TRANSMISSION LINE SAFETY AND NUISANCE

Testimony of Obed Odoemelam, Ph.D.

SUMMARY OF CONCLUSIONS

The California Energy Commission staff concludes that construction and operation of the transmission line for the Hidden Hills Solar Electric Generating System (HHSEGS) would not pose an aviation hazard according to the current FAA criteria. In addition, compliance with the requirements outlined in the proposed conditions of certification would minimize the potential for nuisance and hazardous shocks and maintain the generated fields within levels not associated with radio-frequency interference or audible noise. The proposed line design, routing, and operational plan would be adequate to ensure that the generated electric and magnetic fields are managed to an extent the California Public Utilities Commission considers appropriate in light of the available health effects information. The line would be operated to comply with all federal, state, and local laws, ordinances, regulations, and standards related to transmission line safety and nuisance if staff's recommended conditions of certification are adopted and implemented.

This assessment is limited to the portion of the HHSEGS line located within California. The environmental aspects of the section to be located in Nevada will be assessed by the U.S. Bureau of Land Management (BLM).

INTRODUCTION

The purpose of this analysis is to assess the proposed HHSEGS transmission line design, routing, and operational plan to determine whether the related field and non-field impacts would constitute a significant environmental hazard in the area around the route within California. Similar impacts within Nevada will be assessed by the U.S Bureau of Land Management. All related health and safety laws, ordinances, regulations, and standards are currently aimed at minimizing these impacts. Staff's analysis focuses on the following issues taking into account both the physical presence of each of the two considered lines and the physical interactions of their respective electric and magnetic fields:

- aviation safety,
- interference with radio-frequency communication,
- audible noise,
- fire hazards,
- hazardous shocks,
- nuisance shocks, and
- electric and magnetic field (EMF) exposure.

The following federal, state, and local laws and policies apply to the control of the field and nonfield impacts of electric power lines in California. Staff's analysis examines the project's compliance with these requirements.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

TRANSMISSION LINE SAFETY AND NUISANCE (TLSN) Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable LORS	Description
Aviation Safety	
Federal	
Title 14, Part 77 of the Code of Federal Regulations (CFR),"Objects Affecting the Navigable Air Space"	Describes the criteria used to determine the need for a Federal Aviation Administration (FAA) "Notice of Proposed Construction or Alteration" in cases of potential obstruction hazards.
FAA Advisory Circular No. 70/7460-1G, "Proposed Construction and/or Alteration of Objects that May Affect the Navigation Space"	Addresses the need to file the "Notice of Proposed Construction or Alteration" (Form 7640) with the FAA in cases of potential for an obstruction hazard.
FAA Advisory Circular 70/460-1G, "Obstruction Marking and Lighting"	Describes the FAA standards for marking and lighting objects that may pose a navigation hazard as established using the criteria in Title 14, Part 77 of the CFR.
Interference with Radio Frequency Communication	
Federal	
Title 47, CFR, section 15.2524, Federal Communications Commission (FCC)	Prohibits operation of devices that can interfere with radio-frequency communication.
State	
California Public Utilities Commission (CPUC) General Order 52 (GO-52)	Governs the construction and operation of power and communications lines to prevent or mitigate interference.
Audible Noise	
Local	
Noise Limits by the Inyo County Planning Commission.	Establishes noise standards for the different land uses in the county.
Inyo County General Plan.	Establishes exterior noise standards for receptors in the county.
Hazardous and Nuisance Shocks	
State	
CPUC GO-95, "Rules for Overhead Electric Line Construction"	Governs clearance requirements to prevent hazardous shocks, grounding techniques to minimize nuisance shocks, and maintenance and inspection requirements.
CPUC GO 128. Rules for Construction of Underground Electric Supply and Communications Systems.	Applies to the design construction of underground transmission lines. Specifically establishes requirements and minimum standards to be used for the underground installation AC power and communication circuits.

