND at Appendix B of Appendix C.
[220] Bio Memo, pp. 2-3.
[221] *Napa Citizens for Honest Govt. v. Napa Co. Bd. Of Supervisors* (Aug. 3, 2001) 91 Cal.App.4th 342, 384-385.
[222] Owens' Response, pp. 8-9.
[223] Owens' Comments, p. 7.

near the Project site.[224] Because the CVMSHCP only address loss of habitat, not direct impacts, further analysis must be done.

As explained above, the Bio Memorandums claim that the public does not provide evidence that taller turbines can have greater impact is false. As stated, without substantial evidence to determine existing mortality, and reliable studies to determine Project mortality, no comparison can be made to support the IS/MND claim that harm can occur. Therefore, the IS/MND fails to comply with CEQA as a matter of law.

G. The IS/MND Fails to Adequately Disclose, Analyze and Mitigate the Project's Potentially Significant Impacts to Migratory Birds

Because the County misstates the law regarding the MBTA, it never provided studies or determinations whether the Project will take migratory birds. Ms. Owens has provided substantial evidence that numerous migratory birds are present at the Project site and may be significantly impacted by the Project.[225] Any take of migratory birds is prohibited, unless a permit has been granted by the Secretary of the Interior.[226]

Because the County has not provided a baseline, nor conducted any surveys on migratory birds, and asserts, contrary to the law, that they do not have to, the County fails to provide substantial evidence that the Project will not have a potentially significant impact. Ms. Owens' expert opinion provides substantial evidence that migratory birds are present at the site and may be significantly impacted, citing a study that identifies that 217 of the 535 bird species in California have been found in the San Gorgonio Pass, with a greater percentage of those species being migratory birds.[227] The County must conduct further analysis to disclose, analyze, and mitigate potentially significant impacts to migratory birds.

---

[224] Owens' Comments, p. 7.
[225] Owens' Response, p. 13.
[226] Fish and Game Code § 3513.
[227] Owens' Response, p. 13.

Since the County in the IS/MND does not adequately disclose, analyze, or mitigate the Project's potentially significant impacts to species present at the Project site, the IS/MND fails as an informational document. The County must revise and recirculate the analysis to adequately disclose, analyze, and mitigate the Project's potentially significant impacts on biological resources, including special-status species and migratory birds.

VII. THE MITIGATION MEASURES IN THE IS/MND FAIL TO ADEQUATELY MITIGATE IMPACTS TO BIOLOGICAL RESOURCES

An MND must include all mitigation measures included in the project to avoid potentially significant effects.[228] The IS/MND concludes that compliance with the CVMSHCP is adequate mitigation. The CVMSHCP does not address every species, and the IS/MND does not detail what specific guidelines from the CVMSHCP are being adopted as conditions of Project approval.[229] Thus, the County fails to require in the IS/MND specific, enforceable, and in some cases any, mitigation for the Project's potentially significant impacts on many species. The County must revise and recirculate the analysis to identify adequate mitigation for the Project's significant biological resources impacts.

VIII. THE IS/MND IMPROPERLY RELIES ON "DESIGN FEATURES" AND NONBINDING MITIGATION MEASURES

The County in the IS/MND suggests that following construction, revegetation of the area will occur.[230] However, the County fails completely to disclose the actual potentially significant impact in order for the public and decisionmakers to be able to determine whether the mitigation will actually reduce impacts. Therefore, the County improperly applies mitigation before actually disclosing the extent of the significant impact.[231] Furthermore, revegetation is non-binding and, as Ms. Owens suggests, unlikely to occur.[232]

---

[228] Pub. Res. Code § 21080(c); 14 CCR § 15071(e).
[229] Owens' Comments, pp. 12-13.
[230] IS/MND, p. 6.
[231] IS/MND, p. 6.
[232] Owens' Comments, p. 5.

A. Failure to Disclose Potentially Significant Impacts Prior to Mitigation.

The County's application of mitigation to the Project's unmitigated impacts violates CEQA's requirement that the lead agency must first determine the extent of a project's impacts before it may apply mitigation measures to reduce those impacts.[233] Moreover, the CEQA Guidelines define "measures which are proposed by project proponents to be included in the project" as "mitigation measures" within the meaning of CEQA.[234]

As described under CEQA Guidelines Section 15370, "Mitigation" includes:

(a) Avoiding the impact altogether by not taking a certain action or parts of an action.

(b) Minimizing impacts by limiting the degree or magnitude of the action and its implementation.

(c) Rectifying the impact by repairing, rehabilitating, or restoring the impacted environment.

(d) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.

(e) Compensating for the impact by replacing or providing substitute resources or environments.

Lotus v. Department of Transportation[235] clarified the requirements of CEQA Guideline 15370. In *Lotus*, the court held that "avoidance, minimization and/or mitigation measures," are not "part of the project."[236] Rather, they are mitigation measures designed to reduce or eliminate environmental impacts of the Project and must be treated as such. Mitigation measures cannot be incorporated in an EIR's

---

[233] 14 CCR § 15370; *Lotus v. Dep't of Transp.* (2014) 223 Cal.App.4th 645, 651-52.
[234] 14 CCR 15126.4(a)(1)(A).
[235] *Lotus v. Dept. of Transportation* (2013) 223 Cal.App.4th 650.
[236] *Id.* at 656.

initial calculation of the Project's unmitigated impacts because the analysis of unmitigated impacts, by definition, must accurately assess such impacts before any mitigation measures to reduce those impacts are applied.[237]

Because CEQA and *Lotus* prohibit the compressing of a mitigation measure with the Project, the IS/MND's lack of analysis of impacts caused by the Project's impacts from land disturbance, violates CEQA. The analysis should be revised to disclose the severity of all potentially significant impacts prior to mitigation.

B. Failure to Require Enforceable Mitigation.

i. Proposed Revegetation Plan

Mitigation measures must be enforceable through conditions of approval, contracts or other means that are legally binding.[238] This requirement is intended to ensure that mitigation measures will actually be implemented, not merely adopted and then ignored.[239] The IS/MND reliance on revegetation fails to meet this threshold requirement because the measures are not incorporated as binding mitigation measures for the Project. This plan will be created after the JPR process, well after project approval. As a result, the IS/MND fails to include any details or binding mechanism to ensure that the Applicant will be required to implement these measures for the Project.

ii. Bird Diverters

The Applicant mentioned during the November 28, 2018 Planning Commission hearing that they will install bird diverters on guy wires for meteorological towers in order to limit impact to birds. This mitigation measure was never included as a condition of the project and is not enforceable and may lead to unmitigated significant impacts.

---

[237] *Id.* at 651 - 52.
[238] PRC § 21081.6(b); 14 CCR § 15126.4(a)(2); *Lotus v. Dep't of Transp.* (2014) 223 Cal. App. 4th 645, 651-52.
[239] *Fed'n of Hillside & Canyon Ass'n v. City of Los Angeles* (2000) 83 Cal. App. 4th 1252, 1261; *Anderson First Coal. v. City of Anderson* (2005) 130 Cal.4th 1173, 1186.

Without an enforceable mechanism, the Restoration Plan for revegetation and installation of bird diverters may not happen, and the IS/MND's conclusions that the Project's impacts will be less than significant with these measures incorporated are unsupported. The County must include the Restoration Plan with revegetation of disturbed lands from the Project as a binding mitigation requirement.

The Bio Memorandum asserts that the public does not have evidence that mitigation measures will not be implemented.[240] This is an unfounded legal opinion which does not show that the Project has complied with CEQA's mandate to include binding mitigation measures.

IX. THE IS/MND IMPROPERLY DEFERS MITIGATION OF SIGNIFICANT IMPACTS

It is generally improper to defer the formulation of mitigation measures.[241] An exception to this general rule applies when the agency has committed itself to specific performance criteria for evaluating the efficacy of the measures to be implemented in the future, and the future mitigation measures are formulated and operational before the project activity that they regulate begins.[242] As the courts have explained, deferral of mitigation may be permitted only where the lead agency: (1) undertakes a complete analysis of the significance of the environmental impact; (2) proposes potential mitigation measures early in the planning process; and (3) articulates specific performance criteria that would ensure that adequate mitigation measures were eventually implemented.[243]

A. The IS/MND Defers Mitigation of Significant Impacts for Coachella Valley Jerusalem Cricket Habitat Loss

As noted above, the IS/MND has determined that impacts to the Coachella Valley Jerusalem Cricket are significant and that mitigation will require acquiring habitat, however there is not suitable habitat in place within the Conservation

---

[240] Bio Memo, p. 3.
[241] 14 CCR § 15126.4(a)(1)(B); *POET v. CARB*, 218 Cal.App.4th at 735.
[242] *POET*, 218 Cal.App.4th at 738.
[243] *Comtys. for a Better Env't v. City of Richmond* (2010) 184 Cal.App.4th 70, 95; *Cal. Native Plant Socy' v. City of Rancho Cordova* (2009) 172 Cal.App.4th 603, 621.

Area. Properly mitigating this habitat may require future actions by USFWS and CDFW, who may not approve plans to provide mitigation. Deferral of this mitigation makes it uncertain whether habitat is available, or if the USFWS and CDFW will approve it, potentially leaving the impact unmitigated.

Mitigation will require revegetation of disturbed lands, the details which is not to be revealed until a future Restoration Plan is approved by the CVCC and County. The IS/MND says but provides no assurances that this will be completed prior to any ground disturbance.[244] Approval of the Restoration Plan should occur with or before project approval, not after. This future action may not occur or may be insufficient to fully mitigate the significant impacts, as required. If impacts cannot be fully mitigated, it will be too late to change the Project to reduce impacts to a less-than-significant level.

This deferral of mitigation will have impacts to the region and its workers because the Project without mitigation will exceed Rough Step for the Coachella Valley. This will prevent the County from approving any other projects that may impact the Coachella Valley Jerusalem Cricket until this mitigation is completed.[245]

The Bio Memorandum argues that our previous comments had no basis to allege that the County will not adhere to mitigation requirements.[246] First, as stated above, this is an unfounded legal opinion. Second, mitigation measures are improperly deferred when they are not formulated and not held to certain performance criteria. Without a completed JPR and Restoration Plan, it cannot be determined by the County or the public that the Project's mitigation was adequate, because the County and public would have no assurances what the mitigation measures were or what their impact would be, or whether they will actually reduce significant impacts to a less-than-significant level.

The IS/MND must be withdrawn and recirculated with appropriate mitigation measures identified and required with the project approval, not at a later time as was done here.

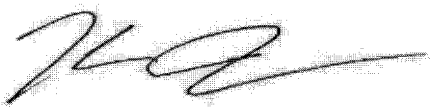
---

[244] Is/MND, p. 34.
[245] *See* Coachella Valley Conservation Commission, Draft Joint Project Review (JPR) (Oct. 30, 2018), p. 3., **Exhibit G.**
[246] Bio Memo, p. 3.

X. CONCLUSION

Substantial evidence supports more than a fair argument that the Project may result in potentially significant adverse public health, transportation, odor and biological resource impacts that were not identified in the IS/MND, and thus have not been adequately analyzed or mitigated. The IS/MND also fails to comply with CEQA as a matter of law. We urge the County to fulfill its responsibilities under CEQA by granting this appeal, withdrawing the IS/MND and preparing a legally adequate EIR to rectify the legal errors and address the potentially significant impacts described in this comment letter and the attached letters from Dr. Fox and Ms. Owens. This is the only way the County and the public will be able to ensure that the Project's potentially significant environmental impacts are mitigated to less than significant levels.

Sincerely,



Kyle Jones

KCJ:ljl

Attachments

EXHIBIT A

Comments

on the

Initial Study/Mitigated Negative Declaration

for the

Painted Hills Wind Energy Repowering Project

Riverside County,
California

November 26, 2018

Phyllis Fox, PhD, PE

I

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1. INTRODUCTION

Painted Hills Wind, LLC (the Applicant) proposes to decommission and remove approximately 291 existing antiquated wind turbines and install up to 14 new wind turbines and related infrastructure, up to 500 feet in height, with a per turbine generating capacity of between 2.0 and 4.2 megawatts (MW) within the Wind Energy Resource (W-E) Zone (the Project).

I reviewed the Initial Study/Mitigated Negative Declaration (IS/MND)[1] and supporting Variance Application (Application).[2] The Public Hearing Notice refers to this collection of information as a "Mitigated Negative Declaration" or MND.[3] My analysis of this information indicates that:

- construction health risks were not evaluated and are potentially significant;
- construction odor impacts were not evaluated and are potentially significant;
- construction emissions are not adequately supported, significantly underestimated, and potentially significant when corrected;
- waste disposal impacts were not evaluated and are potentially significant;
- worker health and safety issues were not evaluated and are potentially significant;
- traffic impacts were not evaluated and are potentially significant; and
- Valley Fever impacts were not evaluated and are potentially significant.

In sum, in my opinion the Initial Study/Mitigated Negative Declaration and supporting Application are substantially deficient. An IS and/or an MND can be prepared only when there is no substantial evidence in light of the whole record before the lead agency that the project will not have a significant effect on the environment. An environmental impact report (EIR) must be prepared when there is substantial evidence in the record that supports a fair argument that significant impacts may occur. My analysis below indicates that there is substantial evidence that the Project will result in significant impacts, requiring that an EIR be prepared. Further, the IS/MND does not fulfill its mandate as an informational document under CEQA to inform the public of potential impacts, lacks substantial evidence to support its conclusions, fails to identify significant impacts, and fails to require adequate mitigation for significant impacts.

My resume is included in Exhibit 1 to these Comments. I have over 40 years of experience in the field of environmental engineering, including air emissions and air pollution control; greenhouse gas (GHG) emission inventory and control; water quality and water supply

---

[1] County of Riverside, Environmental Assessment Form: Initial Study.

