STATE OF CALIFORNIA
Energy Resources Conservation and Development Commission

APPLICATION FOR CERTIFICATION FOR
THE HIDDEN HILLS SOLAR ELECTRIC GENERATING SYSTEM
HHSEGS 11-AFC-02

California Energy Commission
DOCKETED
11-AFC-2
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OPENING TESTIMONY

C.R. MACDONALD
INTERVERNOR

January 31, 2013

OPENING STATEMENT

TESTIMONY OF C.R. MACDONALD, INTERVENOR

PART I

The proposed Hidden Hills Solar Electric Generating System (HHSEGS) is based on an emerging technology that aims to deploy a new generation of utility scale power plants for the purpose of industrializing solar electrical production while simultaneously capitalizing on private and public sector financial opportunities now being largely driven by state and federal mandates.

These mandates have been initiated through political and economic responses to state, national and global outcry from citizens regarding wide spread environmental degradation resulting from the frenzied industrialization of the natural world over the last century, a degradation whose roots lie in the discovery of fossil fuels and the means to produce and deliver electricity on a mass scale.

As a result, these new found ways to generate power became the dominant force in shaping how we now perceive ourselves, our relationship to the world and how we envision our future. They have also become largely responsible for our very survival as we have become increasingly dependent on them to produce our food, provide our water and maintain environmental controls that have allowed us to continually expand into areas formerly restricted by hostile environments and natural limitations.

While we have gained significant benefits from utilizing fossil fuels and electricity in ways that effect every aspect of our daily life, we have also paid a very high price; through polluted air, contaminated water and soil, species decline, extinction and habitat loss, climate change, global warming, degradation of our quality of life, noise pollution, over population, the loss of cultural diversity, income disparity, social unrest, political upheavals, and a global military industrial complex that has standardized war to an apocalyptic level.

Today, most of us cannot imagine life without fossil fuel, electricity and their byproducts; and it's not a matter of simply "pulling the plug". While we can't go back, we have also realized the shortcomings and limitations of trying to continue to pursue the status quo. The challenges we are now faced with to protect our future, our environment and perhaps mankind itself are enormous while the consequences of failing to adequately address them are most likely dire.

It is here on this precipice of "change" that the California Energy Commission finds itself poised, tasked with overseeing much of the California's transformational efforts towards achieving renewable energy goals, green house gas reductions, and compliance with state and federal laws.

The decisions the Commission renders during this unique period in history will have far reaching consequences regarding California's future energy production, infrastructure, the investment and financial communities, the ratepayer, the taxpayer, the public at large and of course, the environment we depend on and will continue to for generations to come.

However, to help determine the future, one must understand the past and work diligently to both recognize and rectify our mistakes.

> *"Understanding California's deregulation fiasco is critical to understanding how getting energy policy wrong can obliterate trust in governance for years to come, particularly in cases where political expediency trumps careful and transparent monitoring of new policies as they are implemented. The crisis laid bare the dysfunctional governance structure under which no one entity is in charge when it comes to keeping the lights on and keeping rates affordable in California. It revealed that regulatory bodies designed a hundred years ago were not nimble enough to respond to the crisis. California paid dearly for its miscalculations. Billions of dollars were and continue to be spent in response to the 2000-01 crisis. Californians' trust that their elected officials could lead and govern in a time of crisis was greatly diminished. As California once again embarks to implement ambitious energy policy goals with a self-imposed timeline, it cannot fail again."* (Rewiring California: Integrating Agendas for Energy Reform, Little Hoover Report, p. 3) [Emphasis added.]

Hopefully, lessons learned in the past have taught us that the costs of implementing new, sweeping energy policies can be excruciatingly high if done without profound consideration of both the broad, political and socio-economic forces behind those policies and careful consideration of the site-specific proposals such as the proposed HHSEGS that advertises their systems and facilities will help achieve these new policy goals.

With respect to how successful or how poorly renewable energy production, integration and green house gas reduction will be achieved in California over the next twenty years largely rests on the Energy Commission now.