Title 8, California Code of Regulations (CCR) section 2700 et seq. “High Voltage Safety Orders”	Specifies requirements and minimum standards for safely installing, operating, working around, and maintaining electrical installations and equipment.
National Electrical Safety Code	Specifies grounding procedures to limit nuisance shocks. Also specifies minimum conductor ground clearances.
Industry Standards	
Institute of Electrical and Electronics Engineers (IEEE) 1119, “IEEE Guide for Fence Safety Clearances in Electric-Supply Stations”	Specifies the guidelines for grounding-related practices within the right-of-way and substations.
Electric and Magnetic Fields	
State	
CPUC GO-131-D, ”Rules for Planning and Construction of Electric Generation Line and Substation Facilities in California”	Specifies application and noticing requirements for new line construction including EMF reduction.
CPUC Decision 93-11-013	Specifies CPUC requirements for reducing power frequency electric and magnetic fields.
Industry Standards	
American National Standards Institute (ANSI/IEEE) 644-1944 Standard Procedures for Measurement of Power Frequency Electric and Magnetic Fields from AC Power Lines	Specifies standard procedures for measuring electric and magnetic fields from an operating electric line.
Fire Hazards	
State	
14 CCR sections 1250–1258, “Fire Prevention Standards for Electric Utilities”	Provides specific exemptions from electric pole and tower firebreak and conductor clearance standards and specifies when and where standards apply.

SETTING

As noted in the **Project Description** section, the proposed HHSEGS site would be 3,097 acres of privately owned land in unincorporated Inyo County California, adjacent to the Nevada border. The site is approximately 8 miles directly south of Pahrump, Nevada and 45 miles northwest of Las Vegas, Nevada. The project would consist of two solar plants: the northern solar plant (Solar Plant 1 occupying 1,483 acres or 2.3 square miles) and the southern solar plant (Solar Plant 2 occupying 1,510 acres or 2.4 square miles). There would be a commonly shared area of 103 acres between the two plants to accommodate an administration, warehouse, and a maintenance complex together with a common on-site switchyard. As more fully discussed by the applicant (HHSEGS 2011a, p. 3-3) the generated power would be transmitted to the Valley Electric Association (VEA) system from each plant’s power block, first to the common on-site switchyard, and then across the California/Nevada line into the area Nevada power grid. Each plant’s line would begin at the power block as an underground line and extend through the heliostat field to emerge at a transition point into an

overhead configuration. It is from this transition point that the line would extend to the on-site switchyard.

The applicant's chosen option for further transmission into the Nevada grid is the line exiting from the common on-site switchyard on the eastern side of the HHSEGS site and stretching 900 feet on the California side before crossing into Nevada. It is only the 900-foot overhead portion within California that is assessed in this staff report together with the on-site underground sections running beneath the heliostat fields. The potential impacts from the segments within the state of Nevada would be assessed by BLM under the requirements of the National Environmental Policy Act (NEPA) of 1969 (HHSG 2011a, pp. 3-2 and 3-3).

The area around HHSEGS and its proposed transmission line is open undisturbed desert land with relatively sparse vegetation and no nearby residences. The nearest residence to the proposed power blocks would be approximately 3,500 feet south of Solar Plant 2, and about 950 feet south of the site's southern boundary. The absence of residences in the immediate line vicinity means that there would not be the types of residential field exposure at the root of the health concern of recent years. That would leave only the potential short-term worker exposures or exposure to an individual crossing over the line.

PROJECT DESCRIPTION

The environmental impacts of the proposed connecting line within California are best assessed separately as impacts from the on-site underground sections and impacts from the noted 900-foot segment from the common on-site switchyard to the California/Nevada border which would mark the end of the segment under California's jurisdiction. The complete project line would be a 10-mile 230-kV transmission line stretching from its noted origination point at the HHSEGS on-site 230-kV switchyard, and would cross the California/Nevada line, avoiding the mesquite vegetation to the south, and continue east for approximately 1.5 miles until reaching Tecopa Road from where it would extend northeastward on a path parallel to Tacopa Road until it reaches the new Valley Electric Association (VEA) Substation (the Crazy Eye Tap Substation) located immediately east of the Tecopa Road/SR 160 intersection in Clark County Nevada. The Crazy Eye Tap Substation would interconnect to the existing VEA Pahrump-Bob Tap 230-kV line connected to the Colorado Substation with a 1-mile line.

The proposed line would be designed, built and operated by the applicant according to the guidelines of the major area utility, which is the Valley Electric Association (VEA). Specifications in VEA design document (SCE 2004) ensure safety, efficiency, reliability and maintainability for underground and overhead lines (HHSG 2011a pp. and 3-4). The requirement for design according to the guidelines of the area's major utility is current CPUC policy on line field management.