[2] Dudek, WECS and Zoning Variance Application Packages for the Painted Hills Wind Energy Repowering Project, Prepared for County of Riverside, Planning Department, June 2018 (Application).

[3] Notice of Public Hearing and Intent to Adopt a Mitigated Negative Declaration, November 28, 2018; available at: https://planning.rctlma.org/Portals/0/hearings/pc/2018/11-28-18%20WCS180001%20PC_1.pdf?ver=2018-11-09-083619-600.

investigations; hazardous waste investigations; risk of upset modeling; environmental permitting; nuisance investigations (odor, noise); environmental impact reports (EIRs), including CEQA/NEPA documentation; risk assessments; and litigation support. I have M.S. and Ph.D. degrees in environmental engineering from the University of California at Berkeley. I am a licensed professional engineer in California.

I have prepared comments, responses to comments and sections of CEQA and NEPA documents on air quality, greenhouse gas emissions, water supply, water quality, hazardous waste, public health, risk assessment, worker health and safety, odor, risk of upset, noise, land use, and other areas for well over 500 CEQA and NEPA documents. This work includes EIRs, EISs, Initial Studies (ISs), Negative Declarations (NDs), and Mitigated Negative Declarations (MNDs). My work has been specifically cited in two published CEQA opinions: *Berkeley Keep Jets Over the Bay Committee, City of San Leandro, and City of Alameda et al. v. Board of Port Commissioners* (2001) 111 Cal. Rptr. 2d 598, and *Communities for a Better Environment v. South Coast Air Quality Management Dist.* (2010) 48 Cal. 4th 310; and has supported the record in many other CEQA and NEPA cases.

2. CONSTRUCTION HEALTH RISKS WERE NOT EVALUATED

The Application reports significance thresholds for Toxic Air Contaminants (TACs)[4] and identifies the major TAC of concern, diesel particulate matter (DPM),[5] but fails to conduct any analysis to determine if TAC emissions are below the significance thresholds. The IS and Application indicate the nearest sensitive receptor land use, an existing residential use, is located about 600 feet from the closest area of construction disturbance[6] and the nearest receptor distance is about 328 feet.[7] Further, many residences are within 2 miles of the Project site.[8]

Without conducting a health risk assessment (HRA), the IS/MND concluded that construction health impacts of TACs to these nearby residents would be insignificant. Instead, it relied on the SCAQMD localized significance thresholds (LSTs), which do not address health risk to local receptors, but only compliance with ambient air quality standards.[9] This is inconsistent with the Office of Environmental Health Hazard Assessment's (OEHHA's) risk assessment guidelines for short-term construction exposures,[10] which require a formal health

---

[4] Application, pdf 442, Table 4.

[5] Application, pdf 422.

[6] IS, pdf 26; Application, pdf 443, 456.

[7] IS, pdf 26.

[8] Application, Exhibit M, pdf 267.

[9] IS, pdf 26-28 and Application, pdf 442.

[10] Office of Environmental Health Hazard Assessment (OEHHA), Risk Assessment Guidelines: Guidance Manual for Preparation of Health Risk Assessments, February 2015 (OEHHA 2015), Section 8.2.10: Cancer Risk Evaluation of Short Term Projects, pp. 8-17/18; available at https://oehha.ca.gov/air/crnr/notice-adoption-air-toxics-hot-spots-program-guidance-manual-preparation-health-risk-0.

risk assessment, not an LST lookup table based on ambient air quality impacts rather than public health impacts. This is inadequate and incorrect.

First, the IS/MND and Application fail to identify all relevant TACs that would be emitted during construction.[11] TACs would include diesel particulate matter (DPM), a potent carcinogen, aldehydes, and benzene and unidentified pollutants from cutting up turbine components on site. See Comment 7.1.

Second, the IS/MND and Application fail to quantify the amount of TACs that would be emitted, which means that health impacts cannot be assessed.

Third, the IS/MND and Application fail to convert TAC emissions into ambient TAC concentrations that exposed residents and construction workers would breathe. Health impacts cannot be assessed without comparing ambient concentrations that would be breathed by residents and workers with acute, chronic, and cancer significance criteria.[12]

Fourth, the IS/MND and Application fail to identify the duration of construction and the fleet composition operating in the vicinity of each residence. The durations of construction of the various Project components are long enough to trigger a formal health risk assessment under OEHHA risk assessment guidance.

Fifth, even if all exposures were short term, significance criteria -- acute reference exposure levels (RELs) -- exist for short-term (1-hour) exposures. The short-term REL for diesel exhaust, for example, is 5 ug/m^3,[13] a very small value commonly present in the vicinity of construction sites. Project construction will emit significant amounts of diesel particulate matter (DPM), which is a potent human carcinogen.[14]

OEHHA guidance on construction requires that construction health risks be evaluated. OEHHA risk assessment guidance requires a health risk assessment for construction projects lasting longer than 2 months, and further recommends using a lower cancer risk significance threshold[15] than cited in the IS/MND and Application.[16] The conceptual construction schedule indicates that construction will last for about 18 months.[17] Six project components last 2 months or longer—including first phase turbine decommissioning (5 months); site preparation/grading

---

[11] DPM is discussed generically in the Application at pdf 422, but is not identified as a TAC that would be emitted by Project construction equipment.

[12] See OEHHA, Air Toxics Hot Spots; available at: https://oehha.ca.gov/air/air-toxics-hot-spots.

[13] OEHHA, OEHHA Acute, 8-hour and Chronic Reference Exposure Level (REL) Summary, June 28, 2016; available at: https://oehha.ca.gov/air/general-info/oehha-acute-8-hour-and-chronic-reference-exposure-level-rel-summary.

[14] OEHHA, Hot Spots Unit Risk and Cancer Potency Values, p. A-3, diesel exhaust; available at: https://oehha.ca.gov/media/CPFs042909.pdf.

[15] OEHHA 2015) Section 8.2.10: Cancer Risk Evaluation of Short Term Projects, pp. 8-17/18.

[16] Application, Table 4, pdf 442 (10 in 1 million).

[17] Application, pdf 189.

(3 months); excavation/collector lines (3 months); foundations (2 months); installation (3 months); and second phase turbine decommissioning (7 months).[18] The OEHHA risk assessment guidelines, which are used throughout California for assessing health risks under CEQA, state:

> Due to the uncertainty in assessing cancer risk from very short-term exposures, we do not recommend assessing cancer risk for projects lasting less than two months at the MEIR. We recommend that exposure from projects longer than 2 months but less than 6 months be assumed to last 6 months (e.g., a 2-month project would be evaluated as if it lasted 6 months). Exposure from projects lasting more than 6 months should be evaluated for the duration of the project. In all cases, for assessing risk to residential receptors, the exposure should be assumed to start in the third trimester to allow for the use of the ASFs (OEHHA, 2009). Thus, for example, if the District is evaluating a proposed 5-year mitigation project at a hazardous waste site, the cancer risks for the residents would be calculated based on exposures starting in the third trimester through the first five years of life.
>
> For the MEIW, we recommend using the same minimum exposure requirements used for the residential receptor (i.e., no evaluation for projects less than 2 months; projects longer than 2 months but less than 6 months are assumed to last 6 months; projects longer than 6 months would be evaluated for the duration of the project). Although the off-site worker scenario assumes that the workers are 16 years of age or older with an Age-Sensitivity Factor of 1, another risk management consideration for short-term project cancer assessment is whether there are women of child bearing age at the worksite and whether the MEIW receptor has a daycare center. In this case, the Districts may wish to treat the off-site MEIW in the same way as the residential scenario to account for the higher susceptibility during the third trimester of pregnancy, and for higher susceptibility of infants and children.
>
> Finally, the risk manager may want to consider a lower cancer risk threshold for risk management for very short-term projects. Typical District guidelines for evaluating risk management of Hot Spots facilities range around a cancer risk of 1 per 100,000 exposed persons as a trigger for risk management. Permitting thresholds also vary for each District. There is valid scientific concern that the rate of exposure may influence the risk – in other words, a higher exposure to a carcinogen over a short period of time may be a greater risk than the same total exposure spread over a much longer time period. In addition, it is inappropriate from a public health perspective to allow a lifetime acceptable risk to accrue in a short period of time (e.g., a very high exposure to a carcinogen over a short period of time resulting in a 1×10^{-5} cancer risk). Thus, consideration should be given for very short term projects to using a lower cancer risk trigger for permitting decisions.

The IS/MND and Application do not contain the type of information normally relied upon to determine if the OEHHA risk assessment guidance is complied with, including a detailed construction schedule and maps that locate each project construction site and identify all nearby sensitive receptors, as well as their distance from construction work and duration of exposure.

---

[18] *Ibid.*

Instead, one must rely on the noise analysis to locate sensitive receptors, with no assurance that it is complete and accurate for health risk assessment. The noise analysis, which does locate some sensitive receptors, fails to disclose the duration of exposure or include maps showing the location of all sensitive receptors, as would be required for an HRA. The IS/MND and Application fail to disclose any information about TAC sensitive receptors at any of these locations (e.g., residents, young children).

Health risk assessments are routinely performed for construction projects. The proximity of identified sensitive receptors and the duration of construction indicate that a health risk assessment should have been prepared for this Project. Based on my experience, I expect that cancer and acute health impacts from DPM would be significant.

Further, the IS/MND and Application fail to recognize that Project construction emissions would occur concurrently with and subsequent to countless other construction projects elsewhere in the air basin. The Application and IS/MND also failed to evaluate cumulative health impacts of construction, which are also likely significant.[19] These impacts could be mitigated by requiring catalyzed diesel particulate traps and diesel oxidation catalysts on construction equipment. These emissions could be further reduced by

- using alternative fueled equipment (e.g., propane), where available;
- limiting engine idling to two minutes for delivery trucks and dump trucks;
- suspending construction activities during smog alerts;
- purchasing local GHG offsets that provide PM2.5 benefits; and
- employing a construction site manager to verify that engines are properly maintained and to maintain a log.

The IS/MND and Application's categorical dismissal of the requirements for an analysis of health impacts to adjacent residents during Project construction is not justified. The IS/MND and Application should be revised to include a proper health risk assessment for TAC emissions. As the Application and IS/MND did not include a health risk assessment for Project construction, did not identify or quantify TAC emissions, and did not include any analysis to verify that none is required (LSTs are not applicable to health risks, only to ambient air quality), the IS fails as an informational document under CEQA and its conclusions are not supported by substantial evidence.

3.0 ODOR IMPACTS WERE NOT EVALUATED

The IS/MND admits that "[o]dors would be potentially generated from vehicles and analysis that they would be "attributable to concentrations of unburned hydrocarbons from tailpipes of construction equipment. Such odors would disperse rapidly from the Project site and generally occur at magnitudes that would not affect substantial numbers of people.

---

[19] Don Anair, Union of Concerned Scientists, Digging Up Trouble: The Health Risks of Construction in California, 2006; available at http://www.ucsusa.org/sites/default/files/legacy/assets/documents/clean_vehicles/digging-up-trouble.pdf.

Further, Project operations do not include uses or activities associated with the creation of objectionable odors. Therefore, impacts associated with the generation of objectionable odors would be less than significant."[20] This is unsupported and inconsistent with my experience.

This is wrong for many reasons. First, the major source of odors during construction is diesel exhaust, not "unburned hydrocarbons." Second, the odors would not disperse rapidly on days with low wind velocities. Third, substantial numbers of people do not have to be exposed for odors to be significant to affected parties. The exposure of a single person to adverse odors is significant.

Construction noise impacts are similar to construction odor impacts, in that noise would also be "temporary" and would affect the same receptors. Both noise and odor would impact local residents. The Application includes a noise analysis[21] but does not include any odor analysis. Based on my personal experience at construction sites, residential areas are close enough to Project construction sites for residents to smell noxious diesel and other exhaust fumes. This is a significant odor impact.

The odors and accompanying eye and nose irritation associated with diesel exhaust—smoky, burnt, oily, kerosene—have been documented for decades.[22] A 1970 EPA report noted that "exhaust gases emitted by diesel engines are characterized by offensive odors, which can be rated by human judges." Elsewhere, the EPA noted that "odor is undoubtedly the prime sensory attribute of diesel exhaust under the typical circumstances of human exposure."[23]

The IS/MND and Application fail to include a map locating residents in the vicinity of the various construction sites—a serious omission. The only way to conclude that odor impacts

---

[20] IS, pdf 28.

[21] Application, pdf 995-1048.

[22] Arthur D. Little, Inc., Chemical Identification of the Odor Components in Diesel Engine Exhaust, June 1971; available at https://nepis.epa.gov/Exe/ZyNET.exe/9101G0ZG.TXT?ZyActionD=ZyDocument=&Client=EPA&Index=Prior+to+1976&Docs=&Query=&Time=&EndTime=&SearchMethod=1&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&IntQFieldOp=0&ExtQFieldOp=0&XmlQuery=&File=D%3A%5Czyfiles%5CIndex%20Data%5C70thru75%5CTxt%5C00000021%5C9101G0ZG.txt&User=ANONYMOUS&Password=anonymous&SortMethod=h%7C-&Maximum=Documents=1&FuzzyDegree=0&ImageQuality=r75g8/r75g8/x150y150g16/i425&Display=hpfr&DefSeekPage=x&SearchBack=ZyActionL&Back=ZyActionS&BackDesc=Results%20page&MaximumPages=1&ZyEntry=1&SeekPage=x&ZyPURL.

