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September 13, 2013

Mr. John Heiser
California Energy Commission
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Re: Comments on the Preliminary Staff Assessment for Hydrogen Energy California Project - Part I: Mitigation for Valley Fever (08-AFC-8A)

Dear Mr. Heiser,

Sierra Club hereby submits comments on the potential health risks from Valley Fever to the public, on-site construction workers and operational personnel during construction and operation of the proposed HECA project.¹

Valley Fever, or coccidioidomycosis (short cocci), is an infectious disease caused by inhaling the spores of *Coccidioides ssp.*², a soil-dwelling fungus. Spores, or arthroconidia, are released into the air when infected soils are disturbed, *e.g.*, by construction activities, agricultural operations, dust storms, or during earthquakes. The disease is endemic (native and common) in the semiarid regions of the southwestern United States, including the San Joaquin Valley.³ No vaccine or known cure exists for

¹ California Energy Commission, Department of Energy, Preliminary Staff Assessment, Draft Environmental Impact Statement, Hydrogen Energy California Project, CEC-700-2013-001-PSA, Docket No. 08-AFC-8A, June 2013.

² 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 Center for Disease Control, Coccidioidomycosis (Valley Fever), Information for Health Professionals; <http://www.cdc.gov/fungal/coccidioidomycosis/health-professionals.html>, accessed August 21, 2013.

³ *Ibid*

the disease.⁴ Between 1990 and 2008, more than 3,000 people have died in the United States from Valley Fever, half of whom lived in California.⁵ In recent years, reported Valley Fever cases in the Southwest have increased dramatically.⁶ The disease is highly endemic in Kern County where the HECA project would be located and the Kern County Public Health Services Department estimates that County residents have a one to three percent chance per year of acquiring Valley Fever.⁷ In 1992 – the peak year during the “first great epidemic” of Valley Fever, which lasted from 1991 through 1994 – Kern County reported over 3,300 cases and 25 deaths.⁸ The west side of Kern County (I-5 corridor), which includes the communities of Taft and Buttonwillow near the HECA project site, is disproportionately affected and has the highest risk for acquiring Valley Fever.⁹ The Kern County Public Health Services Department declared that the “second great epidemic” began in 2010 and 2013 is forecast as another epidemic year.¹⁰

The PSA provides a detailed discussion of the risks of Valley Fever¹¹, noting that “agricultural workers, construction workers, or others (such as archeologists), who dig in the soil in the disease-endemic area of the Central Valley are at the highest risk for the disease.”¹² In order to minimize potential exposure of workers and the public to *Coccidioides ssp.* spores during construction of the HECA project, CEC staff proposes Condition of Certification **WORKER SAFETY-7** (amending Conditions of Certification **AQ-SC-3** and **AQ-SC-4**) which requires that the Applicant develop an enhanced dust

⁴ *Ibid.*

⁵ Jennifer Y. Huang, Benjamin Bristow, Shira Shafir, and Frank Sorvillo, *Coccidioidomycosis-associated Deaths, United States, 1990–2008*; , <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3559166/>, accessed August 21, 2013.

⁶ Center for Disease Control; *Fungal Pneumonia: A Silent Epidemic, Coccidioidomycosis (Valley Fever)*; <http://www.cdc.gov/fungal/pdf/cocci-fact-sheet-sw-us-508c.pdf>, accessed August 21, 2013.

⁷ Kern County Public Health Services Department, *Valley Fever (Coccidioidomycosis) in Kern County*; <http://kerncountyvalleyfever.com/>, accessed August 21, 2013.

⁸ Kern County Public Health Services Department, *History of Valley Fever*, <http://kerncountyvalleyfever.com/history-of-valley-fever/#>, accessed August 21, 2013; and Kern County *Valley Fever Cases by Selected Measure*; <http://kerncountyvalleyfever.com/cases-in-kern-county-2/>, accessed August 21, 2013.

⁹ Center for Disease Control, *Valley Fever (Coccidioidomycosis) in Kern County, Fungal Pneumonia: A Silent Epidemic*, December 2012; <http://kerncountyvalleyfever.com/?portfolio=valley-fever-facts-usa>, accessed August 21, 2013; and Kern County Public Health Services Department, *Kern County Valley Fever Cases by Region*; <http://kerncountyvalleyfever.com/kern-county-valley-fever-cases-by-region/>, accessed August 16, 2013.

¹⁰ Kern County Public Health Services Department, *Kern County Valley Fever Cases by Selected Measure*; <http://kerncountyvalleyfever.com/cases-in-kern-county-2/>, accessed August 16, 2013.

¹¹ PSA, Sections 4.8-6 (Public Health), p. 4.8-13 and pp. 4.8-114 through 4.8-115, and 4.16 (Worker Safety and Fire Protection), pp. 4.16-14 through 4.16-20.