Much like the deregulation fiasco referenced above, I have developed serious concerns that history is about to repeat itself, that the stage has been set to once again leave California and the nation vulnerable to predatory practices aimed at exploiting society's genuine need to transform how electricity is generated, delivered and used in a truly renewable and sustainable manner.

Since my earliest childhood days, the development and deployment of renewable energy was a strong focus in our family as my father had an avid interest in wind, solar and alternative energy issues throughout most of my life.

In 1975, I accompanied my father to a renewable energy conference in Santa Rosa for my tenth birthday. In the 1980's, I listened to him rant because President Regan pulled the photovoltaic panels off the White House and gutted most of the funding for alternative energy and R&D. He also embarked on several alternative energy projects over the years including setting up a small wind generator (that was abandoned due to noise) and a small photovoltaic system (where batteries proved to be the weak link). He also tried to begin a consulting business regarding the design of small solar photovoltaic systems in the mid 1990's but found the costs too prohibitive. His final, big "retirement" project consisted of adding renewable power to a small boat by equipping it with a wind generator, photovoltaic panels and a battery bank. (*See* Exhibit 716)

The point is, because of my father's lifetime activities and interest, my awareness was raised from a very early age of both the need for renewable energy and the national socioeconomic-political environment that has thus far prohibited its sincere development and implementation.

As a result, the proposed HHSEGS project is of intense interest to me on two levels, the first being a very personal one because of its profound and irreparable environmental impact to an area I love, have called "home" for forty years, that my remaining family still lives at, where I own property at, where I have always routinely visited and where I had hoped to retire. The second level of interest is because of my long standing awareness of the overdue need to transform energy production, delivery and use within our society.

Because of this background, I have thrown myself completely into researching, studying and learning about a wide range of associated issues including technical, historical, legal, environmental, and economic considerations related to the proposed HHSEGS.

Despite my lack of formal education and socially recognized expertise, I have endeavored to do what few have attempted, which is to critically analyze and cross reference each of the technical disciplines related to the proposed HHSEGS, how the system works and its history, its renewable components, its feasibility, the level of data adequacy and accuracy throughout the AFC proceedings, potential impacts to the environment, site suitability and most importantly, how each of these components relate to each other as a whole.

As a result, I was able to discover and report upon at least two now "officially" recognized errors in the AFC files. The first included noted discrepancies in the originally reported amount of onsite SF_6 storage as well as the revised amount of SF_6 reported in the "Boiler Optimization Plan". Unfortunately, despite bringing this issue to the attention of the Applicant, Staff and the Great Basin Unified Air Quality District, it remained ignored, unnoticed, and/or unresolved until the EPA, Region 9, personally responded to my August 10th, 2012, letter and began inquiring into these discrepancies.(1)

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(1) Letter to Environmental Protection Agency, Request For Determination of Adequacy and Compliance Review, Great Basin Unified Air Pollution Control District's Final Determination of Compliance, Hidden Hills Solar Electric Generating System, (11-AFC-02), TN#66548, C.R. MacDonald, available online at: http://www.energy.ca.gov/sitingcases/hiddenhills/documents/others/2012-08-13_Letter_from_Cindy_MacDoanld_to_EPA.pdf

Additional errors were also brought to light by my research efforts regarding the number of monthly truck deliveries and associated emissions data, which also had highly significant relevance to traffic impacts during the construction phase of the proposed project.(2) In a letter dated July 31, 2012, the Applicant did respond to some of the issues raised by citing a section in their PSA Comments that addressed them, (though this letter has still yet to be posted on the CEC website), and it is included in the Applicant's Exhibit List, Exhibit #61.

As such, despite my lack of "formal training" in each of the related subject matters, I have attempted to compensate by vigorously educating myself and critically scrutinizing the proposed project on every level.

Therefore, it is my hope that the Commission will be forgiving of my lack of formal training but not take lightly or easily dismiss the issues I have previously raised throughout the AFC proceedings and will continue to raise during the Evidentiary Hearings regarding both site specific issues related to the proposed HHSEGS as well as the overarching need to address the broader social, political and economic issues that are the driving force behind California's attempt to transform and integrate renewable energy with sustainable, comprehensive policies that can serve as a guide for future AFC proceedings.