The underground segment of the on-site line for Solar 1 would be approximately 3,800 feet (0.7 miles) while the overhead segment would be 10,275 feet or 1.9 miles. For Solar Plant 2, the equivalent underground segment would be 7,300 feet (1.4 miles) while the remaining overhead portion would be 3,270 feet or 0.6 miles.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHODS AND THRESHOLDS FOR DETERMINING SIGNIFICANCE

The potential magnitude of the line impacts of concern in this staff analysis depends on compliance with the listed design-related LORS and industry practices. These LORS and practices have been established to maintain impacts below levels of potential significance. Thus, if staff determines that the project would comply with applicable LORS, we would conclude that any transmission line-related safety and nuisance impacts would be less than significant for either candidate line. The nature of these individual impacts is discussed below together with the potential for compliance with the LORS that apply.

DIRECT IMPACTS AND MITIGATION

Aviation Safety

Any potential hazard to area aircraft would relate to the potential for collision in the navigable airspace. The related requirements in **TLSN Table 1** establish the standards for assessing the potential for obstruction hazards within the navigable space and establish the criteria for determining when to notify the FAA about such hazards. These regulations require FAA notification in cases of structures over 200 feet from the ground. Notification is also required if the structure were to be below 200 feet in height but located within the restricted airspace in the approaches to public or military airports. For airports with runways longer than 3,200 feet, the restricted space is defined by the FAA as an area extending 20,000 feet (3.98 miles) from the runway, with no obstructing structures for whom the ratio of distance from runway to height is greater than 100:1. For airports with runways of 3,200 feet or less, the restricted airspace would be an area that extends 10,000 feet from this runway. For heliports, the restricted space is an area extending 5,000 feet.

As noted by the applicant, the nearest commercial airport to the HHSEGS site and either of the two possible connecting lines is McCarran International Airport in Las Vegas approximately 45 miles to the east (HHSG 1011a, p. 5.12-11 and 5.12-12). The Pahrump Valley General Aviation Airport is proposed to be located approximately 10 miles northwest of the HHSEGS site and thus too far for any of the lines' structures to pose a significant obstruction risk to utilizing aircraft. Furthermore, the line supports would be erected according to SCE guidelines ensuring heights below the FAA threshold for concern over collision with area aircraft. Other area airports would similarly not pose an aviation hazard because of the distance from the lines or orientation of their respective runways. There are no heliports in the area leading staff to agree with the applicant (HHSG 1211a, p. 5.12-14) that neither of the two candidate lines would pose an aviation hazard to both area helicopters and fixed-wing aircraft.

Interference with Radio-Frequency Communication

Transmission line-related radio-frequency interference is one of the indirect effects of overhead line operation and is produced by the physical interactions of line electric fields. Since electric fields cannot penetrate the soil and most materials, the discussed electric field effects would not occur in the underground segments. These electric field-related interferences are due to the radio noise produced by the action of the electric fields on the surface of the energized conductor. The process involved is known as "corona discharge,"

but is referred to as “spark gap electric discharge” when it occurs within gaps between the conductor and insulators or metal fittings. When generated, such noise manifests itself as perceivable interference with radio or television signal reception or interference with other forms of radio communication. Since the level of interference depends on factors such as line voltage, distance from the line to the receiving device, orientation of the antenna, signal level, line configuration, and weather conditions, maximum interference levels are not specified as design criteria for modern overhead transmission lines. The level of any such interference usually depends on the magnitude of the electric fields involved and the distance from the line. The potential for such impacts and related complaints is therefore unlikely because the responsible fields would be reduced using SCE designs, and the line located away from inhabited areas. The absence of such electric field impacts around underground lines would further serve to minimize the potential for complaints. Staff does not recommend any related conditions of certification.

Audible Noise

The noise-reducing designs for low-intensity electric fields are not specifically mandated by federal or state regulations in terms of specific noise limits. As with radio noise, such noise is limited instead through design, construction, or maintenance practices established from industry research and experience as effective without significant impacts on line safety, efficiency, maintainability, and reliability. Audible noise usually results from the action of the electric field at the surface of the line conductor and could be perceived as a characteristic crackling, frying, or hissing sound or hum, especially in wet weather. Since the noise level depends on the strength of the line electric field, the potential for perception around an overhead line can be assessed from estimates of the field strengths expected during operation. Such noise is usually generated during rainfall, but mainly from overhead lines of 345-kV or higher. It is, therefore, not generally expected at significant levels from lines of less than 345-kV but is possible for a 500-kV line. Given the use of noise-reducing design and noise-eliminating undergrounding in the nearest area to residences, staff does not expect either line option to add significantly to current background noise levels in the project area. For an assessment of the noise from the proposed line and related facilities, please refer to staff’s analysis in the **Noise and Vibration** section of this **FSA**.