¹² PSA, p. 4.16-18.

control plan that a) specifies mandatory wearing of dust masks (NIOSH N-95¹³ or better) for site workers whenever visible dust is present; b) implements enhanced dust control methods (increased frequency of watering, use of dust suppression chemicals, etc.) immediately whenever visible dust comes from or onto the site; and c) limits the increase of downwind ambient concentrations of PM10 above upwind concentrations to 50 micrograms per cubic meter (“µg/m³”).¹⁴

Sierra Club commends CEC staff for identifying Valley Fever as a significant risk on account of the HECA project’s location in highly endemic western Kern County and strongly supports the development of enhanced dust control plans for both construction and operation of the project. Sierra Club recommends that these enhanced dust control plans be made available for public review and comment as part of the CEC’s review under the California Environmental Quality Act (“CEQA”). Further, Sierra Club recommends that these enhanced dust control plans incorporate additional and more stringent mitigation measures for greater protection of workers and the public as outlined below.

Mitigation for Linear Facilities

The HECA project would include a number of linear facilities including 32 miles of underground pipelines (15 miles process water, 1 mile potable water, 13 miles natural gas, 3 miles CO₂), a 2-mile long transmission line, and, under Alternative 1, an approximately 5-mile long new railroad spur.¹⁵ In addition, approximately 652 miles of new pipeline would be installed for CO₂ sequestration during the 20-year proposed phase of the enhanced oil recovery (“EOR”) project at the Elk Hills Oil Field (“EHOF”).¹⁶ Construction of these linear facilities may occur in areas where soils have not been previously disturbed and where pockets of *Coccidioides ssp.* spores may exist. The Kern County Public Health Services Department found that *Coccidioides ssp.* frequently occurs in the soil in the following areas: areas with many animal burrows; prehistoric Indian campsites; areas with sparse vegetation; areas adjacent to arroyos; areas with packrat middens; areas with an upper 12 inches of undisturbed soil; and areas with sandy, well-aerated soil with high water holding capacity.¹⁷ One or more of these conditions will likely be encountered during construction of the HECA project’s linear facilities. Sierra Club requests that Condition of Certification **WORKER SAFETY-**

¹³ An N95 facepiece respirator approved by the National Institute for Occupational Safety and Health filters at least 95% of airborne particles.

¹⁴ PSA, p. 4.16-20.

¹⁵ PSA, pp. 1-23–1-24.

¹⁶ PSA, p. 3.1-3.

¹⁷ Kern County Public Health Services Department, What Is Valley Fever, Prevention; <http://kerncountyvalleyfever.com/what-is-valley-fever/prevention/>, accessed August 21, 2013.

7 be clarified to explicitly require implementation during construction and operation of the project's off-site linears.

Protection of Public

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.¹⁸ CEC staff believes that "the persons who would have the greatest exposure and thus who would be most at risk are the workers involved in soil disturbance activities or those on the site when soil is moved during grading and excavation. Staff contends that if the workers are protected to the greatest extent possible from contracting Valley Fever, then the off-site public would also be protected."¹⁹

Sierra Club agrees that the greatest threat for infection with *Coccidioides ssp.* likely occurs during soil-disturbing construction activities and that protection for construction workers is essential. However, these measures do not ensure adequate protection for the public at times when construction is not occurring. Sierra Club recommends that mitigation plans specifically require controls during time periods when construction is not occurring, such as during nights and weekends, when high winds could generate dust clouds from disturbed sites, exposing downwind populations including agricultural workers and residents. Further, Sierra Club notes that unless the soils are effectively stabilized Valley Fever will pose an ongoing threat during the operational phase of the Project to both employees and the public from the unpaved areas onsite and disturbed soil along the new linear facilities. Sierra Club recommends that CEC Staff incorporate specific mitigation measures requiring effective and ongoing stabilization of these areas to adequately protect employees and the public.

Seasonality of Valley Fever

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

¹⁸ See Center for Disease Control, Coccidioidomycosis (Valley Fever); <http://www.cdc.gov/fungal/coccidioidomycosis/>, accessed August 21, 2013; and Kern County Public Health Services Department, Valley Fever (Coccidioidomycosis) in Kern County; <http://kerncountyvalleyfever.com/>, accessed August 21, 2013.

¹⁹ PSA, p. 4.8-13.

November and April.²⁰ The majority of cases of Valley Fever in Kern County accordingly occur during the months of June through December. 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.²¹ Drought periods can have an especially potent impact on Valley Fever if they follow periods of rain.²² 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.²³

Sierra Club suggests that major onsite and offsite soil-disturbing construction activities be timed to coincide with the area's rainy season. After soil-disturbing activities conclude, all disturbed soils including along linear facilities should be sufficiently stabilized to prevent air-borne dispersal of cocci.

