CALIFORNIA ENERGY COMMISSION
1516 NINTH STREET
SACRAMENTO, CA 95814-5512

February 3, 2012

DOCKET
11-AFC-2
DATE FEB 03 2012
RECD. FEB 03 2012

Clay Jensen, Senior Director
BrightSource Energy, Inc.
1999 Harrison Street, Ste. 2150
Oakland, CA 94612

RE: HIDDEN HILLS SOLAR ELECTRIC GENERATING SYSTEM (11-AFC-2), DATA REQUESTS, SET 2C (#'s 147-155)

Mr. Jensen:

Pursuant to Title 20, California Code of Regulations, Section 1716, the California Energy Commission staff seeks the information specified in the enclosed data requests. The information requested is necessary to: 1) more fully understand the project, 2) assess whether the facility will be constructed and operated in compliance with applicable regulations, and 3) assess whether the project will result in significant environmental impacts.

This set of data requests (Set 2c, #'s 147-155) is being made in the area of Air Quality (#147), Traffic and Transportation (#'s 148-151), and Visual Resources (#'s 152-155). Written responses to the enclosed data requests are due to the Energy Commission staff on or before March 5, 2012.

If you are unable to provide the information requested, need additional time, or object to providing the requested information, you must send a written notice to both the Committee and me within 20 days of receipt of this notice. The notification must contain the reasons for not providing the information, the need for additional time, and the grounds for any objections (see Title 20, California Code of Regulations, Sec.1716 (f)). If you have any questions, please call me at (916) 654-4894 or email me at mike.monasmith@energy.state.ca.us.

Sincerely,

Mike Monasmith
Project Manager

cc: Docket (11-AFC-2)
Proof of Service List

Technical Area: Air Quality
Author: Jacquelyn Leyva

BACKGROUND: NATURAL GAS USAGE IN THE BOILERS

The AFC does not provide detailed information on the percentage of the annual heat input from fossil fuel compared to that from the sun. Page 5.1-32 and 5.1-37 of the AFC indicates that the annual heat input of natural gas will be limited to be less than 10 percent of annual solar energy capture. The percentage of fossil fuel usage should account for not only the natural gas used in the boilers, but also fuel used to keep the system operating, including mirror washing.

DATA REQUEST

147. Please provide fuel use documentation in MMBTUs that demonstrates compliance with intent of Public Utilities Code 399.12(h)(3)(A), which states

> *(3) (A) An electricity generated by an eligible renewable energy resource attributable to the use of nonrenewable fuels, beyond a de minimis quantity used to generate electricity in the same process through which the facility converts renewable fuel to electricity, shall not result in the creation of a renewable energy credit. The Energy Commission shall set the de minimis quantity of nonrenewable fuels for each renewable energy technology at a level of no more than 2 percent of the total quantity of fuel used by the technology to generate electricity. The Energy Commission may adjust the de minimis quantity for an individual facility, up to a maximum of 5 percent*[1]

a. This documentation should allow computation of the percentage of annual heat input from fossil fuel use relative to total heat input.

b. Report mirror washing separately for mirror washing.

[1] http://www.leginfo.ca.gov/cgi-bin/waisgate?WAISdocID=94715221473+0+0+0&WAISaction=retrieve

Technical Area: Traffic and Transportation
Author: Gregg Irvin, Ph.D.

BACKGROUND

The applicant has provided a previous analysis with respect to the MPE (Maximum Permissible Energy) for retinal damage, and the equivalent apparent brightness of a 100W light bulb at viewing distance. Further, although the applicant states that the brightness levels of the Solar Receiver Steam Generator (SRSG) on the top segments of the solar power towers are a tiny fraction (53-68 W/m2) of the levels established for MPE (1,000 W/m2 for continuous exposure) it is well known that: a) perceived brightness and MPE are not systematically related, and b) perceived brightness and irradiance (w/m2) are not systematically related. For that matter, neither is perceived brightness and radiance (e.g., lm/m2). Disability glare has been shown to be quite prominent at source levels up to and in excess of 3 orders of magnitude less than MPE. In the applicant's example the SRSGs are 1.3 orders (i.e., log units, a factor of 10) less than CW (continuous wave) MPE.

Additionally, the impact of glare is not considered within the context of a spatially extended emissive source. The solar collector is bigger than the sun at a considerable range of viewing distances. For example at 12 meters in width the solar collector has a visual extent (angular subtense) exceeding that of the sun (32 min arc) for a viewing distance of approximately 1,288 meters (0.8 mile).