[23] Amos Turk and others, Sensory Evaluation of Diesel Exhaust Odors, U.S. Department of Health, Education, and Welfare Report; available at https://nepis.epa.gov/Exe/ZyNET.exe/=9100HJM4.TXT?ZyActionD=ZyDocument&Client=EPA&Index=Prior+to+1976&Docs=&Query=&Time=&EndTime=&SearchMethod=1&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&IntQFieldOp=0&ExtQFieldOp=0&XmlQuery=&File=D%3A%5Czyfiles%5CIndex%20Data%5C70thru75%5CTxt%5C00000012%5C9100HJM4.txt&User=ANONYMOUS&Password=anonymous&SortMethod=h%7C-&MaximumDocuments=1&FuzzyDegree=0&ImageQuality=r75g8/r75g8/=x150y150g16/i425&Display=hpfr&DefSeekPage=x&SearchBack=ZyActionL&Back=ZyActionS&BackDesc=Results%20page&MaximumPages=1&ZyEntry=1&SeekPage=x&ZyPURL#.

are insignificant is to use air dispersion modeling to estimate ambient concentrations of DPM (and other odoriferous compounds) at nearby residences and compare the resulting concentrations to odor thresholds. The dismissal of potential odor impacts of diesel exhaust emissions due to their temporary nature is not acceptable. Most odors are temporary, but their temporary nature does not render them insignificant or excuse a lead agency from evaluating them under CEQA. Noise is also temporary, but noise impacts are routinely evaluated in CEQA documents and were evaluated in the Application.

The odor of diesel exhaust is considered by most people to be objectionable. The EPA found that, at high intensities, diesel exhaust may produce sufficient physiological and psychological effects to warrant concern for public health.[24] The nearest sensitive receptor to the Project site is a residence located about 600 feet from construction.[25] A fleet of heavy-duty, diesel-fueled construction equipment, located as close as 600 feet from a home would certainly result in significant odor impacts for the home's occupants and likely result in accompanying physiological and psychological effects. Further, clouds of soot from diesel-powered equipment when working and idling at the Project site can travel downwind for miles and drift into more heavily populated areas.[26]

The IS/MND and Application fail to evaluate construction odor impacts. The analysis of odor is no different than the analysis of construction air quality impacts. One identifies the odoriferous compounds that would be present (in this case diesel exhaust, represented by PM2.5 or another surrogate, such as aldehydes),[27] estimates their emission rates, and uses an air dispersion model to estimate ambient concentrations of the odoriferous compounds at the location of sensitive receptors. The modeled ambient concentrations are then compared to published odor thresholds.[28]

Although the County has no specific odor guidance, the absence of specific guidance does not mean odor impacts can be ignored. It is standard practice in such situations to review and adopt policies and procedures adopted by other jurisdictions. Design criteria, for example, have been developed for diesel-fueled equipment based on the 1:2000 odor dilution threshold, including for a 400-hp diesel truck, a 250-kW diesel generator, and a 2,000-kW diesel generator.

---

[24] EPA, Health Assessment Document for Diesel Engine Exhaust, EPA/600/8-90/057F, May 2002; available at https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=29060.

[25] Application, pdf 443.

[26] Union of Concerned Scientists, Digging Up Trouble: The Health Risks of Construction Pollution in California, 2006; available at: http://sandiegohealth.org/air/ucsusa/Digging-up-Trouble.pdf.

[27] M. M. Roy and N. N. Mustafi, Investigation of Odorous Components in the Exhaust of DI Diesel Engines, International Conference on Mechanical Engineering, December 26-28, 2001, pp. II 31-36; available at https://me.buet.ac.bd/icme/icme2001/cdfiles/Papers/Environment/6_Final_en01(31-36).pdf.

[28] See, for example, J. E. Alpert and N. T. Wu, Odor Modeling as a Tool in Site Planning, *BioCycle Magazine*, 2012; available at https://pdfs.semanticscholar.org/74fe/73042013cfb465539def89ec97328a89eb2a.pdf.

The resulting design criteria are 5,293 $\mu g/m^3/g/s$; 492 $\mu g/m^3/g/s$; and 66 $\mu g/m^3/g/s$, respectively, for this equipment.[29]

The IS/MND and Application do not contain any analysis at all to support the conclusion that odor impacts would not be significant. Thus, the IS/MND fails as an informational document under CEQA and its conclusions are not supported by substantial evidence. In my opinion, construction odor impacts would be significant. Mitigation is available to reduce diesel particulate matter emissions, the major source of construction odors, and should be required for all construction equipment within at least 1,000 feet of sensitive receptors. Construction equipment that operates near sensitive receptors, for example, can be equipped with a diesel oxidation catalyst, which eliminates odors.[30]

4.0 WASTE DISPOSAL IMPACTS WERE NOT EVALUATED

The Project involves the decommissioning of 291 existing, antiquated turbines from the Project site.[31] The blades, towers and nacelles would be cut up on site to facilitate movement off site to recycling facilities.[32] The IS and Application fail to disclose the materials in the shells of the wind turbine blades, which determine impacts to workers dismantling and cutting them up as well as the impacts of their ultimate disposal. Blade material, for example, includes plastics and organic material which would release hazardous materials on cutting up and disposal.[33] The IS and Application also failed to disclose worker health impacts from dismantling the existing turbines. However, other studies indicate the hub, nacelle, and tower are steel and the blades glass reinforced plastic.[34]

Cutting up the blades on site would produce small fiber particles that create occupational health and safety risks for workers. Inhalation, as well as skin and eye contact, can produce moderate irritation to mucous membranes, skin, and eyes, as well as coughing. Further, particles can produce alterations in the cellular and enzymatic components of the deep

---

[29] U.S. EPA and U.S. DOE (Laboratories for the 21st Century: Best Practices), Modeling Exhaust Dispersion for Specifying Acceptable Exhaust/Intake Designs, May 2005, Table 1; available at http://labs21.lbl.gov/DPM/Assets/bp_modeling_508.pdf.

[30] W. Addy Majewski, Diesel Oxidation Catalyst, 2012; available at https://www.dieselnet.com/tech/cat_doc.php.

[31] Application, pdf 75.

[32] IS, pdf 5; Application, pdf 91-92, 447.

[33] Niklas Andersen, Wind Turbine End-of-Life: Characterization of Waste Material, 2015, Section 7.3; available at: https://www.diva-portal.org/smash/get/diva2:873368/FULLTEXT01.pdf;

[34] Tyer R. Fox, Recycling Wind Turbine Blade Composite Material as Aggregate in Concrete, Master of Science Thesis, Iowa State University, Table 1; available at: https://www.imse.iastate.edu/files/2014/03/Fox-Tyler-Recycling-wind-turbine-blade-composite-material-as-aggregate-in-concrete.pdf.

lung.[35] These smaller pieces are then generally further crushed, shredded and milled down until the resulting material can be divided into fibers and resins and the copper elements can be sifted out. The IS/MND and Application are silent on this second step and does not disclose where it occurs or include any emissions from these shredding operations.[36] Regardless, the impacts must be considered.

The IS/MND and Application assert that the cut-up blades would be recycled and that a nearby landfill would be used, classifying the impact as less than significant.[37] However, the blades, which are made of composite, are currently regarded as unrecyclable.[38] The currently known available disposal methods all have significant environmental impacts, as summarized in Table 1.[39] Landfill disposal, for example is known to release methane and volatile organic compounds that could result in significant local impacts. The IS/MND and Application fail to disclose the impacts of landfill disposal and worker health impacts from cutting up the blades. Thus, the IS fails as an informational document under CEQA.

---

[35] K. Ramirez-Tejeda, D. A. Turcotte, and S. Pike, Unsustainable Wind Turbine Blade Disposal Practices in the United States: A Case for Policy Intervention and Technology Innovation, Table 1, *New Solutions: A Journal of Environmental and Occupational Health Policy*, v. 26, no. 4, pp. 581-598, 2017, Exhibit 2.

[36] Andersen, 2015, p. 15.

[37] IS, pdf 75.

[38] P. Liu and C. Y. Barlow, Wind Turbine Blade Waste in 2050, *Waste Management*, v. 62, pp. 229-240, 2017; abstract available at https://www.ncbi.nlm.nih.gov/pubmed/28215972.

[39] Ramirez-Tejeda et al., 2017; Andersen 2015, p. 14 ("Composite material on the other hand have proven challenging to recycle.")

Table 1: Existing Turbine Blade Disposal Methods and Associated Impacts

Disposal method	Economic	Environment and occupational exposure
Landfill	Opportunity cost of unrecovered material and concerns of long-term space availability	Release of methane and other volatile organic compounds from wood and other organics in the blades
Incineration with energy and/or material recovery	Significant energy and machinery requirements to cut and transport the blades to the incineration plant	Pollutant ash after the incineration process, possible emissions of hazardous flue gasses, and potential hazards from mechanical processing
Pyrolysis	Low economic viability because of degradation of resulting fibers	Emission of environmentally hazardous off-gasses and potential hazards from mechanical processing
Fluidized bed combustion	Low economic viability because of degradation of resulting fibers	Potential hazards from mechanical processing
Chemical	Economic viability dependent on chemical process used	Use of hazardous chemicals and dust from mechanical processing of the blades
Mechanical	Low market value of both the resulting fibers and substitute virgin material	Dust emission during the grinding process of glass fiber thermoset composites

5.0 IMPACTS TO MWD AQUEDUCT WERE NOT EVALUATED

The Colorado River Aqueduct, a subsurface water pipe owned and operated by the Metropolitan Water District (MWD), bisects the Project site from east to west.[40] The IS/MND and Application assert with no support that construction would not impact this aqueduct.[41] However, the IS/MND and Application failed to evaluate the impact of soil borne vibration during decommissioning and construction, which could adversely affect the Aqueduct. The vibration analysis only considered impacts on the nearest residence and ignored impacts on the much closer aqueduct. Thus, the IS/MND fails as an informational document under CEQA.

6.0 TRANSPORTATION IMPACTS WERE NOT EVALUATED

The Project will decommission and remove about 291 existing small wind turbines and install up to 14 new substantially larger wind turbines. The new turbines would be up to 500 feet high (blade tip to base) with rotor diameters of up to 427 feet.[42] These large wind turbines are heavy and extremely difficult to transport. It is well known, for example, that the size and weight of these large turbines often exceed the limits of U.S. infrastructure, making them

[40] IS, pdf 9, 38.

[41] See, for example, IS, pdf 39, 72.

[42] Application, pdf 88, Figure 1.

difficult to transport from the manufacturing facilities (which are not identified) to the site,[43] a remote desert location with only rural road access. The dimensions and weight of turbine components place limits on the feasible routes, due to the larger turning radius, tall clearance requirements, and road weight restrictions.

The IS/MND and Application are silent on how these very large turbines would be transported to the site.[44] The Application admits that transporting turbine components to the site is part of Project construction,[45] but is silent on how the turbine components will arrive. Further, the air quality analysis does not include emissions from the types of vehicles that would be required to transport them. It is, for example, unknown whether ship, barge, rail, truck—or some combination—would be used to deliver the turbine components to the site. The transportation mode determines the air quality and transportation/traffic impacts. It is impossible to evaluate the transportation and construction air quality impacts of delivering the new turbines without transportation mode and route information. Thus, the IS fails as an informational document under CEQA. The available turbine information indicates that traffic and air quality impacts would be significant.[46]

7.0 CONSTRUCTION IMPACTS ARE UNDERESTIMATED

The IS and Application estimated criteria pollutant emissions during Project construction[47] using the CalEEMod Version 2016.3.2 model.[48] The IS/MND concluded, based on the CalEEMod analysis in the Application,[49] that emissions during construction would not exceed SCAQMD significance thresholds and thus were not significant.[50] However, construction emissions were underestimated by using default and other assumptions that are not applicable, especially with respect to the unique challenges posed by this Project - the

---

[43] Lockheed Martin Corporation, Solving the Challenge of Transporting Wind Turbine Blades, December 2017; available at https://www.lockheedmartin.com/content/dam/lockheed-martin/eo/documents/webt/transporting-wind-turbine-blades.pdf.

[44] IS, pdf 68-71; Application, pdf 87-93.

[45] Application, pdf 162.

[46] See, for example, Transportation of Large Wind Components: A Review of Existing Geospatial Data, September 2016; available at https://www.nrel.gov/docs/fy16osti/67014.pdf; Inbound Logistics, Transporting Wind Turbines: An Oversized Challenge, January 31, 2012; available at https://www.inboundlogistics.com/cms/article/transporting-wind-turbines-an-oversized-challenge/; LM Wind Power, World's Longest Wind Turbine Blade Successfully Completes Its First Journey; available at https://www.lmwindpower.com/en/stories-and-press/stories/news-from-lm-places/transport-of-longest-blade-in-the-world; James Osborne, As Wind Turbines Grow, So Does Transportation Challenge, Houston Chronicle, February 20, 2016; available at https://www.houstonchronicle.com/business/energy/article/As-wind-turbines-grow-larger-so-does-the-6840315.php.

[47] Application, Table 7, pdf 452.

[48] Application, pdf 510, Appendix A, CalEEMod Output Files.

[49] Application, pdf 510, Appendix A.

[50] IS, pdf 25, Table 1 and Application, pdf 452, Table 7.

transport of very large wind turbines and the on-site dismembering and ultimate disposal of the retired wind turbines. Further, the CalEEMod analysis omitted major sources of emissions. Thus, the IS/MND fails as an informational document under CEQA.

7.1 The CalEEMod Analysis Underestimates Construction Emissions

First, the Application exclusively used the CalEEMod model to estimate construction emissions. However, this model does not include all sources of PM10 and PM2.5 "conventional" construction emissions, let alone from the unique aspects of this Project. It omits windblown dust from graded areas and storage piles and fugitive dust from off-road travel:[51]

> Fugitive dust associated with grading, demolition, truck loading, and on-road vehicles traveling along paved and unpaved roads. (Fugitive dust from wind blown sources such as storage piles and inactive disturbed areas, as well as fugitive dust from off-road vehicle travel, are not quantified in CalEEMod, which is consistent with approaches taken in other comprehensive models.)