2. BRIGHTSOURCE ENERGY/APPLICANT

I have also spent a fair amount of time researching Bright Source Energy itself, including its financial and political background, associations and activities in efforts to determine if this is a company truly capable of being a leader in California's efforts to integrate renewable and sustainable energy production over the 25-30 years and beyond.

Unfortunately, most of what I have found has resulted in more questions than answers and has caused grave concerns regarding the actual viability of the company, their utility scale projects and their commitment to morally, ethically and accurately implement their projects based on a sincere understanding of the desperate need to go above and beyond the "status quo" of yesterday towards the aim of achieving an environmentally stable tomorrow.

Instead, I have seen the Applicant fight to whitewash impacts, potential impacts or in some cases, just refused to acknowledge significant impacts at all, such as the adverse visual impacts that will result from two 750 ft. towers rising from five square miles of mirrors in the middle of a desert valley floor.

In other instances, the Applicant has argued that prevailing laws allow the Applicant to do less than they should, despite the fact that it is imperative California "get it right" this time or that globally, we need real solutions, not the song and dance that brought us to this point.

(2) "Request For Immediate Rectification Of Errors In Hidden Hills AFC Project Data", C.R. MacDonald, June 18th, 2012, TN#65816, available online at: http://www.energy.ca.gov/sitingcases/hiddenhills/documents/others/2012-06-18_C_MacDonald_Request_for_Rectification_of_Errors_TN-65816.pdf)

Some brief examples include arguments presented in the Applicant's "Motion In Limine" demanding Staff be restricted from analyzing impacts of the proposed HHSEGS to Nevada – despite the fact that it will be built on the California/Nevada border as well as attempting to prohibit a vigorous alternative analysis by Staff in the FSA.

Also, Applicant has argued that tail pipe emissions produced by dedicated vehicles known as mirror washing machines (MWM), considered critical for maintaining the "renewable" portion of the facility, are exempt from power plant emissions reporting requirements - even though the MWM's will be responsible for approximately one third of the green house gas emissions produced by the plant once it is operational.

In the Applicant's comments regarding the PSA, Applicant stated that, "*Construction effects to common wildlife are insignificant.*"(3) While the actual degree of impacts may continue to be debated, for the Applicant to so casually dismiss impacts to "common" wildlife and habitat loss is a clear indication of the company's attitude, the kind of attitude that brought us to this point in the first place. The truth is, if the proposed HHSEGS is approved, there will be a trade-off and one of the prices paid will be the industrialization of yet another area in the natural world where common wildlife will continue to be less "common".

The Applicant has also has spoken freely that, if necessary, the Commission can merely "override" both laws and adverse environmental impacts to push the project through, thus providing a plain example of the known impacts and legal issues connected with the proposed HHSEGS to both the site and surrounding environment, issues that Applicant so far seems to solely focus on what it will take to legally and financially get around them.

On a company level, Bright Source Energy's (BSE) website has slick marketing campaigns that speak of their proven utility scale systems – even though none actually yet exist. Credible data regarding their Israel 6MW SEDC facility, the supposed foundation for their technology, is nowhere to be found. Even simple questions regarding the SEDC facility's acreage are considered "classified" by the Applicant under proprietary protection clauses.

BSE has professional computer generated photos of utility scale facilities that create the illusion of established technology, even though they have yet to be built - as well as speaking confidently and with authority about electrical power production capabilities, improvements and system designs they have never constructed or operated.

While advertising they produce high performance, reliable utility scale systems, BSE also makes it very clear their intent is to "flip" the majority interest in their projects to third party entities, as with Ivanpah. It also may be why they stated restrictions incorporated in the PSA's Water Supply-8 would make the project "*unfinanceable*". (4)

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(3) CEC FSA, Appendix 1: PSA Response To Comments, Biological Resources, Comment # 13.46, p. 36.
(4) CEC Status Conference Transcript, 7/09/12, p. 29

BSE also has had, and still has, some very influential people and connections behind them since their emergence on the renewable power scene in 2007, just shortly after California accelerated their Renewable Portfolio Standard in 2006 under Senate Bill 107.