Fire Hazards

The fire hazards addressed through the related LORS in **TLSN Table 1** are those that could be caused by sparks from conductors of overhead lines, or that could result from direct contact between the line and nearby trees and other combustible objects. Since the proposed line corridors would traverse a desert environment without combustible materials at high enough levels, staff does not anticipate a fire hazard during operations and does not recommend a related condition of certification.

Hazardous Shocks

Hazardous shocks are those that could result from direct or indirect contact between an individual and the energized line, whether overhead or underground. Such shocks are capable of serious physiological harm or death and remain a driving force in the design and operation of transmission and other high-voltage lines. No design-specific federal regulations have been established to prevent hazardous shocks from overhead or underground power lines. Safety is assured within the industry from compliance with the requirements specifying

the minimum national safe operating clearances applicable in areas where the line might be accessible to the public.

The applicant's stated intention to implement the GO-95- and GO-128-related measures against direct contact with the energized line (HHSG 2011a, p. 3-4) would serve to minimize the risk of hazardous shocks for the chosen line as located overhead or underground. Staff's recommended Condition of Certification **TLSN-1** would be adequate to ensure implementation of the necessary mitigation measures.

Nuisance Shocks

Nuisance shocks are caused by current flow at levels generally incapable of causing significant physiological harm. They result mostly from direct contact with metal objects electrically charged by fields from the energized line. Such electric charges are induced in different ways by the line's electric and magnetic fields.

There are no design-specific federal or state regulations to limit nuisance shocks in the transmission line environment. For modern overhead high-voltage lines, such shocks are effectively minimized through grounding procedures specified in the National Electrical Safety Code (NESC) and the joint guidelines of the American National Standards Institute (ANSI) and the Institute of Electrical and Electronics Engineers (IEEE). For the proposed project lines, the project owner would be responsible in all cases for ensuring compliance with these grounding-related practices within the rights-of-way.

The potential for nuisance shocks around the proposed lines would be minimized through standard industry grounding practices (HHSG 2011a, p. 3-7). Staff recommends Condition of Certification **TLSN-3** to ensure such grounding for the line segments assessed.

Electric and Magnetic Field Exposure

The possibility of deleterious health effects from EMF exposure has increased public concern in recent years about living near high-voltage lines. Both electric and magnetic fields occur together whenever electricity flows and exposure to them together is generally referred to as EMF exposure. The available evidence as evaluated by the CPUC, other regulatory agencies, and staff has not established that such fields pose a significant health hazard to exposed humans. There are no health-based federal regulations or industry codes specifying environmental limits on the strengths of fields from power lines. Most regulatory agencies believe, as staff does, that health-based limits are inappropriate at this time. They also believe that the present knowledge of the issue does not justify any retrofit of existing lines.

Staff considers it important, as does the CPUC, to note that while such a hazard has not been established from the available evidence, the same evidence does not serve as proof of a definite lack of a hazard. Staff, therefore, considers it appropriate in light of present uncertainty, to recommend feasible reduction of such fields without affecting safety, efficiency, reliability, and maintainability.

While there is considerable uncertainty about EMF health effects, the following facts have been established from the available information and have been used to establish existing policies:

- Any exposure-related health risk to the individual will likely be small.
- The most biologically significant types of exposures have not been established.
- Most health concerns are about the magnetic field.
- There are measures that can be employed for field reduction, but they can affect line safety, reliability, efficiency, and maintainability, depending on the type and extent of such measures.

State

In California, the CPUC (which regulates the installation and operation of many high-voltage lines owned and operated by investor-owned utilities) has determined that only no-cost or low-cost measures are presently justified in any effort to reduce power line fields beyond levels existing before the present health concern arose. The CPUC has further determined that such reduction should be made only in connection with new or modified lines. It requires each utility within its jurisdiction to establish EMF-reducing measures and incorporate such measures into the designs for all new or upgraded power lines and related facilities within their respective service areas. The CPUC further established specific limits on the resources to be used in each case for field reduction. Such limitations were intended by the CPUC to apply to the cost of any redesign to reduce field strength or relocation to reduce exposure. Publicly owned utilities, which are not within the jurisdiction of the CPUC, voluntarily comply with these CPUC requirements. This CPUC policy resulted from assessments made to implement CPUC Decision 93-11-013.