Visible Dust

Condition of Certification **WORKER SAFETY-7** requires site worker use of dust masks and enhanced dust control measures whenever visible dust is present. 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 important to note that visible dust is only an indicator 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. However, these larger particles settle more rapidly and the remaining fine respirable particles may be difficult to see.

Spores of *Coccidioides ssp.* have slow settling rates in air due to their small size (2 µm – 5 µm), low terminal velocity, and possibly also due to their buoyancy, barrel

²⁰ 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; <http://geopubs.wr.usgs.gov/open-file/of00-348/of00-348.pdf>, accessed August 21, 2013.

²¹ Kern County Public Health Services Department, What Is Valley Fever, Prevention, Valley Fever Risk Factors; <http://kerncountyvalleyfever.com/what-is-valley-fever/risk-factors/>, accessed August 21, 2013.

²² Gosia Wozniacka, Associated Press, Fever Hits Thousands in Parched West Farm Region, May 5, 2013, citing Prof. John Galgiani, director of the Valley Fever Center for Excellence at the University of Arizona; <http://abcnews.go.com/m/story?id=19113795>, accessed August 21, 2013.

²³ Theodore N. Kirkland and Joshua Fierer, Coccidioidomycosis: A Reemerging Infectious Disease, Emerging Infectious Diseases, Vol. 3, No. 2, July-September 1996; <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2626789/pdf/8903229.pdf>, accessed August 21, 2013.

shape and commonly attached empty hyphae cell fragments.²⁴ Thus, spores, which are invisible to human eyes, may be present in air that appears relatively clear and dust free. Such ambient, airborne spores with low settling rates can remain aloft for long periods and be carried hundreds of kilometers from their point of origin. Therefore, implementation of the proposed dust control measures only when visible dust is present will likely not provide sufficient protection for either site workers or the general public. Sierra Club recommends that CEC require implementation of the more health-protective mitigation measures that were developed by agencies and scientific studies, as discussed below.

Recommended Measures to Reduce Risk of Valley Fever

Several agencies and scientific studies have developed precautions to protect workers and the public from Valley Fever that go beyond the measures recommended in the PSA.

The California Departments of Public Health and Industrial Relations recommend incorporating the following elements into a company's Injury and Illness Prevention Program and project-specific health and safety plans²⁵:

1. Determine if the worksite is in an area where Valley Fever is endemic (consistently present). Check with your local health department to determine whether cases have been known to occur in the proximity of your work area. ...
2. Train workers and supervisors on the location of Valley Fever endemic areas, how to recognize symptoms of illness ..., and ways to minimize exposure. Encourage workers to report respiratory symptoms that last more than a week to a crew leader, foreman, or supervisor.
3. Limit workers' exposure to outdoor dust in disease-endemic areas. For example, suspend work during heavy wind or dust storms and minimize amount of soil disturbed.
4. When soil will be disturbed by heavy equipment or vehicles, wet the soil before disturbing it and continuously wet it while digging to keep dust levels down.
5. Heavy equipment, trucks, and other vehicles generate heavy dust. Provide vehicles with enclosed, air-conditioned cabs and make sure workers keep the windows closed. Heavy equipment cabs should be equipped with high efficiency particulate air (HEPA) filters. Two-way radios can be used for communication so that the windows can remain closed but allow communication with other workers.

²⁴ Fisher et al., 2000.

²⁵ California Department of Public Health and California Department of Industrial Relations, Hazard Evaluation System & Information Service, Preventing Work-Related Coccidioidomycosis (Valley Fever), June 2013, hereinafter "HESIS Fact Sheet";

<http://www.cdph.ca.gov/programs/hesis/Documents/CocciFact.pdf>, accessed September 10, 2013.

6. Consult the local Air Pollution Control District regarding effective measures to control dust during construction. Measures may include seeding and using soil binders or paving and laying building pads as soon as possible after grading.
7. When digging a trench or fire line or performing other soil-disturbing tasks, position workers upwind when possible.
8. Place overnight camps, especially sleeping quarters and dining halls, away from sources of dust such as roadways.
9. When exposure to dust is unavoidable, provide NIOSH-approved respiratory protection with particulate filters rated as N95, N99, N100, P100, or HEPA. Household materials such as washcloths, bandanas, and handkerchiefs do not protect workers from breathing in dust and spores.

Respirators for employees must be used within a Cal/OSHA compliant respiratory protection program that covers all respirator wearers and includes medical clearance to wear a respirator, fit testing, training, and procedures for cleaning and maintaining respirators.