These emissions must be separately calculated using methods in AP-42[52] and added to the CalEEMod total. The Application did not calculate these emissions. Based on calculations I have made in other cases, these are the major sources of PM10 and PM2.5 emissions from construction projects. These emissions taken alone frequently exceed the PM10 and PM2.5 significance thresholds. Thus the IS/MND, which relied on the CalEEMod emission calculations, fails as an informational document.

Windblown dust from Project disturbed soils is a particular concern at this site due to desert winds, which occur in the area. These winds are strong, extremely dry, and reach speeds of 30 to 60 mph.[53] In comparison, the CalEEMod analysis assumed a wind speed of 7.5 mph, thus underestimating PM10 and PM2.5 emissions.[54] These winds can raise significant amounts of dust, even when conventional dust control methods are used, often prompting alerts from air pollution control districts.[55] If these winds occurred during grading, cut and fill, or soil movement, or from bare graded soil surfaces (even if periodically wetted), significant amounts of PM10, PM2.5, and associated Valley Fever spores as well as silica dust would be released. These emissions could result in public health impacts from the silica and Valley Fever spores

---

[51] CAPCOA 2016, pdf 8. This same language appears in CAPCOA 2017, pdf 7.

[52] U.S. EPA, Compilation of Air Pollutant Emission Factors, Report AP-42; available at https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emission-factors#Proposed.

[53] DesertWeather.com, Live Weather Information for the Coachella Valley, 2004–November 2018; available at https://desertweather.com/windsummary.php.

[54] Application, pdf 511, wind speed = 3.4 m/s = 7.5 mph.

[55] SCAQMD Issues Dust and Ash Advisory Due to Strong Winds in the Southland; available at https://lasentinel.net/scaqmd-issues-dust-and-ash-advisory-due-to-strong-winds-in-the-southland.html.

and/or violations of PM10 and PM2.5 CAAQS and NAAQS. These potential impacts were not evaluated.

Wind erosion emissions are typically calculated using methods in AP-42,[56] which require detailed information on site topography, wind profiles, and dispersion modeling. This information is not cited or included in the IS/MND or Application. Generally, wind erosion impacts are estimated using AERMOD. The Application and IS/MND do not include any calculations of wind erosion emissions but rather tacitly assume that compliance with conventional construction mitigation measures and regulations are adequate wind erosion control, without any analysis at all or without acknowledging the added risk of high-velocity desert winds.

Second, construction emissions depend upon the conditions at the site. The CalEEMod uses default emission factors.[57] However, the site is desert land in Coachella Flats, an area where sandy[58] soil conditions will generate significantly more PM10 and PM2.5 than assumed in the CalEEMod calculations. The default emission factors should have been adjusted to increase emissions to account for desert conditions.

Third, the Project involves the decommissioning of 291 existing, antiquated turbines from the Project site.[59] The towers, blades, and nacelles would be cut up on site to facilitate movement off site to recycling facilities.[60] The Application fails to disclose the wind turbine materials and how they would be cut up. CalEEMod does not include any emissions from decommissioning these turbines, including on-site cutting up of the towers, blades, and nacelles. The CalEEMod inputs for "turbine decommissioning," for example, show that no concrete/industrial saws will be used and do not list any equipment that could be used to cut up the towers, blades, and nacelles.[61] The only emissions from "turbine decommissioning" are off-road emissions.[62] Thus, a major source of construction emissions has been omitted from the construction air quality impact analysis.

Fourth, the Application asserts that the cut-up blades would be recycled. However, the blades, which are made with composite, are currently regarded as unrecyclable.[63] The

---

[56] U.S. EPA, AP-42, Section 13.2.5 Industrial Wind Erosion; available at https://www3.epa.gov/ttnchie1/ap42/ch13/final/c13s0205.pdf.

[57] H. Fan, A Critical Review and Analysis of Construction Equipment Emission Factors, *Procedia Engineering*, v. 196, 2017, pp. 351-358, Sec. 3.4; available at https://www.sciencedirect.com/science/article/pii/S1877705817330801.

[58] Application, pdf 655.

[59] Application, pdf 75.

[60] IS, pdf 5; Application, pdf 91-92.

[61] Application, pdf 569.

[62] Application, pdf 631.

[63] P. Liu and C. Y. Barlow, Wind Turbine Blade Waste in 2050, *Waste Management*, v. 62, pp. 229-240, 2017; abstract available at https://www.ncbi.nlm.nih.gov/pubmed/28215972.

CalEEMod analysis does not include any emissions from disposing of the cut-up turbine blades nor disclose their likely destination—that is, if they would be hauled to an appropriate recycling facility,[64] which is not identified. The distance from the Project site to the final disposal site determines emissions. The off-site disposal location and its distance from the site are not disclosed and the associated emissions are omitted from air quality analyses although emissions from other recycled components are included.[65]

Fifth, emissions from importing the new turbines are significantly underestimated. The very large new turbines would require non-standard heavy-duty transport methods, which are not disclosed. The IS/MND and Application are silent on how these very large turbines would be transported to the site.[66] It is, for example, unknown whether ship, barge, rail, truck—or some combination—would be used to deliver the turbine components to the site. Emissions from ships, barges, rails, and the huge on-road transports are not included in the CalEEMod analysis.[67]

7.2 Localized Significance Thresholds

The Application also used localized significance thresholds (LSTs) to evaluate the impact of construction emissions on air quality.[68] An LST is the maximum emissions from a project that is not expected to cause or contribute to an exceedance of the most stringent applicable federal or state ambient air quality standard.[69]

The LST methodology does not apply to project sites larger than 5 acres or where emissions are distinctly non-uniform across the site.[70] The Project site is significantly greater than 5 acres.[71] The Application argues that the Project is estimated to disturb about 80 acres or less over a 17-month period, or less than 1 acre per day, and that it is thus appropriate to use the LST lookup tables.[72] The rejection criteria are expressed in terms of "acres," not acres per day.

---

[64] IS, pdf 5.

[65] Application, pdf 631-634 ("off-road"). The CalEEMod outputs are silent on what is included in this estimate.

[66] IS, pdf 68-71; Application, pdf 87-93.

[67] See photos and video at https://www.lmwindpower.com/en/stories-and-press/stories/news-from-lm-places/transport-of-longest-blade-in-the-world.

[68] Application, Section 2.5.4, pdf 454.

[69] SCAQMD, Localized Significance Thresholds, accessed November 23, 2018; available at http://www.aqmd.gov/home/rules-compliance/ceqa/air-quality-analysis-handbook/localized-significance-thresholds.

[70] SCAQMD, Final Localized Significance Threshold Methodology, June 2003, Revised July 2008, Table 3-2; available at http://www.aqmd.gov/docs/default-source/ceqa/handbook/localized-significance-thresholds/final-lst-methodology-document.pdf?sfvrsn=2.

[71] Application, pdf 179, 227.

[72] Application, pdf 443.

Further, emissions will be non-uniform across the site. Finally, there is no evidence that construction will be uniform over its duration, disturbing only 1 acre per day. It is entirely plausible that some days will disturb substantially more than the average. The Application did not include a detailed construction schedule, so the assumption of uniform disturbance is unsupported and inconsistent with my experience with similar projects. Thus, the LST methodology does not apply.

For projects greater than 5 acres in area, the SCAQMD recommends the use of air dispersion modeling to determine localized air quality impacts.[73] The Application does not contain any air dispersion modeling calculations. Thus, the analysis of air quality impacts of construction is incomplete and does not support a no-impact conclusion.

7.3 Off-Site Emissions Are Excluded

The LST analysis excluded off-site mobile source emissions because "[h]auling of soils and construction materials associated with the Project construction are not expected to cause substantial air quality impacts to sensitive receptors along off-site roadways."[74] The CalEEMod analysis also excluded off-site emissions from importing the new turbines.

These omissions ignore the challenge of importing the gigantic turbines that will be used by the Project and cutting up 291 turbines on site. The Project will decommission and remove about 291 existing small wind turbines and install up to 14 new substantially larger wind turbines. The new turbines would be up to 500 feet high (blade tip to base) with rotor diameters of up to 427 feet.[75] These large turbines would require very large delivery vehicles that would emit significant amounts of greenhouse gases (GHG) and criteria pollutants.[76]

The Application and IS/MND are silent on where these turbines would be manufactured and how they would be transported to the site. Thus, the IS/MND fails as an informational document. Based on my experience, it is reasonable to assume that emissions from transporting the very large and heavy components of the proposed turbines would generate significant amounts of criteria pollutants, resulting in a significant air quality impact.

8.0 THE IS AND APPLICATION FAIL TO ANALYZE POTENTIALLY SIGNIFICANT HEALTH IMPACTS DUE TO VALLEY FEVER

The IS/MND asserts with respect to Valley Fever:[77]

---

[73] *Ibid.*

[74] Application, pdf 454.

[75] Application, pdf 88, Figure 1.

[76] Electrek, The Art of Transporting Spain's Largest Wind Turbine Blade, November 5, 2017; available at https://electrek.co/2017/11/05/transporting-largest-wind-turbine-blade/.

[77] IS, pdf 28.

> Exposure to Valley Fever
> Valley fever is not highly endemic to the County, and within the County, the incident rate in Desert Hot Springs is very low, accounting for only 0.9% of the County's incidents in 2015 (Appendix B). The Project would also employ dust mitigation measures by watering three times per day and limiting speed on unpaved roads to 15 miles per hour. The Project would also be constructed in accordance with the SCAQMD Rules 403 and 403.1, which limit the amount of fugitive dust generated during construction. As previously mentioned, the nearest sensitive-receptor land use (an existing residential use) is located approximately 600 feet from the closest area of disturbance. Therefore, health impacts associated with Valley Fever exposure would be less than significant.

The cited study indicates that only 0.9% of the Valley Fever cases in Riverside County occurred in Desert Hot Springs. However, the Project site is not in Desert Hot Springs, but rather 2.2 miles northeast (elsewhere, 6 miles southwest[78]) in a remote area of the county where conditions are ideal for Valley Fever, as discussed below. The IS/MND and Application present no evidence that Valley Fever is absent at the Project site itself. As discussed below, on-site monitoring is required to draw this conclusion.

Elsewhere, the Application asserts that "Riverside County is not considered a highly endemic region for Valley Fever as the latest report from the California Department of Public Health listed Riverside County as having 2.7 cases per 100,000 people."[79] However, this is outdated information from 2016.[80] The most recent report shows the number of cases of Valley Fever in Riverside County has doubled, to 5.6 cases per 100,000 people.[81] In fact, the number of Valley Fever cases in Riverside County has been rising countywide since 2015. See Table 2.[82] Even though the number of reported cases in Riverside County is low compared to other endemic counties, the incident rate among exposed workers could be substantially higher than in more highly endemic counties, as discussed below.[83]

---

[78] Application, pdf 227.

[79] Application, pdf 423.

[80] California Department of Public Health, Epidemiologic Summary of Coccidioidomycosis in California, 2016, p. 8; available at https://www.cdph.ca.gov/Programs/CID/DCDC/CDPH%20Document%20Library/CocciEpiSummary2016.pdf.

[81] California Department of Public Health, Epidemiologic Summary of Coccidioidomycosis in California, 2017, Table 1; available at https://www.cdph.ca.gov/Programs/CID/DCDC/CDPH%20Document%20Library/CocciEpiSummary2017.pdf.

[82] Epidemiologic Summary of Coccidioidomycosis in California, 2016, Figure 1; available at https://www.cdph.ca.gov/Programs/CID/DCDC/CDPH%20Document%20Library/CocciEpiSummary2016.pdf, and Coccidioidomycosis in California Provisional Monthly Report, January–October 2018 (as of October 31, 2018); available at https://www.cdph.ca.gov/Programs/CID/DCDC/CDPH%20Document%20Library/CocciinCAProvisionalMonthlyReport.pdf.

[83] Rebecca L. Law and others, Coccidioidomycosis Outbreak Among Workers Constructing a Solar Power Farm—Monterey County, California, 2016–2017; *Morbidity and Mortality Weekly Report*, v. 67, no. 33, pp. 931–934, August 24, 2018; available at https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6107319/

Table 2: Reported Cases of Valley Fever in Riverside County

Year	No. of Cases
2015	63
2016	94
2017	130
2018	221

As I demonstrate below, the impacts from Valley Fever are significant and must be mitigated.

Valley Fever, or coccidioidomycosis (abbreviated as cocci), is an infectious disease caused by inhaling the spores of *Coccidioides ssp.*,[84] a soil-dwelling fungus. The fungus lives in the top 2 to 12 inches of soil. When soil containing this fungus is disturbed by activities such as digging, vehicles, construction activities, dust storms, or during earthquakes, the fungal spores become airborne.[85] Valley Fever outbreaks during construction of solar plants have been reported.[86,87]

The Valley Fever fungal spores are too small to be seen by the naked eye.[88] The California Department of Public Health has concluded:[89]

---

[84] Two species of *Coccidioides* are known to cause Valley Fever: *C. immitis*, which is typically found in California, and *C. posadasii*, which is typically found outside California. See Centers for Disease Control, Coccidioidomycosis (Valley Fever), Information for Health Professionals; available at https://www.cdc.gov/fungal/diseases/coccidioidomycosis/health-professionals.html.