In keeping with this CPUC policy, staff requires a showing that each proposed overhead line would be designed according to the EMF-reducing design guidelines applicable to the area's main utility which in this case is SCE. These field-reducing measures can impact line operation if applied without appropriate regard for environmental and other local factors bearing on safety, reliability, efficiency, and maintainability. Therefore, it is up to each applicant to ensure that such measures are applied in ways that prevent significant impacts on line operation and safety. The extent of such applications would be reflected by ground-level field strengths as measured during operation and required by staff for all permitted lines. When estimated or measured for lines of similar voltage and current-carrying capacity, such field strength values can be used by staff and other regulatory agencies to assess the effectiveness of the applied reduction measures. These field strengths can be estimated for any given design using established procedures. Estimates are specified for a height of one meter above the ground, in units of kilovolts per meter (kV/m), for the electric field, and milligauss (mG) for the companion magnetic field. Their magnitude depends on line voltage (in the case of electric fields), the geometry of the support structures, degree of cancellation from nearby conductors, distance between conductors and, in the case of magnetic fields, amount of current in the line.

Since most new lines in California are currently required by the CPUC to be designed according to the EMF-reducing guidelines of the main electric utility in the service area involved, their fields are required under this CPUC policy to be similar to fields from similar lines in that service area. Designing the proposed project lines according to existing SCE field strength-reducing guidelines would constitute compliance with the CPUC requirements for line field management.

The CPUC has recently revisited the EMF management issue to assess the need for policy changes to reflect the available information on possible health impacts. The findings did not point to a need for significant changes to existing field management policies. Since there are no residences in the immediate vicinity of the proposed project lines, there would not be the long-term residential EMF exposures mostly responsible for the health concern of recent years. The only project-related EMF exposures of potential significance are the short-term exposures of plant workers, regulatory inspectors, maintenance personnel, visitors, or individuals in the vicinity of the lines. These types of exposures are short term and well understood as not significantly related to the health concern. Staff uses their measured intensities to (a) compare the effective application of control measures on lines of similar voltage and current-carrying capacities and (b) to assess the similarity in worker or other short-term exposures around similar lines.

Industry's Approach to Reducing Field Exposures

The present focus is on the magnetic field because unlike electric fields, it can penetrate the soil, buildings, and other materials to produce the types of human exposures at the root of the health concern of recent years. The industry seeks to reduce exposure, not by setting specific exposure limits, but through design guidelines that minimize exposure in each given case. As one focuses on the strong magnetic fields from the more visible high-voltage power lines, staff considers it important, for perspective, to note that an individual in a home could be exposed to much stronger fields while using some common household appliances than from high-voltage lines (National Institute of Environmental Health Services and the U.S. Department of Energy, 1998). The difference between these types of field exposures is that the higher-level, appliance-related exposures are short-term, while the exposure from power lines is lower level, but long term. Scientists have not established which of these types of exposures would be more biologically meaningful in the individual. Staff notes such exposure differences only to show that high-level magnetic field exposures regularly occur in areas other than around high-voltage power lines.

As with similar SCE lines, specific field strength-reducing measures would be incorporated into the proposed lines to ensure the field strength minimization currently required by the CPUC in light of the concern over EMF exposure and health.

As discussed by the applicant (HHSG 2011a, p. 3-4), the field reduction measures to be applied to any overhead segments include the following:

1. Increasing the distance between the conductors and the ground to an optimal level;

2. Reducing the spacing between the conductors to an optimal level;

3. Minimizing the current in the line; and

4. Arranging current flow to maximize the cancellation effects from interacting of conductor fields.

The strengths of the line fields along the two candidate routes would depend on the effectiveness of the field-reducing measures incorporated into their designs for the overhead segment. These fields should be of the same intensity as SCE lines of the same construction, voltage and current-carrying capacity. The requirements in Condition of Certification **TLSN-2**

for field strength measurements are intended to validate the applicant's assumed minimization efficiency for the overhead line. For the underground segment, undergrounding by itself would yield the magnetic fields of the lowest intensity possible (without affecting safety, reliability, and efficiency) since undergrounding allows for the closest conductor spacing and field strength cancellation possible). The only related requirements for this project would be for undergrounding according to requirements of CPUC's GO-128, and compliance with standard industry and SCE standards and practices. Only the magnetic field would be involved since only they can penetrate the soil and most materials to reach the area above the line. Since there would be no long-term residential exposure as previously noted, the field measurement in **TLSN-2** would allow for direct comparison with short-term human exposures around SCE lines of the same voltages and current-carrying capacity.