Different classes of respirators provide different levels of protection according to their Assigned Protection Factor (APF) (see table below). Powered air-purifying respirators (PAPRs) have a battery-powered blower that pulls air in through filters to clean it before delivering it to the wearer’s breathing zone. PAPRs will provide a high level of worker protection, with an APF of 25 or 1000 depending on the model. When PAPRs are not available, provide a well-fitted NIOSH-approved full-face or half-mask respirator with particulate filters.

Fit-tested half-mask or filtering facepiece respirators are expected to reduce exposure by 90% (still allowing about 10% face seal leakage), which can result in an unacceptable risk of infection when digging where Valley Fever spores are present.

| Respiratory Protection for Reducing Dust and Spore Exposure | | | |
|---|--|---|--|
| | Respirator Type (worn with particulate filters) | Assigned Protection Factor (APF) | Expected Reduction of Exposure to Dust and Spores (%) |
| | No respirator | None | 0 |
| Increasing Protection  | Half-mask respirator (elastomeric or filtering facepiece) | 10 | 90 |
| | Powered air-purifying respirator with loose-fitting face covering | 25 | 96 |
| | Full-face respirator | 50 | 98 |
| | Some powered air-purifying respirators are designed to offer higher protection (check with manufacturer) | 1000 | 99.9 |

Similarly, the Kern County Public Health Services Department recommends:²⁶

- 1) Practice general prevention measures.
- 2) Determine if the work site is in a high risk Valley Fever area (contact the Kern County Public Health Services Department).
- 3) Obtain a health assessment prior to being exposed to Valley Fever.
- 4) Use non-susceptible workers.
- 5) Use machinery and vehicles with enclosed cabs and use air conditioning.
- 6) Use dust masks appropriate for the activity performed (see HESIS Fact Sheet).
- 7) Remove dusty clothing and store in plastic bags until washed.

In response to an outbreak of Valley Fever among construction workers in 2007, the San Luis Obispo County Public Health Department in conjunction with the California Department of Public Health developed recommendations to limit exposure to Valley Fever based on scientific information from the published literature. They recommend that the following measures be implemented to reduce the possibility of worker illness when workers are exposed to dust in Valley Fever endemic areas:²⁷

2. *Implement comprehensive Injury and Illness Prevention Program (required by Title 8, Section 3203) ensuring safeguards to prevent Valley Fever are included.*
3. *Work with a medical professional with expertise in cocci to develop a training program for all employees discussing the following issues: potential presence of C. immitis in soils; the risks involved with inhaling spores; how to recognize common symptoms (which resemble common viral infections, and may include fatigue, cough, chest pain, fever, rash, headache, and body and joint ache); requesting prompt reporting of suspected symptoms to a supervisor and health care provider; discussing worker entitlement to receive prompt medical care if they suspect symptoms of work-related Valley Fever; and requesting the use of personal protection measures as outlined below.*
4. *Control exposure to dust:*
 - 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

²⁶ Kern County Public Health Services Department, What Is Valley Fever, Prevention; <http://kerncountyvalleyfever.com/what-is-valley-fever/prevention/>.

²⁷ San Luis Obispo County Health Agency, Recommendations for Workers to Prevent Infection by Valley Fever in SLO County; <http://www.slocounty.ca.gov/Assets/PH/Epidemiology/Cocci+Recomendations.pdf>.

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.
- Provide communication methods, such as 2-way radios, for use in enclosed cabs.
- Provide National Institute for Occupational Safety and Health (“NIOSH”)-approved respirators for workers without 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.
- 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.
- 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.
- Consider limiting outdoor construction during the fall to essential jobs only, as the risk of cocci infection is higher during this season.

5. *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 system 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; and
- Post warnings onsite and consider limiting access to visitors, especially those without adequate training and respiratory protection.

6. *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;
- Please note that skin testing is not recommended for evaluation of Valley Fever;
- 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.

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Sierra Club recommends that CEC staff consolidate the measures recommended by the California Departments of Public Health and Industrial Relations, the Kern County Public Health Services Department, and the San Luis Obispo County Public Health Department and amend Condition of Certification **WORKER SAFETY-7** to incorporate these more health-protective mitigation measures. In addition, Sierra Club recommends that CEC Staff consider for the Final Staff Assessment any additional relevant information from the upcoming 2013 Valley Fever Symposium which will be held by the Centers for Disease Control and Prevention and the National Institutes of Health on September 23, 2013 at the Kern County Public Health Services Department's Hans Einstein Center, 1800 Mount Vernon Ave., in Bakersfield.²⁸

Sincerely,



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²⁸ Valley Fever Americas Foundation, 2013 Valley Fever Symposium;
<http://valleyfever.com/events/2013-valley-fever-symposium/>.