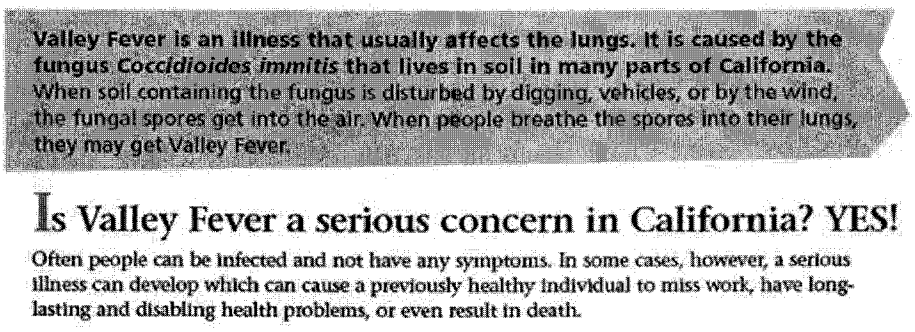
[85] California Department of Public Health, Valley Fever Fact Sheet, January 2016; available at https://www.cdph.ca.gov/Programs/CID/DCDC/CDPH%20Document%20Library/ValleyFeverFactSheet.pdf.

[86] Jason A. Wilken et al., Coccidioidomycosis among Workers Constructing Solar Power Farms, California, USA, 2011–2014, *Emerging Infectious Diseases*, v. 21, no. 11, November 2015; available at https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4622237/.

[87] The Associated Press, Valley Fever Hits 28 at Calif. Solar Plant Sites, *The San Diego Union-Tribune*, May 1, 2013; available at http://www.sandiegouniontribune.com/sdut-valley-fever-hits-28-at-calif-solar-plant-sites-2013may01-story.html.

[88] California Department of Public Health, Preventing Work-Related Coccidioidomycosis (Valley Fever), June 2013; available at https://www.cdph.ca.gov/Programs/CCDPHP/DEODC/OHB/HESIS/CDPH%20Document%20Library/CocciFact.pdf.

[89] California Department of Public Health, Preventing Work-Related Coccidioidomycosis (Valley Fever), June 2012; available at https://www.cdph.ca.gov/Programs/CCDPHP/DEODC/OHB/HESIS/CDPH%20Document%20Library/CocciFact.pdf.



8.1 Riverside County Is Endemic for Valley Fever

The disease is endemic (native and common) in the semiarid regions of the southwestern United States.[90] Riverside County, including the Project site, is located within the established endemic range of Valley Fever,[91] as shown in Figure 1.[92] The site itself contains conditions that could harbor Valley Fever, including areas with sparse vegetation and areas that have been undisturbed for long periods.

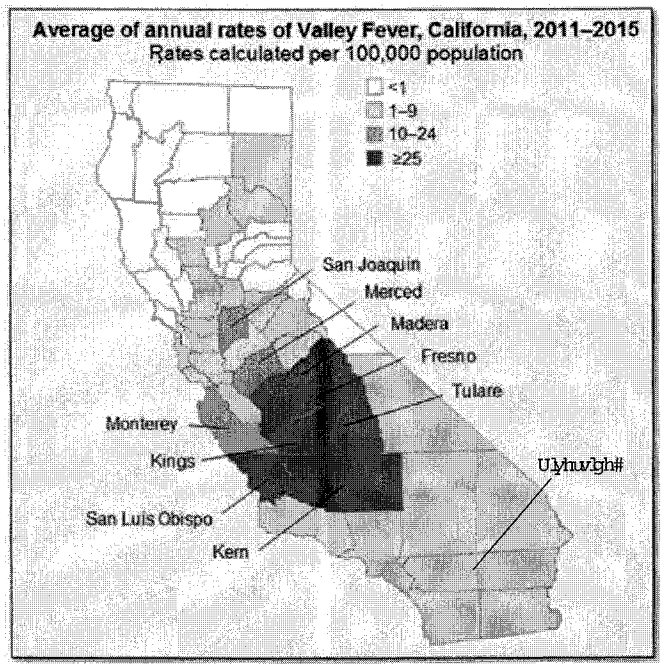
---

[90] San Luis Obispo County Public Health Department, Valley Fever in San Luis Obispo County (undated); available at http://www.slocounty.ca.gov/health/publichealth/commdisease/Cocci_in_SLO_County.htm.

[91] See, for example, K. Schmitt, R. Plevin and T. Wood, Just One Breath: Valley Fever Cases Reach Epidemic Levels, But Harm Remains Hidden, September 8, 2012 ("The cocci fungus is common in much of the southwest and in northwestern Mexico, especially in the dry earth of California's Central Valley and in the areas around Phoenix and Tucson in Arizona. It can be found, however, in soils of the beach haven of San Diego, the wine country of Sonoma County and inland in the Sierra foothills."); available at https://www.centerforhealthjournalism.org/content/just-one-breath-valley-fever-cases-reach-epidemic-levels-harm-remains-hidden.

[92] Medical Board of California Newsletter, v. 141, Winter 2017, pdf 21; available at http://www.mbc.ca.gov/Publications/Newsletters/newsletter_2017_01.pdf.

Figure 1: Endemic Areas for Valley Fever in California



The removal of established vegetation, biological soil crusts and centuries-old desert pavement during construction creates opportunities for dust to be airborne every time the wind blows. Not only does fugitive dust create problems for visual and biological resources, it creates issues for public health as well.

8.2 Construction Workers Are an At-Risk Population

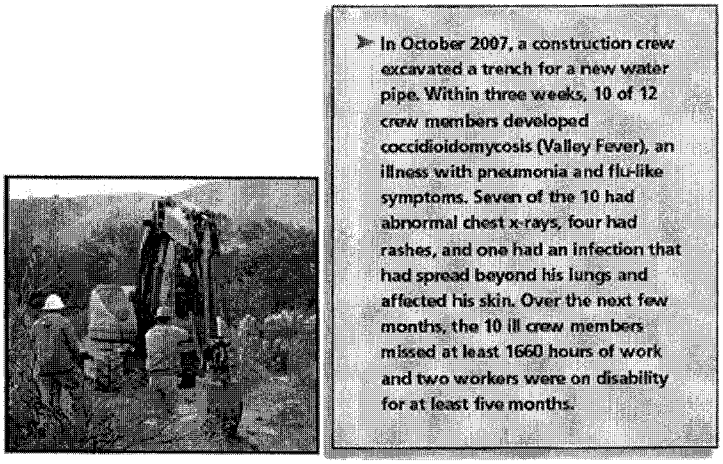
The CDPH specifically notes that construction workers in endemic areas, such as those that will build the Project, are at risk.[93] Project construction will disturb 80 acres.[94] Thus, significant opportunity exists to expose both on-site workers and off-site sensitive receptors to Valley Fever spores.

---

[93] CDPH, June 2012.

[94] Application, pdf 443.

Figure 2: Valley Fever Risk to Construction Workers



Dust exposure is one of the primary risk factors for contracting Valley Fever.[95] Specific occupations and outdoor activities associated with dust generation—such as construction, farming, road work, military training, gardening, hiking, camping, bicycling, or fossil collecting—increase the risk of exposure and infection. The risk appears to be more specifically associated with the amount of time spent outdoors than with doing specific activities.[96] As the area surrounding the Project site is rural, locals and visitors who participate in outdoor activities could be exposed during construction.

The most at-risk populations are construction and agricultural workers.[97] Construction workers are the very population that would be most directly exposed by the Project. A refereed journal article on occupational exposures notes that "[l]abor groups where occupation involves close contact with the soil are at greater risk, especially if the work involves dusty digging operations."[98] One study reported that at study sites, "generally 50% of the individuals who

---

[95] Rafael Laniado-Laborin, Expanding Understanding of Epidemiology of Coccidioidomycosis in the Western Hemisphere, *Annals of the New York Academy of Sciences*, v. 111, 2007, pp. 20–22, available at https://nyaspubs.onlinelibrary.wiley.com/doi/abs/10.1196/annals.1406.004; Frederick S. Fisher, Mark W. Bultman, Suzanne M. Johnson, Demosthenes Pappagianis, and Erik Zaborsky, Coccidioides Niches and Habitat Parameters in the Southwestern United States, a Matter of Scale, *Annals of the New York Academy of Sciences*, v. 111, 2007, pp. 47–72 ("All of the examined soil locations are noteworthy as generally 50% of the individuals who were exposed to the dust or were excavating dirt at the sites were infected."), available at https://nyaspubs.onlinelibrary.wiley.com/doi/abs/10.1196/annals.1406.031.

[96] Kern County Public Health Services Department, Prevention ("The risk appears to be more specifically associated with the amount of time spent outdoors than with doing specific activities"); available at http://kerncountyvalleyfever.com/what-is-valley-fever/prevention/.

[97] Lawrence L. Schmelzer and R. Tabershaw, Exposure Factors in Occupational Coccidioidomycosis, *American Journal of Public Health and the Nation's Health*, v. 58, no. 1, 1968, pp. 107–113, Table 3; available at http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1228046/?page=1.

[98] *Ibid.*, p. 110.

were exposed to the dust or were excavating dirt at the sites were infected."[99] A recent Valley Fever outbreak during construction of a solar plant in Monterey County found a worksite incidence rate of 1,095 per 100,000 persons/year, compared to the 2016 incidence rates in Monterey and five surrounding counties that ranged from 4.4 to 210.6, demonstrating the significant risk to construction workers who disturb soils with Cocci spores.[100]

The disease debilitates the population and thus prevents them from working.[101] The longest period of disability from occupational exposure in California is to construction workers, with 62% of the reported cases resulting in over 60 days of lost work.[102] Another study estimated the average hospital stay for each (non-construction work) case of coccidioidomycosis at 35 days.[103]

8.3 Sensitive Receptors Near the Project Site Are an At-Risk Population

The California Department of Public Health and the State Health Officer have warned that "[p]eople who live, work or travel in Valley Fever areas are also at a higher risk of getting infected, especially if they work or participate in activities where soil is disturbed."[104] Thus, those living, working, or recreating in the vicinity of the Project site during construction are also at risk of being affected from windblown dust, both during construction and after soils have been disturbed but lie fallow until mitigation has been implemented and/or the Project is built out.

The potentially exposed population in surrounding areas is much larger than construction workers because the nonselective raising of dust during Project construction will carry the very small spores, 0.002–0.005 millimeters ("mm") (Figure 3),[105] into nonendemic areas, potentially exposing large non-Project-related populations.[106,107] These very small particles are not controlled by conventional construction dust control mitigation measures.

---

[99] Fisher et al., 2007.

[100] Law et al. 2018, Table 2.

[101] Frank E. Swatek, Ecology of *Coccidioides Immitis*, *Mycopathologia et Mycologia Applicata*, v. 40, no. 1–2, pp. 3–12, 1970.

[102] Schmelzer and Tabershaw, 1968, Table 4.

[103] Demosthenes Pappagianis and Hans Einstein, Tempest from Tehachapi Takes Toll or Coccidioides Conveyed Aloft and Afar, *Western Journal of Medicine*, v. 129, Dec. 1978, pp. 527–530; available at http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1238466/pdf/westjmed00256-0079.pdf.

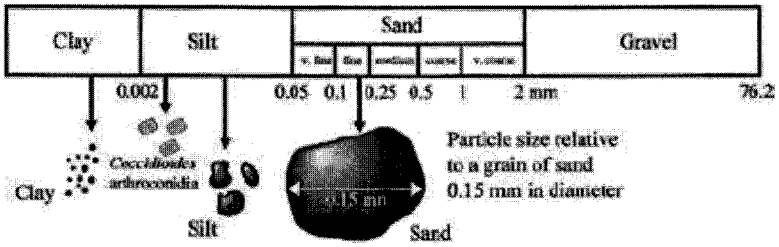
[104] California Department of Public Health, State Health Officer Warns About Dangers of Valley Fever, Number 15-055, August 4, 2015; available at https://www.cdph.ca.gov/Programs/OPA/Pages/NR15-055.aspx.

[105] Fisher et al., 2007, Fig. 3.

[106] Schmelzer and Tabershaw, 1968, p. 110; Pappagianis and Einstein, 1978.

[107] Pappagianis and Einstein, 1978, p. 527 ("The northern areas were not directly affected by the ground level windstorm that had struck Kern County but the dust was lifted to several thousand feet elevation

Figure 3: Size of Cocci Spores Compared to Soil Particles (in mm)



Valley Fever spores have been documented to travel as far as 500 miles,[108] and thus dust raised during construction could potentially expose a large number of people hundreds of miles away.

8.4 Valley Fever Symptoms

Typical symptoms of Valley Fever include fatigue, fever, cough, headache, shortness of breath, rash, muscle aches, and joint pain. Symptoms of advanced Valley Fever include chronic pneumonia, meningitis, skin lesions, and bone or joint infections. The most common clinical presentation of Valley Fever is a self-limited acute or subacute community-acquired pneumonia that becomes evident 13 weeks after infection.[109] No vaccine or known cure exists for the disease.[110] However, the FDA recently granted Fast Track designation for a proposed treatment.[111] Between 1990 and 2008, more than 3,000 people died in the United States from Valley Fever, with about half of the deaths occurring in California.[112] Between 2000 and 2013 in

---

and, borne on high currents, the soil and arthrospores along with some moisture were gently deposited on sidewalks and automobiles as 'a mud storm' that vexed the residents of much of California." The storm originating in Kern County, for example, had major impacts in the San Francisco Bay Area and Sacramento).

[108] David Filip and Sharon Filip, *Valley Fever Epidemic*, Golden Phoenix Books, 2008, p. 24.

[109] See, *e.g.*, Lisa Valdivia, David Nix, Mark Wright, Elizabeth Lindberg, Timothy Fagan, Donald Lieberman, Prien Stoffer, Neil M. Ampel, and John N. Galgiani, Coccidioidomycosis as a Common Cause of Community-Acquired Pneumonia, *Emerging Infectious Diseases*, v. 12, no. 6, June 2006; available at https://wwwnc.cdc.gov/eid/article/12/6/06-0028_article.