CUMULATIVE IMPACTS AND MITIGATION

When field intensities are measured or calculated for a specific location, they reflect the interactive, and therefore, cumulative effects of fields from all contributing conductors. This interaction could be additive or subtractive depending on prevailing conditions. Since either of the proposed candidate project transmission lines would be designed and erected according to applicable field-reducing SCE guidelines as currently required by the CPUC, any contribution to cumulative area exposures should be at levels expected for SCE lines of similar voltage and current-carrying capacity. It is this similarity in intensity that constitutes compliance with current CPUC requirements on EMF management. The actual field strengths and contribution levels for the chosen line would be assessed from the results of the field strength measurements specified in Condition of Certification **TLSN-2**.

COMPLIANCE WITH LORS

As previously noted, current CPUC policy on safe EMF management requires that any high-voltage line within a given area be designed to incorporate the field strength-reducing guidelines of the main area utility lines to be interconnected. As previously noted, the utility in this case is SCE. Since each of the proposed lines would be designed according to the respective requirements of the LORS listed in **TLSN Table 1**, and operated and maintained according to current SCE guidelines on line safety and field strength management, staff considers the proposed design and operational plan to be in compliance with the health and safety requirements of concern in this analysis. The actual contribution to the area's field exposure levels would be assessed from results of the field strength measurements required in Condition of Certification **TLSN-2**.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

Staff received no public or agency comments on the transmission line nuisance and safety aspects of the proposed HHSEGS. However, Please see **Appendix 1**, PSA Response to Comments, TLSN, for responses to Applicant's Preliminary Staff Assessment (PSA) comments.

CONCLUSIONS

Staff does not expect either of the two candidate HHSEGS transmission lines to pose an aviation hazard according to current FAA criteria, and therefore, does not consider it necessary to recommend location changes on the basis of a potential hazard to area aviation.

The potential for nuisance shocks would be minimized through grounding and other field-reducing measures to be implemented in keeping with current SCE guidelines (reflecting standard industry practices). These field-reducing measures would maintain the generated fields within levels not associated with radio-frequency interference or audible noise.
The potential for hazardous shocks would be minimized through compliance with the height and clearance requirements of PUC's General Order 95 and General Order 128 in the case of the underground section. Compliance with Title 14, California Code of Regulations, section 1250, would minimize fire hazards, while the use of low-corona line designs, together with appropriate corona-minimizing construction practices would minimize the potential for corona noise and its related interference with radio-frequency communication in the area around the route.

Since electric or magnetic field health effects have neither been established nor ruled out for the proposed HHSEGS and similar transmission lines, the public health significance of any related field exposures cannot be characterized with certainty. The only conclusion to be reached with certainty is that the proposal to design, build and operate either line option according to SCE guidelines would be adequate to ensure that the generated electric and magnetic fields are managed to an extent the CPUC considers appropriate in light of the available health effects information. The long-term, mostly residential magnetic exposure of health concern in recent years would be insignificant for the proposed lines given the general absence of residences along either of the proposed routes. On-site worker or public exposure would be short term and at levels expected for SCE lines of similar design and current-carrying capacity. Such exposure is well understood and can be used for comparison with similar SCE lines.

Since both of the candidate project lines would be operated to minimize the health, safety, and nuisance impacts of concern to staff and would be located away from areas of human habitation, staff considers the proposed design, maintenance, and construction plan as complying with the applicable laws for either line. With the conditions of certification proposed below, any such impacts would be less than significant for the chosen alternative.

The impacts from the segments within the state of Nevada would be assessed by BLM under the requirements of the National Environmental Policy Act (NEPA) of 1969 (HHSG 2011a, pp. 3-2 and 3-3).

PROPOSED CONDITIONS OF CERTIFICATION

TLSN-1 The project owner shall construct the chosen 230-kV or 500-kV transmission line according to the requirements of California Public Utility Commission's GO-95, GO-52, GO-131-D, Title 8, and Group 2, High Voltage Electrical Safety Orders,

sections 2700 through 2974 of the California Code of Regulations, GO-128 (in the case of any underground segment), and SCE's EMF-reduction guidelines.