DATA REQUESTS

148. Please address the impact of apparent glare and visual disruption in terms of observer incident luminous energy at nominal viewing distances for worker, the public and motorist populations.

149. Please address the impact of apparent glare and visual disruption for the baseline solar collector dimensions at nominal viewing distance for workers, the public and motorists given the predicted observer incident luminous energy.

BACKGROUND

The ability of light to cause injury to the retina has been shown both clinically and experimentally. Light can result in retinal damage through photothermal, photomechanical, and photochemical mechanisms. Photochemical damage is associated with long-duration exposure times as well as lower-wavelength (higher-energy) light exposure. While retina pigment epithelium (RPE) and the neurosensory retina are protected from light-induced exposure by the absorption profile of the surrounding ocular structures (e.g., cornea, crystalline lens, macular pigments) and through retinal photoreceptor outer segment regeneration, photic injury is still possible due to photochemical retinal light toxicity mechanisms.

Photochemical injury is both dose-dependent and cumulative in nature. The cumulative time-dependent nature is that daily exposures can build up and can last many weeks. For example, it has been estimated that the half-life (1/e, when an exposure effect has decayed to approximately 37%) of the cumulative dose exposure effect is on the order of 30 days. This has significant implications for observers (e.g., workers over many weeks) that spend a significant amount of time in proximity to the high luminance environment of a solar field in the presence of the additional high terrestrial ambient of the desert environment.

As retinal injury can be caused by exposure to otherwise innocuous visible light, there appears to be some critical dose or threshold at which exposure becomes injurious. The safe exposure times for common ophthalmic instruments (e.g., fundal photography) has been reported in the literature and supports the concept of a critical threshold dose necessary for injury.

DATA REQUEST

150. Please address the potential for photochemical retinal damage to the public (workers, local residents) given the cumulative exposure effects of the combined terrestrial ambient and solar field/ tower exposure levels. Additionally, if found to be significant, please address any potential mitigating methodologies (e.g., worker sunglasses).

BACKGROUND

In the Data Response to Set 1A, Data Request 29 the applicant discuses heliostat positioning and transition strategies. The discussions include positioning algorithms to optimize path selection for minimizing reflected sunrays on all unintended areas and the inclusion of forbidden areas within each heliostat's controller. An aviation concern with respect to Glint and Glare is unwanted aircraft exposure during heliostat transition. Further, since the heliostat field circumscribes a 360° field around the solar tower any spillage or leakage past the tower margins of reflected energy could potentially intercept aircraft and produce harmful Glint and or Glare visual impacts for pilots.

DATA REQUEST

151. Please describe any strategy in the heliostat positioning algorithms to address the intermittent presence of aircraft for either known or unknown flight paths. Also, please address the amount of energy from the heliostats which spills beyond the tower and its potential for negative impacts on aviation safety.

Technical Area: Visual Resources
Author: Melissa Mourkas, ASLA

BACKGROUND

To independently evaluate visual and glare effects of the heliostat field, staff requires a better understanding of the physical components.

DATA REQUEST

152. Please provide scaled plans and elevations with dimensions in feet and inches of individual proposed heliostat units. Include surface treatment and materials for the rear and frame of the heliostat units.

BACKGROUND

To facilitate preparation of the Staff Assessment, and to conduct its analysis, staff requires high-resolution image files of photographs in the AFC visual analysis.

DATA REQUEST

153. Please provide high-resolution image files of individual photos in the AFC Visual Resources Section, including simulations and character photos, in jpg or tif format. Please do not provide 'paired' before and after page layouts, but rather the individual photo image files at a resolution suitable for printing in ledger-size format.

Technical Area: Visual Resources
Author: Gregg Irvin, Ph.D.

BACKGROUND

The content of the optical path from the heliostats to the solar collector is assumed to be air and generally free of aerosols, particulates and other airborne obscurants. However, under various meteorological conditions, airborne dust and particulates can be of sufficient density and reflectivity to produce a substantial scattering field and a pronounced "haloing" effect. Such "haloing" can be relatively bright and visually prominent producing a "Tee Pee" shaped dome over the entire solar field. This effect can produce an extremely large and prominent visual stimulus.

DATA REQUESTS

154. Please address the expected frequency and deleterious visual impact of visual scattering effects for visual resources, visual disruption, distraction and glare.

155. Please add the visual effect of the airborne dust and particulates to the simulation provided in KOP-3.