[110] Rebecca Plevin, National Public Radio, Cases of Mysterious Valley Fever Rise in American Southwest, May 13, 2013; available at http://www.npr.org/blogs/health/2013/05/13/181880987/cases-of-mysterious-valley-fever-rise-in-american-southwest.

[111] Mathew Shanley, Valley Fever Treatment Granted FDA Fast Track Designation, July 14, 2017; available at http://www.raredr.com/news/valley-fever-drug-fast-track-designation.

[112] Jennifer Y. Huang, Benjamin Bristow, Shira Shafir, and Frank Sorvillo, Coccidioidomycosis-Associated Deaths, United States, 1990–2008, *Emerging Infectious Diseases*, v. 18, no. 11, November 2012; available at http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3559166/.

California, 1,098 deaths were attributed to Valley Fever.[113] In recent years, reported Valley Fever cases in the Southwest have increased dramatically.[114]

Infections by *Coccidioides ssp.* frequently have a seasonal pattern, with infection rates that generally spike in the first few weeks of hot dry weather that follow extended milder rainy periods. In California, infection rates are generally higher during the hot summer months, especially if weather patterns bring the usual winter rains between November and April.[115] The majority of cases of Valley Fever accordingly occur during the months of June through December, which are typically periods of peak construction activity.

Typically, the risk of catching Valley Fever begins to increase in June and continues an upward trend until it peaks during the months of August, September, and October.[116] Drought periods can have an especially potent impact on Valley Fever if they follow periods of rain.[117] It is thought that during drought years the number of organisms competing with *Coccidioides ssp.* decreases and the fungus remains alive but dormant. When rain finally occurs, the arthroconidia germinate and multiply more than usual because of a decreased number of other competing organisms. When the soil dries out in the summer and fall, the spores can become airborne and potentially infectious.[118]

The recent drought conditions in southern California may well increase the occurrence of Valley Fever cases. Thus, major on-site and off-site soil-disturbing construction activities should be timed to occur outside of a prolonged dry period. After soil-disturbing activities conclude, all disturbed soils should be sufficiently stabilized to prevent airborne dispersal of cocci spores.

The IS dismisses the potential existence of Valley Fever in the area or of the health risks posed by Valley Fever from construction and/or operation of the Project and does not require any mitigation to limit the public's or workers' potential exposure to cocci. As discussed below, conventional mitigation for construction impacts is not adequate to protect construction workers or offsite sensitive receptors from Valley Fever. Thus, the IS/MND utterly fails to

---

[113] G. L. Sondermeyer et al., Coccidioidomycosis-Associated Deaths in California, 2000–2013, *Public Health Reports*, v. 131, no. 4, 2016; available at http://journals.sagepub.com/doi/10.1177/0033354916662210.

[114] See Centers for Disease Control; Fungal Pneumonia: A Silent Epidemic, Coccidioidomycosis (Valley Fever); available at http://www.cdc.gov/fungal/pdf/cocci-fact-sheet-sw-us-508c.pdf.

[115] *Ibid.*

[116] Kern County Public Health Services Department, What Is Valley Fever, Prevention, Valley Fever Risk Factors; available at http://kerncountyvalleyfever.com/what-is-valley-fever/risk-factors/.

[117] Gosia Wozniacka, Associated Press, Fever Hits Thousands in Parched West Farm Region, May 5, 2013, Updated April 29, 2016, citing Prof. John Galgiani, Director of the Valley Fever Center for Excellence at the University of Arizona; available at http://www.denverpost.com/2013/05/05/valley-fever-hits-thousands-in-parched-west/.

[118] Theodore N. Kirkland and Joshua Fierer, Coccidioidomycosis: A Reemerging Infectious Disease, *Emerging Infectious Diseases*, v. 3, no. 2, July–September 1996; available at http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2626789/pdf/8903229.pdf.

inform the public of these potential significant consequences of Project construction. The County should prepare an EIR to provide an adequate assessment of Valley Fever and other issues discussed elsewhere in these comments and propose adequate mitigation.

8.5 Pre-Construction, On-Site Monitoring Should Be Required

As the proposed site has the potential to contain Coccidioidomycosis spores and it is well known that they can easily become airborne when soil is disturbed,[119] the Project construction site should be tested well in advance of construction to determine if spores are present. Accurate test methods have been developed and used in similar applications.[120,121] 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."[122] An Environmental Assessment for a solar project in a nearby area has required soil testing.[123]

8.6 The IS Fails to Require Adequate Mitigation for Valley Fever

A conventional dust control plan is inadequate to address potential health risks posed by exposure to Valley Fever. The IS?MND's proposed fugitive dust mitigation is wholly inadequate to control fugitive dust, let alone tiny cocci spores. Conventional dust control measures such as those included in the mitigation measures for the Project[124] are not effective at

---

[119] Colson et al. 2016, p. 11; Colson et al. 2017, p. 451 ("A correlation between soil disturbances due to large-scale renewable energy construction projects, agricultural management practices and PM10 fugitive dust emission with increased incidence of coccidioidomycosis was clearly indicated by results of this study."), p. 456 ("One such danger is Coccidioides spp. arthroconidia becoming airborne when soil is disturbed and dust mitigation measures are inefficient or absent.").

[120] J. R. Bowers and others, Direct Detection of Coccidioides from Arizona Soils Using CocciENV, a Highly Sensitive and Specific Real-time PCR Assay, *Medical Mycology*, 2018. Exhibit 3 and Proceedings of the 60th Annual Coccidioidomycosis Study Group Meeting, April 8–9, 2016, Fresno, CA; available at http://coccistudygroup.com/wp-content/uploads/2016/10/CSG-60th-Annual.pdf.

[121] A. J. Colson and others, Large-Scale Land Development, Fugitive Dust, and Increased Coccidioidomycosis Incidence in the Antelope Valley of California, *Mycopathologia*, v. 182, pp. 439–458, June 2017. Exhibit 4.

[122] Colson et al. 2016, p. 11; Colson et al. 2017, p. 456.

[123] 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, available at 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.

[124] Application, Exhibit I: Dust Control Management Plan *et seq*, pdf 157-168.

controlling Valley Fever[125] because they largely focus on visible dust or larger dust particles—the PM10 fraction—not the very fine particles where the Valley Fever spores are found. While dust exposure is one of the primary risk factors for contracting Valley Fever and dust-control measures are an important defense against infection, it is essential to note that PM10 and visible dust, the targets of conventional control mitigation, are only indicators that *Coccidioides ssp.* spores may be airborne in a given area. Freshly generated dust clouds usually contain a larger proportion of the more visible coarse particles, PM10 (</=0.01 mm), compared to cocci spores (0.002 mm). However, these larger particles settle more rapidly and the remaining fine respirable particles may be difficult to see and are not controlled by conventional dust control measures.

Spores of *Coccidioides ssp.* have slow settling rates in air due to their small size (0.002 mm) and low terminal velocity, and possibly also due to their buoyancy, barrel shape, and commonly attached empty hyphae cell fragments.[126] Thus spores, whose size is well below the limits of human vision, may be present in air that appears relatively clear and dust free. Such ambient airborne spores with their low settling rates can remain aloft for long periods and be carried hundreds of miles from their point of origin. Thus, implementation of conventional dust control measures, such as those proposed for this Project, will not provide sufficient protection for both on-site workers and the general public.

In response to an outbreak of Valley Fever in construction workers in 2007 at a construction site for a solar facility within San Luis Obispo County, its Public Health Department, in conjunction with the California Department of Public Health,[127] developed recommendations to limit exposure to Valley Fever based on scientific information from the published literature. The recommended measures go far beyond the conventional dust control measures recommended in the Application to control construction emissions, which primarily control PM10. They include the following measures that are not required in the Application to mitigate construction emissions from the Project:

1. Reevaluate and update your Injury and Illness Prevention Program (as required by Title 8, Section 3203) and ensure safeguards to prevent Valley Fever are included.

2. Train all employees on the following issues:

   - The soils in Riverside County may contain cocci spores;

---

[125] See, e.g., Cummings and others, 2010, p. 509; Schneider et al., 1997, p. 908 ("Primary prevention strategies (*e.g.*, dust-control measures) for coccidioidomycosis in endemic areas have limited effectiveness.").

[126] Frederick S. Fisher, Mark W. Bultman, and Demosthenes Pappagianis, Operational Guidelines (version 1.0) for Geological Fieldwork in Areas Endemic for Coccidioidomycosis (Valley Fever), U.S. Geological Survey Open-File Report 00-348, 2000; available at https://pubs.usgs.gov/of/2000/0348/.

[127] CDPH June 2013, pp. 4-6. See also Wilken et al., 2015, and Sondermeyer et al., Dust Exposure and Coccidioidomycosis Prevention Among Solar Power Farm Construction Workers in California, *American Journal of Public Health*, 2017, abstract available at https://www.ncbi.nlm.nih.gov/pubmed/28640687.

- Inhaling cocci spores may cause Valley Fever;
- How to recognize symptoms of Valley Fever; these symptoms resemble common viral infections, and may include fatigue, cough, chest pain, fever, rash, headache, and body and joint ache;
- Work with a medical professional with expertise in cocci as you develop your training program and consult information on public health department websites;
- Workers must promptly report suspected symptoms of work-related Valley Fever to a supervisor;
- Workers are entitled to receive prompt medical care if they suspect symptoms of work-related Valley Fever. Workers should inform the health care provider that they may have been exposed to cocci;
- To protect themselves, workers should use control measures as outlined here.

3. Control dust exposure:

   - Consult with local Air Pollution Control District Compliance Assistance programs and with California Occupational Safety and Health Administration ("Cal/OSHA") compliance program regarding meeting the requirements of dust control plans and for specific methods of dust control. These methods may include wetting the soil while ensuring that the wetting process does not raise dust or adversely affect the construction process;
   - Provide high-efficiency particulate ("HEP")-filtered, air-conditioned enclosed cabs on heavy equipment. Train workers on proper use of cabs, such as turning on air conditioning prior to using the equipment and keeping windows closed.
   - Provide communication methods, such as 2-way radios, for use in enclosed cabs.
   - Employees should be medically evaluated, fit-tested, and properly trained on the use of the respirators, and a full respiratory protection program in accordance with the applicable Cal/OSHA Respiratory Protection Standard (8 CCR 5144) should be in place.
   - Provide National Institute for Occupational Safety and Health (NIOSH)-approved respirators for workers with a prior history of Valley Fever.
   - Half-face respirators equipped with N-100 or P-100 filters should be used during digging. Employees should wear respirators when working near earth moving machinery.
   - Prohibit eating and smoking at the worksite, and provide separate, clean eating areas with hand-washing facilities.
   - Avoid outdoor construction operations during unusually windy conditions or in dust storms.

- Consider limiting outdoor construction during the Fall to essential jobs only, as the risk of cocci infection is higher during this season.

4. Prevent transport of cocci outside endemic areas:

   - Thoroughly clean equipment, vehicles, and other items before they are moved off-site to other work locations.
   - Provide workers with coveralls daily, lockers (or other systems for keeping work and street clothing and shoes separate), daily changing and showering facilities.
   - Clothing should be changed after work every day, preferably at the work site.
   - Train workers to recognize that cocci may be transported offsite on contaminated equipment, clothing, and shoes; alternatively, consider installing boot-washing.
   - Post warnings onsite and consider limiting access to visitors, especially those without adequate training and respiratory protection.

5. Improve medical surveillance for employees:

   - Employees should have prompt access to medical care, including suspected work-related illnesses and injuries.
   - Work with a medical professional to develop a protocol to medically evaluate employees who have symptoms of Valley Fever.
   - Consider preferentially contracting with 1-2 clinics in the area and communicate with the health care providers in those clinics to ensure that providers are aware that Valley Fever has been reported in the area. This will increase the likelihood that ill workers will receive prompt, proper and consistent medical care.
   - Respirator clearance should include medical evaluation for all new employees, annual re-evaluation for changes in medical status, and annual training, and fit-testing.
   - Skin testing is not recommended for evaluation of Valley Fever. [128]
   - If an employee is diagnosed with Valley Fever, a physician must determine if the employee should be taken off work, when they may return to work, and what type of work activities they may perform.

In a more recent Valley Fever outbreak among solar plant construction workers in Monterey County, public health officials conducted a site visit to the solar farm to observe and interview workers and employers about work practices, dust control and use of protective equipment; review training materials; and discuss prevention strategies. The visit confirmed

---

[128] Short-term skin tests that produce results within 48 hours are now available. See Kerry Klein, NPR for Central California, New Valley Fever Skin Test Shows Promise, But Obstacles Remain, November 21, 2016; available at http://kvpr.org/post/new-valley-fever-skin-test-shows-promise-obstacles-remain.

dust control issues, serious lapses in use of respiratory protection, insufficient coccidioidomycosis employee training, and no system for tracking or reporting illness. Thus, in November 2017, the CDPH issued prevention recommendations before the start of the second construction phase, which is scheduled to continue through the end of 2018. Recommendations for employers included:[129]

1) reducing dust exposure by ensuring ample and efficient water truck capacity to wet soil;

2) using only heavy equipment with enclosed cabs and temperature-controlled, high efficiency particulate air-filtered air;

3) providing clean coveralls daily to employees who disturb soil;

4) implementing a mandatory respiratory protection program (8 CCR §5144, Respiratory Protection: https://www.dir.ca.gov/title8/5144.html) that specifically requires National Institute for Occupational Safety and Health-approved respirators be worn while performing or in the near vicinity of job activities that create airborne dust;

5) developing effective Valley fever training for all employees, including ways to reduce exposure, how to recognize symptoms, and where to seek care; and

6) tracking and reporting of all suspected Valley fever illnesses that occur at the worksite to the Monterey County Health Department.