Verification: At least 30 days before starting the construction of the chosen line option and related facilities, the project owner shall submit to the Compliance Project Manager (CPM) a letter signed by a California registered electrical engineer affirming that the lines will be constructed according to the requirements stated in the condition.

TLSN-2 The project owner shall use a qualified individual to measure the strengths of the electric and magnetic fields from the chosen line at the points of maximum intensity along its route. The measurements shall be made after energization according to the American National Standard Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE) standard procedures. These measurements shall be completed not later than six months after the start of operations.

Verification: The project owner shall file copies of the post-energization measurements with the CPM within 60 days after completion of the measurements.

TLSN3 The project owner shall ensure that all permanent metallic objects within the right-of-way of each of the chosen project line are grounded according to industry standards.

Verification: At least 30 days before the lines are energized, the project owner shall transmit to the CPM a letter confirming compliance with this condition.

REFERENCES

(EPRI). Electric Power Research Institute. 1982. Transmission Line Reference Book: 345 kV and Above.

HHSG 2011a. (BrightSource Energy/J. Woolard (tn:61756). Application for Certification Volumes 1&2: Submitted to the California Energy Commission on August 5, 2011.

National Institute of Environmental Health Services, 1998. An Assessment of the Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields. A Working Group Report, August 1998.

SCE 2004 (Sothern California Edison). EMF Design Guidelines for Electrical Facilities. EMF Research & Education, Irwindale, California. September.

TLSN

List of Comment Letters

		TLSN Comments?
1	Inyo County	
2	Bureau of Land Management	
3	National Park Service	
4	The Nature Conservancy	
5	Amargosa Conservancy	
6	Basin & Range Watch	
7	Pahrump Paiute Tribe	
8	Richard Arnold, Pahrump Piahute Tribe	
9	Big Pine Tribe of Owens Valley	
10	Intervenor Cindy MacDonald	
11	Intervenor Center for Biological Diversity	
12	Intervenor, Old Spanish Trail Association	
13	Applicant, BrightSource Energy, Inc.	**X**

Comment #	DATE	COMMENT TOPIC	RESPONSE
13	**July 23, 2012**	**Applicant, BrightSource Energy**	
13.1	**p. 258 #1**	Page 4.12-1, Summary of Conclusions, 1st paragraph, 1st sentence: The PSA is referencing the lines in Nevada, outside the CEC's jurisdiction. Discussion needs to be limited to onsite transmission lines. Comment is referring to the following text in the first sentence: *".. that construction and operation of either of the two candidate transmission lines…"*	Comment noted
13.2	**p. 258 #2**	Page 4.12-3, Setting, 1st paragraph, 1st sentence: The following text should be added to the end of the 1st sentence: "and a 103-acre Common Area for a total plant size of 3,096 acres."	103-acre Common Area added. Project size remains 3,097, however, as was indicated in AFC and uniformily throughout the Final Staff Assessment

13.3	**p. 258 #3**	Page 4.12-3, Setting, 1st paragraph, 3rd sentence: The project size is 3,096 acres (per general comment). The third sentence should be revised to reflect the correct project size.	Project size remains 3,097, however, as was indicated in AFC and uniformily throughout the **Final Staff Assessment (FSA)**
13.4	**p. 258 #4**	Page 4.12-4, Setting, 1st paragraph, 1st sentence: This sentence is confusing because the PSA is talking about the aboveground versus underground segments. Note the use of the following text: "Each transmission line option…"	Comment noted
13.5	**p. 258 #5**	Page 4.12-4, Setting, 2nd paragraph, 1st sentence: This sentence is confusing because the PSA is talking about the aboveground versus underground segments. Note the use of the following text: "two candidate connecting lines…"	Comment noted
13.6	**p. 258 #6**	Page 4.12-4, Project Description, 1st paragraph, last three sentences: These three sentences require updating once the EIS is published.	Comment noted
13.7	**p. 258 #7**	Page 4.12-4, Project Description, 2nd paragraph: Please see the revised transmission system project description in the General Document Comments.	Comment noted, clarification made to discussion in **FSA**
13.8	**p. 258 #8**	Page 4.12- 5, 1st paragraph, 1st sentence: Valley Electric Associate (VEA) would be the owner of most of the 230-kv facilities beyond the gen-tie. Replace "Southern California Edison (SCE)" at the end of this sentence with "VEA."	Comment noted, clarification made to discussion in **FSA**