In 2008, Governor Schwarzenegger accelerated the pace again by mandating a RPS achievement of 33% by the year 2020 through Executive Order S-14-08, thereby setting the stage for a frenzied rush to fulfill the new mandates and BSE began snapping up Power Purchase Agreements (PPA) beginning in March 2008(5) with their state-of-the-art public relations package and filing AFC's in rapid fire succession (relatively).

Though BSE states that their PPAs were all at market rates at the time they signed with SCE and PG&E(6), in a February 2011 report, the CPUC Division of Ratepayer Advocates publicly voiced concern over the costs of the all the long-term contracts that were being signed (not just through BSE) and noted the CPUC had accepted all but two of 170 contracts because the RPS requirements were creating an inelastic demand for renewables that was driving very high prices.(7)

> "*CPUC Commissioner Michel Florio expressed serious concerns about the value of three renewable energy contracts that were before the commission for approval in May 2012. "I am a strong supporter of California's RPS goals, but at the same time I believe we can achieve those goals in a far more cost-effective manner," Commissioner Florio wrote in his dissent to approve the contracts."* Rewiring California: Integrating Agendas for Energy Reform, Little Hoover Report, p. 11, p.v.

With respect to the competitiveness of some of Bright Source Energy's PPAs, an independent evaluation determined that;

> *"Although <u>none of the BSE amended PPAs had renewable premiums and viability characteristics that would have put them on SCE's 2011 RPS short list</u>, it is important to remember that there is a difference between shortlisted projects/PPAs and fully negotiated contracts",* and,
>
> *"Regarding whether or not Sedway Consulting recommends the approval of the BSE amended PPAs, it comes down to a question of how much the CPUC wants to advance solar thermal technology in California."*(8)

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(5) Exhibit 726, p. 32
(6) Exhibit 726, BSE/SEC Excerpts, Commitments And Contingencies: Power Purchase Agreements, p. 32.
(7) Exhibit 727, Rewiring California: Integrating Agendas, December 2012, p. 11 p.v.
(8) Exhibit 709, Response To Motion In Limine, p. 21/22.

BSE provides also an in depth description of their PPA agreement with PG&E in their March 2012 SEC Security filing, which states:

> *"In connection with the PG&E Agreement, the Company's wholly-owned foreign subsidiary entered into a royalty agreement with PG&E, guaranteed by the Company pursuant to which the Company's foreign subsidiary has agreed to pay certain royalties to PG&E, up to a maximum of $20.0 million, on sales of its integrated solar field system and licenses of its solar field technology. No royalty shall be due with respect to sales of its integrated solar field systems and licenses of its solar field technology as part of the first 100 megawatts of electrical generating capacity of a single project to be designated by the Company's foreign subsidiary and PG&E. Royalties will accrue on sales of the solar field systems and licenses of its solar field technology upon the first commercial operation date of the project described above."*(9)

Meanwhile, while researching the corporations that were listed on Bright Source Energy's March 2012 SEC filing, I was surprised to learn that two of them, Barclays(10) and Deutsche Bank(11) , have recently been under investigation by the FERC for manipulating energy prices in and around California. Apparently, California continues to remain easy prey for energy sector predators.

While the Commission may wish to dismiss the larger political and economic considerations surrounding the proposed HHSEGS, perhaps preferring to leave it to "the free market" to sort out, I would like to again reiterate what happened to last time the "free market" was not sufficiently scrutinized prior to it assuming control of California's electrical systems.