The study concluded that prevention methods need to be better incorporated into the planning and monitoring of construction projects in areas with endemic *Coccidioides* (e.g., by involving public health practitioners in pre-project reviews). Specifically, the following was recommended: "Outdoor workers in these areas should be trained by employers about the potential for infection, how to limit dust exposure, how to recognize symptoms, where to seek care, and how to ask a health care provider to assess them for coccidioidomycosis. Clinicians should inquire about occupational history and should suspect coccidioidomycosis in patients who are outdoor workers in areas with endemic *Coccidioides* and who have a clinically compatible illness."[130]

Two other studies have developed complementary recommendations to minimize the incidence of Valley Fever. The U.S. Geological Survey ("USGS") has developed recommendations to protect geological field workers in endemic areas.[131] An occupational study of Valley Fever in California workers also developed recommendations to protect those

---

[129] Laws et al., 2018.

[130] *Ibid.*

[131] Fisher et al., 2000.

working and living in endemic areas.[132] These two sources identified the following additional measures:

- Evaluate soils to determine if each work location is within an endemic area.
- Implement a vigorous program of medical surveillance.
- Implement aggressive enforcement of respiratory use where exposures from manual digging are involved.
- Test all potential employees for previous infection to identify the immune population and assign immune workers to operations involving known heavy exposures.
- Hire resident labor whenever available, particularly for heavy dust exposure work.
- All workers in endemic areas should use dust masks to protect against inhalation of particles as small as 0.4 microns. Mustaches or beards may prevent a mask from making an airtight seal against the face and thus should be discouraged.
- Establish a medical program, including skin tests on all new employees, retesting of susceptibles, prompt treatment of respiratory illness in susceptibles; periodic medical examination or interview to discover a history of low grade or subclinical infection, including repeated skin testing of susceptible persons.

The Application's construction mitigation does not include any of these measures. The mitigation measures identified in this comment, based on actual experience during construction of solar and wind projects in endemic areas, should be required for the Project.

In addition to the above-discussed measures, I recommend the following mitigation measures to protect workers and off-site sensitive receptors:

- Continuously wet the soil before and while digging or moving the earth. Landing zones for helicopters and areas where bulldozers, graders, or skid steers operate are examples where continuously wetting the soil is necessary.
- When digging a trench or fire line or performing other soil-disturbing tasks, position workers upwind when possible.
- Place overnight camps, especially sleeping quarters and dining halls, away from sources of dust such as roadways.
- Minimize the amount of digging by hand. Instead, use heavy equipment with the operator in an enclosed, air-conditioned, HEPA-filtered cab.

In sum, construction mitigation measures in the Application are not adequate to control Valley Fever. Projects that have implemented conventional PM10 dust control measures, such

---

[132] Schmelzer and Tabershaw, 1968, pp. 111-113.

as those proposed in the Application, have experienced fugitive dust issues and reported cases of Valley Fever.

For example, construction of First Solar's Antelope Valley Solar Ranch One ("AVSR1") was officially halted in April 2013 due to the company's failure to bring the facility into compliance with ambient air quality standards, despite conventional dust control measures more aggressive than those required for the Project. A dust storm in Antelope Valley on April 8, 2013 was so severe that it resulted in multiple car pileups in the sparsely populated region, as well as closure of the Antelope Valley Freeway. The company was issued four violations by the Antelope Valley Air Quality Management District. Dust from the project led to complaints of respiratory distress by local residents and concern about Valley Fever. [133]

At two photovoltaic solar energy projects in San Luis Obispo County, Topaz Solar Farm and California Valley Solar Ranch, 28 construction workers contracted Valley Fever. One man was digging into the ground and inhaled dust and subsequently became ill. A blood test confirmed Valley Fever.[134]

All of the above health-protective measures recommended by the San Luis Obispo County Public Health Department, Monterey County Health Department, and the California Department of Public Health are feasible for the Project and must be required in an enhanced dust control plan to reduce the risk to construction workers, nearby residents, and the public of contacting Valley Fever. Many of these measures have been required by the County of Monterey in other EIRs.[135] They are also required in the EIR for the California High-Speed Train.[136] Even if all of the above measures are adopted, an EIR is required to analyze whether these measures are adequate to reduce this significant impact to a level below significance.

---

[133] Herman K. Trabish, Green Tech Media, Construction Halted at First Solar's 230 MW Antelope Valley Site, April 22, 2013, available at http://www.greentechmedia.com/articles/read/Construction-Halted-At-First-Solars-230-MW-Antelope-Valley-Site.

[134] Julie Cart, Los Angeles Times, 28 Solar Workers Sickened by Valley Fever in San Luis Obispo County May 01, 2013; available at http://articles.latimes.com/2013/may/01/local/la-me-ln-valley-fever-solar-sites-20130501.

[135] County of Monterey, California Flats Solar Project Final Environmental Impact Report, December 2014; available at https://www.co.monterey.ca.us/planning/major/California%20Flats%20Solar/FEIR/FEIR_PLN120294_122314.pdf.

[136] California High-Speed Rail Authority and U.S. Department of Transportation, California High-Speed Train Project Environmental Impact Report/Environmental Impact Statement, Fresno to Bakersfield, Mitigation Monitoring and Enforcement Program Amendments, September 2015; available at

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; 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; 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 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 November 2018, prepared 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, prepared 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, prepared 20 pages of comments on the health risk assessment in the IS/MND for a large Safeway fueling station in Petaluma.
- In August 2018, prepared responses to comments on the DEIR for the Newland Sierra Project, San Diego County on greenhouse gas emissions, construction emissions, odor, and Valley Fever.
- In July/August 2018, prepared 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, prepared 12 pages of technical comments rebutting NDDH responses to comments on Meridian Davis Refinery.

- In April 2018, prepared 26 pages of comments on greenhouse gas emissions and mitigation as proposed in the San Diego County Climate Action Plan.
- In April 2018, prepared 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, prepared 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, prepared 40 pages of comments on the IS/MND for the Diablo Energy Storage Facility in Pittsburg, California.
- In March 2018, prepared 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, prepared 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, prepared 19 pages of comments on DEIR for the Rialto Bioenergy Facility, Rialto, California.
- In November and December 2017, prepared 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, prepared 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, prepared 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, prepared 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, prepared 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, prepared comments on Initial Study/Mitigated Negative Declaration for the AES Battery Energy Storage Facility, Long Beach, CA.
- In November 2016, prepared comments on Campo Verde Battery Energy Storage System Draft Environmental Impact Report.
- In October 2016, prepared 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, prepared comments on Proposed Title V Permit and Environmental Assessment Statement, Yuhuang Chemical Inc. Methanol Plant, St. James, Louisiana.
- In September 2016, prepared 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, prepared comments on Mitigated Negative Declaration for the Chevron Long Wharf Maintenance and Efficiency Project.
- In July 2016, prepared 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, prepared 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, prepared comments on Draft Title V Permit and Draft Environmental Impact Report for the Tesoro Los Angeles Refinery Integration and Compliance Project.
- In March 2016, prepared comments on Valero's Appeal of Planning Commission's Denial of Valero Crude-by-Rail Project.
- In February 2016, prepared comments on Final Environmental Impact Report, Santa Maria Rail Spur Project.
- In February 2016, prepared comments on Final Environmental Impact Report, Valero Benicia Crude by Rail Project.
- In January 2016, prepared 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, prepared 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, prepared 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, prepared 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, prepared comments on DEIR for the CalAm Monterey Peninsula Water Supply Project.
- In April 2015, prepared 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, prepared "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, prepared 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, prepared "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, prepared comments on Revised Draft Environmental Impact Report for the Phillips 66 Propane Recovery Project.

- In November 2014, prepared 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, prepared 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, prepared 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, prepared 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, prepared 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, prepared 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, prepared 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, prepared technical report on Initial Study and Draft Negative Declaration for the Tesoro Logistics Storage Tank Replacement and Modification Project.
- In May 2014, prepared 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, prepared 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, prepared 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, prepared 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, prepared 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, prepared 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, prepared 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, prepared 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, prepared 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, prepared technical comments on air quality impacts of the Finger Lakes LPG Storage Facility as reported in various Environmental Impact Statements.
- In July 2013, prepared 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, prepared 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, prepared 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, prepared technical report on Draft Environmental Impact Report for the California Ethanol and Power Imperial Valley 1 Project.
- In May 2013, prepared 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, prepared 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, prepared 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, prepared 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).

- Prepared 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).
- Prepared 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).

- Prepared 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).
- Prepared 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.

J. Phyllis Fox, *Air Quality Impacts of Using CPVC Pipe in Indoor Residential Potable Water Systems*, Report Prepared for California Pipe Trades Council, California Firefighters Association, and other trade associations, August 29, 1998.

J. Phyllis Fox and others, *Authority to Construct Avila Beach Remediation Project*, Prepared for Unocal Corporation and submitted to San Luis Obispo Air Pollution Control District, June 1998.

J. Phyllis Fox and others, *Authority to Construct Former Guadalupe Oil Field Remediation Project*, Prepared for Unocal Corporation and submitted to San Luis Obispo Air Pollution Control District, May 1998.

J. Phyllis Fox and Robert Sears, *Health Risk Assessment for the Metropolitan Oakland International Airport Proposed Airport Development Program*, Prepared for Plumbers & Steamfitters U.A. Local 342, December 15, 1997.

Levine-Fricke-Recon (Phyllis Fox and others), *Preliminary Endangerment Assessment Work Plan for the Study Area Operable Unit, Former Solano County Sanitary Landfill, Benicia, California*, Prepared for Granite Management Co. for submittal to DTSC, September 26, 1997.

Phyllis Fox and Jeff Miller, "Fathead Minnow Mortality in the Sacramento River," *IEP Newsletter*, v. 9, n. 3, 1996.

Jud Monroe, Phyllis Fox, Karen Levy, Robert Nuzum, Randy Bailey, Rod Fujita, and Charles Hanson, *Habitat Restoration in Aquatic Ecosystems. A Review of the Scientific Literature Related to the Principles of Habitat Restoration*, Part Two, Metropolitan Water District of Southern California (MWD) Report, 1996.

Phyllis Fox and Elaine Archibald, *Aquatic Toxicity and Pesticides in Surface Waters of the Central Valley*, California Urban Water Agencies (CUWA) Report, September 1997.

Phyllis Fox and Alison Britton, *Evaluation of the Relationship Between Biological Indicators and the Position of X2*, CUWA Report, 1994.

Phyllis Fox and Alison Britton, *Predictive Ability of the Striped Bass Model*, WRINT DWR-206, 1992.

J. Phyllis Fox, *An Historical Overview of Environmental Conditions at the North Canyon Area of the Former Solano County Sanitary Landfill*, Report Prepared for Solano County Department of Environmental Management, 1991.

J. Phyllis Fox, *An Historical Overview of Environmental Conditions at the East Canyon Area of the Former Solano County Sanitary Landfill*, Report Prepared for Solano County Department of Environmental Management, 1991.

Phyllis Fox, *Trip 2 Report, Environmental Monitoring Plan, Parachute Creek Shale Oil Program*, Unocal Report, 1991.

J. P. Fox and others, "Long-Term Annual and Seasonal Trends in Surface Salinity of San Francisco Bay," *Journal of Hydrology*, v. 122, p. 93-117, 1991.

J. P. Fox and others, "Reply to Discussion by D.R. Helsel and E.D. Andrews on Trends in Freshwater Inflow to San Francisco Bay from the Sacramento-San Joaquin Delta," *Water Resources Bulletin*, v. 27, no. 2, 1991.

J. P. Fox and others, "Reply to Discussion by Philip B. Williams on Trends in Freshwater Inflow to San Francisco Bay from the Sacramento-San Joaquin Delta," *Water Resources Bulletin*, v. 27, no. 2, 1991.

J. P. Fox and others, "Trends in Freshwater Inflow to San Francisco Bay from the Sacramento-San Joaquin Delta," *Water Resources Bulletin*, v. 26, no. 1, 1990.

J. P. Fox, "Water Development Increases Freshwater Flow to San Francisco Bay," *SCWC Update*, v. 4, no. 2, 1988.

J. P. Fox, *Freshwater Inflow to San Francisco Bay Under Natural Conditions*, State Water Contracts, Exhibit 262, 58 pp., 1987.

J. P. Fox, "The Distribution of Mercury During Simulated In-Situ Oil Shale Retorting," *Environmental Science and Technology*, v. 19, no. 4, pp. 316-322, 1985.

J. P. Fox, "El Mercurio en el Medio Ambiente: Aspectos Referentes al Peru," (Mercury in the Environment: Factors Relevant to Peru) Proceedings of Simposio Los Pesticidas y el Medio Ambiente," ONERN-CONCYTEC, Lima, Peru, April 25-27, 1984. (Also presented at Instituto Tecnologico Pesquero and Instituto del Mar del Peru.)

J. P. Fox, "Mercury, Fish, and the Peruvian Diet," *Boletin de Investigacion*, Instituto Tecnologico Pesquero, Lima, Peru, v. 2, no. 1, pp. 97-116, 1984.

J. P. Fox, P. Persoff, A. Newton, and R. N. Heistand, "The Mobility of Organic Compounds in a Codisposal System," *Proceedings of the Seventeenth Oil Shale Symposium*, Colorado School of Mines Press, Golden, CO, 1984.

P. Persoff and J. P. Fox, "Evaluation of Control Technology for Modified In-Situ Oil Shale Retorts," *Proceedings of the Sixteenth Oil Shale Symposium*, Colorado School of Mines Press, Golden, CO, 1983.

J. P. Fox, *Leaching of Oil Shale Solid Wastes: A Critical Review*, University of Colorado Report, 245 pp., July 1983.

J. P. Fox, *Source Monitoring for Unregulated Pollutants from the White River Oil Shale Project*, VTN Consolidated Report, June 1983.

A. S. Newton, J. P. Fox, H. Villarreal, R. Raval, and W. Walker II, *Organic Compounds in Coal Slurry Pipeline Waters*, Lawrence Berkeley Laboratory Report LBL-15121, 46 pp., Sept. 1982.

M. Goldstein et al., *High Level Nuclear Waste Standards Analysis, Regulatory Framework Comparison*, Battelle Memorial Institute Report No. BPMD/82/E515-06600/3, Sept. 1982.

J. P. Fox et al., *Literature and Data Search of Water Resource Information of the Colorado, Utah, and Wyoming Oil Shale Basins*, Vols. 1-12, Bureau of Land Management, 1982.

A. T. Hodgson, M. J. Pollard, G. J. Harris, D. C. Girvin, J. P. Fox, and N. J. Brown, *Mercury Mass Distribution During Laboratory and Simulated In-Situ Retorting*, Lawrence Berkeley Laboratory Report LBL-12908, 39 pp., Feb. 1982.

E. J. Peterson, A. V. Henicksman, J. P. Fox, J. A. O'Rourke, and P. Wagner, *Assessment and Control of Water Contamination Associated with Shale Oil Extraction and Processing*, Los Alamos National Laboratory Report LA-9084-PR, 54 pp., April 1982.

P. Persoff and J. P. Fox, *Control Technology for In-Situ Oil Shale Retorts*, Lawrence Berkeley Laboratory Report LBL-14468, 118 pp., Dec. 1982.

J. P. Fox, *Codisposal Evaluation: Environmental Significance of Organic Compounds*, Development Engineering Report, 104 pp., April 1982.

J. P. Fox, *A Proposed Strategy for Developing an Environmental Water Monitoring Plan for the Paraho-Ute Project*, VTN Consolidated Report, Sept. 1982.

J. P. Fox, D. C. Girvin, and A. T. Hodgson, "Trace Elements in Oil Shale Materials," *Energy and Environmental Chemistry, Fossil Fuels*, v.1, pp. 69-101, 1982.

M. Mehran, T. N. Narasimhan, and J. P. Fox, "Hydrogeologic Consequences of Modified In-situ Retorting Process, Piceance Creek Basin, Colorado," *Proceedings of the Fourteenth Oil Shale Symposium*, Colorado School of Mines Press, Golden, CO, 1981 (LBL-12063).

U. S. DOE (J. P. Fox and others), *Western Oil Shale Development: A Technology Assessment*, v. 1-9, Pacific Northwest Laboratory Report PNL-3830, 1981.

J. P. Fox (ed), "Oil Shale Research," Chapter from the *Energy and Environment Division Annual Report 1980*, Lawrence Berkeley Laboratory Report LBL-11989, 82 pp., 1981 (author or co-author of four articles in report).

D.C. Girvin and J.P. Fox, On-Line Zeeman Atomic Absorption Spectroscopy for Mercury Analysis in Oil Shale Gases, U.S. EPA Report EPA-600/7-80-130, June 1980.

J. P. Fox, *The Partitioning of Major, Minor, and Trace Elements during In-Situ Oil Shale Retorting*, Ph.D. Dissertation, U. of Ca., Berkeley, also Report LBL-9062, 441 pp., 1980 (*Diss. Abst. Internat.*, v. 41, no. 7, 1981).

J.P. Fox, "Elemental Composition of Simulated *In Situ* Oil Shale Retort Water," *Analysis of Waters Associated with Alternative Fuel Production, ASTM STP 720*, L.P. Jackson and C.C. Wright, Eds., American Society for Testing and Materials, pp. 101-128, 1981.

J. P. Fox, P. Persoff, P. Wagner, and E. J. Peterson, "Retort Abandonment -- Issues and Research Needs," in *Oil Shale: the Environmental Challenges*, K. K. Petersen (ed.), p. 133, 1980 (Lawrence Berkeley Laboratory Report LBL-11197).

J. P. Fox and T. E. Phillips, "Wastewater Treatment in the Oil Shale Industry," in *Oil Shale: the Environmental Challenges*, K. K. Petersen (ed.), p. 253, 1980 (Lawrence Berkeley Laboratory Report LBL-11214).

R. D. Giauque, J. P. Fox, J. W. Smith, and W. A. Robb, "Geochemical Studies of Two Cores from the Green River Oil Shale Formation," *Transactions*, American Geophysical Union, v. 61, no. 17, 1980.

J. P. Fox, "The Elemental Composition of Shale Oils," Abstracts of Papers, 179th National Meeting, ISBN 0-8412-0542-6, Abstract No. FUEL 17, 1980.

J. P. Fox and P. Persoff, "Spent Shale Grouting of Abandoned In-Situ Oil Shale Retorts," *Proceedings of Second U.S. DOE Environmental Control Symposium*, CONF-800334/1, 1980 (Lawrence Berkeley Laboratory Report LBL-10744).

P. K. Mehta, P. Persoff, and J. P. Fox, "Hydraulic Cement Preparation from Lurgi Spent Shale," *Proceedings of the Thirteenth Oil Shale Symposium*, Colorado School of Mines Press, Golden, CO, 1980 (Lawrence Berkeley Laboratory Report LBL-11071).

F. E. Brinckman, K. L. Jewett, R. H. Fish, and J. P. Fox, "Speciation of Inorganic and Organoarsenic Compounds in Oil Shale Process Waters by HPLC Coupled with Graphite Furnace Atomic Absorption (GFAA) Detectors," Abstracts of Papers, Div. of Geochemistry, Paper No. 20, Second Chemical Congress of the North American Continent, August 25-28, 1980, Las Vegas (1980).

J. P. Fox, D. E. Jackson, and R. H. Sakaji, "Potential Uses of Spent Shale in the Treatment of Oil Shale Retort Waters," *Proceedings of the Thirteenth Oil Shale Symposium*, Colorado School of Mines Press, Golden, CO, 1980 (Lawrence Berkeley Laboratory Report LBL-11072).

J. P. Fox, *The Elemental Composition of Shale Oils*, Lawrence Berkeley Laboratory Report LBL-10745, 1980.

R. H. Fish, J. P. Fox, F. E. Brinckman, and K. L. Jewett, *Fingerprinting Inorganic and Organoarsenic Compounds in Oil Shale Process Waters Using a Liquid Chromatograph Coupled with an Atomic Absorption Detector*, Lawrence Berkeley Laboratory Report LBL-11476, 1980.

National Academy of Sciences (J. P. Fox and others), *Surface Mining of Non-Coal Minerals, Appendix II: Mining and Processing of Oil Shale and Tar Sands*, 222 pp., 1980.

J. P. Fox, "Elemental Composition of Simulated In-Situ Oil Shale Retort Water," in *Analysis of Waters Associated with Alternative Fuel Production*, ASTM STP 720, L. P. Jackson and C. C. Wright (eds.), American Society for Testing and Materials, pp. 101-128, 1980.

R. D. Giauque, J. P. Fox, and J. W. Smith, *Characterization of Two Core Holes from the Naval Oil Shale Reserve Number 1*, Lawrence Berkeley Laboratory Report LBL-10809, 176 pp., December 1980.

B. M. Jones, R. H. Sakaji, J. P. Fox, and C. G. Daughton, "Removal of Contaminative Constituents from Retort Water: Difficulties with Biotreatment and Potential Applicability of Raw and Processed Shales," *EPA/DOE Oil Shale Wastewater Treatability Workshop*, December 1980 (Lawrence Berkeley Laboratory Report LBL-12124).

J. P. Fox, *Water-Related Impacts of In-Situ Oil Shale Processing*, Lawrence Berkeley Laboratory Report LBL-6300, 327 p., December 1980.

M. Mehran, T. N. Narasimhan, and J. P. Fox, *An Investigation of Dewatering for the Modified In-Situ Retorting Process, Piceance Creek Basin, Colorado*, Lawrence Berkeley Laboratory Report LBL-11819, 105 p., October 1980.

J. P. Fox (ed.) "Oil Shale Research," Chapter from the *Energy and Environment Division Annual Report 1979*, Lawrence Berkeley Laboratory Report LBL-10486, 1980 (author or coauthor of eight articles).

E. Ossio and J. P. Fox, *Anaerobic Biological Treatment of In-Situ Oil Shale Retort Water*, Lawrence Berkeley Laboratory Report LBL-10481, March 1980.

J. P. Fox, F. H. Pearson, M. J. Kland, and P. Persoff, *Hydrologic and Water Quality Effects and Controls for Surface and Underground Coal Mining -- State of Knowledge, Issues, and Research Needs*, Lawrence Berkeley Laboratory Report LBL-11775, 1980.

D. C. Girvin, T. Hadeishi, and J. P. Fox, "Use of Zeeman Atomic Absorption Spectroscopy for the Measurement of Mercury in Oil Shale Offgas," *Proceedings of the Oil Shale Symposium: Sampling, Analysis and Quality Assurance*, U.S. EPA Report EPA-600/9-80-022, March 1979 (Lawrence Berkeley Laboratory Report LBL-8888).

D. S. Farrier, J. P. Fox, and R. E. Poulson, "Interlaboratory, Multimethod Study of an In-Situ Produced Oil Shale Process Water," *Proceedings of the Oil Shale Symposium: Sampling, Analysis and Quality Assurance*, U.S. EPA Report EPA-600/9-80-022, March 1979 (Lawrence Berkeley Laboratory Report LBL-9002).

J. P. Fox, J. C. Evans, J. S. Fruchter, and T. R. Wildeman, "Interlaboratory Study of Elemental Abundances in Raw and Spent Oil Shales," *Proceedings of the Oil Shale Symposium: Sampling, Analysis and Quality Assurance*, U.S. EPA Report EPA-600/9-80-022, March 1979 (Lawrence Berkeley Laboratory Report LBL-8901).

J. P. Fox, "Retort Water Particulates," *Proceedings of the Oil Shale Symposium: Sampling, Analysis and Quality Assurance*, U.S. EPA Report EPA-600/9-80-022, March 1979 (Lawrence Berkeley Laboratory Report LBL-8829).

P. Persoff and J. P. Fox, "Control Strategies for In-Situ Oil Shale Retorts," *Proceedings of the Twelfth Oil Shale Symposium*, Colorado School of Mines Press, Golden, CO, 1979 (Lawrence Berkeley Laboratory Report LBL-9040).

J. P. Fox and D. L. Jackson, "Potential Uses of Spent Shale in the Treatment of Oil Shale Retort Waters," *Proceedings of the DOE Wastewater Workshop*, Washington, D. C., June 14-15, 1979 (Lawrence Berkeley Laboratory Report LBL-9716).

J. P. Fox, K. K. Mason, and J. J. Duvall, "Partitioning of Major, Minor, and Trace Elements during Simulated In-Situ Oil Shale Retorting," *Proceedings of the Twelfth Oil Shale Symposium*, Colorado School of Mines Press, Golden, CO, 1979 (Lawrence Berkeley Laboratory Report LBL-9030).

P. Persoff and J. P. Fox, *Control Strategies for Abandoned In-Situ Oil Shale Retorts*, Lawrence Berkeley Laboratory Report LBL-8780, 106 pp., October 1979.

D. C. Girvin and J. P. Fox, *On-Line Zeeman Atomic Absorption Spectroscopy for Mercury Analysis in Oil Shale Gases*, Environmental Protection Agency Report EPA-600/7-80-130, 95 p., August 1979 (Lawrence Berkeley Laboratory Report LBL-9702).

J. P. Fox, *Water Quality Effects of Leachates from an In-Situ Oil Shale Industry*, Lawrence Berkeley Laboratory Report LBL-8997, 37 pp., April 1979.

J. P. Fox (ed.), "Oil Shale Research," Chapter from the *Energy and Environment Division Annual Report 1978*, Lawrence Berkeley Laboratory Report LBL-9857 August 1979 (author or coauthor of seven articles).

J. P. Fox, P. Persoff, M. M. Moody, and C. J. Sisemore, "A Strategy for the Abandonment of Modified In-Situ Oil Shale Retorts," *Proceedings of the First U.S. DOE Environmental Control Symposium*, CONF-781109, 1978 (Lawrence Berkeley Laboratory Report LBL-6855).

E. Ossio, J. P. Fox, J. F. Thomas, and R. E. Poulson, "Anaerobic Fermentation of Simulated In-Situ Oil Shale Retort Water," *Division of Fuel Chemistry Preprints*, v. 23, no. 2, p. 202-213, 1978 (Lawrence Berkeley Laboratory Report LBL-6855).

J. P. Fox, J. J. Duvall, R. D. McLaughlin, and R. E. Poulson, "Mercury Emissions from a Simulated In-Situ Oil Shale Retort," *Proceedings of the Eleventh Oil Shale Symposium*, Colorado School of Mines Press, Golden, CO, 1978 (Lawrence Berkeley Laboratory Report LBL-7823).

J. P. Fox, R. D. McLaughlin, J. F. Thomas, and R. E. Poulson, "The Partitioning of As, Cd, Cu, Hg, Pb, and Zn during Simulated In-Situ Oil Shale Retorting," *Proceedings of the Tenth Oil Shale Symposium*, Colorado School of Mines Press, Golden, CO, 1977.

Bechtel, Inc., *Treatment and Disposal of Toxic Wastes*, Report Prepared for Santa Ana Watershed Planning Agency, 1975.

Bay Valley Consultants, *Water Quality Control Plan for Sacramento, Sacramento-San Joaquin and San Joaquin Basins*, Parts I and II and Appendices A-E, 750 pp., 1974.