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(9) Exhibit 726, p. 32
(10) "A Triple Whammy For Barclays", Henning, 11/05/12, available at: http://dealbook.nytimes.com/2012/11/05/a-triple-whammy-for-barclays/
(11) 140 FERC 61,178, Docket No. IN12-4-000, Order To Show Cause and Notice of Proposed Penalty, available at: http://www.ferc.gov/EventCalendar/Files/20120905141131-IN12-4-000.pdf

Gov. Jerry Brown has vowed to "crush" opponents of solar projects. At the launch of a solar farm near Sacramento, the governor pledged: "It's not easy. There are gonna be screw-ups. There are gonna be bankruptcies. There'll be indictments and there'll be deaths. But we're gonna keep going — and nothing's gonna stop me."(12)

Part II

The proposed project site is in the immediate vicinity of where I grew up, where my remaining family still lives, where I own property and where I hoped to retire. If approved, it will result in significant changes and impacts to the area that will permanently and irrevocably alter the current environment and its unique qualities of life. As such, I have a very high personal interest and stake in the outcome of these proceedings.

Outside of my own personal interest regarding the proposed projects direct, indirect and cumulative impacts to the area, I have also had a long standing interest and concern regarding renewable energy vs. traditional energy production, the politics of sustainable living and environmental protection as well as the preservation of public trust values and the sanctity of public involvement; all of which are interwoven within these proceedings.

As a result, I have been placed in a unique position; one that has evidence and personal history of the proposed project site and the surrounding area combined with strong personal motivation that have led to a variety of previous involvement in public planning efforts, citizen activism as well as critical analysis and technical research on a wide scope of related subject matters.

My testimony is based on my personal knowledge and understanding of the proposed site and the surrounding environment for the last forty years, personal involvement in these proceedings since November 20, 2011, which has included a reasonable review of the AFC files, data requests and responses, the attendance of multiple workshops and status conferences, review of public and agency comments including Staff's Preliminary and Final Staff Assessments, the review of a minimum of 328 related articles, studies, laws, and technically related websites as well a multiple submissions of comments, analysis, responses, requests, and motions throughout these proceedings.

My first submission to the CEC regarding the proposed HHSEGS was on March 9, 2012, when I submitted 223 pages of comments, questions, photos, and recommendations separated by subject via email. (*See* Exhibit 700) First it was sent to the CEC's Assistant Public Advisor, then twice to the HHSEGS Project Manager and Public Advisor and finally, to the CEC Dockets Office. After ten days with no response, the docket office finally gave me the courtesy of informing me they could not accept my comments in multiple sections and that I must submit as a complete document by mail.

(12) "Solar Power Plants Burden The Counties That Host Them", LA Times, 11/25/12, available online at: http://articles.latimes.com/2012/nov/25/local/la-me-solar-counties-20121125

When my comments were finally publicly posted, they were posted in black and white. When I attended workshops prior to the publishing of the PSA and tried address some of the questions or issues I had submitted, I was told they would be addressed in the PSA.

When the PSA was published in May, technical discipline after technical discipline stated, "No public comments received", even though I had submitted them almost two months before the PSA was published. However, in the PSA's Executive Summary, the receipt of my comments was acknowledged and the following explanation was provided regarding "when" I could expect my comments, questions and recommendations to be addressed.

> "*Comments not responded to within the PSA will be addressed within the respective technical sections of the forthcoming Final Staff Assessment (FSA). The FSA will also contain staff responses to PSA comments filed by the applicant, intervenors and public agencies, as well as address issues that may arise at the June 14, 2012 PSA Workshop in Pahrump, Nevada, or the June 27, 2012 PSA Workshop in Bishop, California."* (HHSEGS PSA, Executive Summary, p. 1.1-11)

And so I have waited, and waited, and waited…….

I've waited through workshops, for workshops, status conferences and email replies. At the last workshop in December on the avian flux issue, the discussion went from, "Why don't we break for lunch?" to "We are going to end the meeting now" in what seemed like less than a minute, and nobody even called for intervenor or public comments.

When the FSA was finally published on December 21, 2012, whole sections of the comments I previously submitted had "disappeared". Instead, they were replaced by some of the additional questions I had submitted in another 223 pages in July for the PSA. (*See* Exhibit 702)

Throughout the AFC process through the present, I have continued to study, review, analyze, cross-reference and research information presented by Applicant, Staff, interested parties and independent sources in efforts to objectively evaluate the proposed facility. I have made every conceivable effort to be involved and well informed as well as sharing anything I had to offer to both Staff and the interested public along the way.

As a result, it is my intent to invoke the requirement that the Applicant bear the burden of proof regarding the information provided in the HHSEGS AFC and subsequent documents throughout this proceeding. This will include requesting where the Applicant has addressed the issues previously raised and to provide evidence that supports the statements and conclusions presented in the AFC and throughout these proceedings.

It is also my intent to invoke Staff's requirements under CEQA and Title 20 to provide evidence of where they have addressed issues previously raised and to provide evidence that supports the statements and conclusions presented in the PSA and/or FSA.

Therefore, I will be focusing on many of the issues raised throughout these proceedings during the Evidentiary Hearings and consider much of my previous submissions as the foundation of my testimony.

While technical areas associated with the proposed project provide a wealth of detailed information and/or analysis, much of the information is regurgitate through copy and paste techniques while other, more critical components associated with the AFC and the Applicant's design, data, responses and renewable portion of the proposed facility have remained partial, incomplete, inadequate, unanalyzed, insufficiently addressed, potentially erroneous and/or inaccurate and in some instances, verifiably erroneous, inaccurate and false.

There are additional issues associated with the "compartmentalization" of this process that analyze each technical disciple as a stand-alone subject but has resulted in contradictory data, information and analysis between the technical disciplines instead of data and analysis being supportive and representative of the project as an integrated whole.

Based on my current understanding of the substantive requirements of CEQA, I also believe it is inappropriate for Staff to propose mitigation measures for project impacts without disclosing or examining what those potential impacts may be prior to project approval.

I believe it is even more inappropriate to issue a determination that proposed mitigation measures will be capable of reducing project impacts to less than significant based on little or no data to support that finding or that the promise to disclose facts and develop a plan "*post*-CEQA" is credible mitigation.

Additionally, I have developed serious concerns regarding the CEC's actual political will to enforce compliance or mitigation measures at the proposed HHSEGS after project approval.

This concern is supported by the facts surrounding the Applicant's first well pump test conducted in February 2012, as a required component of both CEQA and data requests made during the discovery period by Staff.

There were three stipulations outlined to the Applicant regarding what was required of the well pump test. These were:

1) The well pump test must be performed for at least 7 days.

2) If after 7 days, data was insufficient, the applicant must extend the test to 14 days.

3) Regardless of the initially proposed 7-14 day time frame, the duration of the well pump test must be performed until the water levels stabilized.

Despite these stipulations, the Applicant adhered to none of them nor made any effort to re-initiate a new well pump test to meet the required conditions for several months after the fact – despite a tremendous amount of dispute from many of the parties (including both Staff and I) regarding the adequacy of a four and a half day test.

Yet, what is most disturbing of all is, even while Staff was dissatisfied with portions of the data generated by the 4.5 day well pump test, no one enforced the prior stipulations or ever demanded compliance from the Applicant on this critical issue - even at this early stage of the proposed project certification process.

As such, the evidence indicates that enforcement of whatever plans are developed for mitigation outside the CEQA equivalency process and public review cannot be relied upon with any degree of confidence as the CEC has already failed to enforce or demand compliance regarding the established criteria of the well pump test, despite this data being deemed critical to a site-specific review of the proposed projects impacts.

The only reason an additional well pump test was conducted several months later, at least according to the Applicant, is they didn't want investors to have any questions about the water supply.

Heliostat Positioning Plan

Hazardous Material Business Plan

Groundwater-dependent Vegetation Monitoring Plan

Weed Management Plan

CEQA EQUIVALENCY PROCESS FLOW CHART

TRAFFIC CONTROL PLAN

Operation Waste Management Plan

Construction Waste Management Plan

Desert Tortoise Translocation Plan

List of Herbicides and Soil Stabilizers

Determination:
Impacts Will Be Less Than Significant

To Be Determined. (TBD)

What is the basis for the Determination?

NOise

Mitigation Action Plan

Air Quality Fugitive Dust Operations Plan

What's in the plan?

The development of a "Plan".

Storm Water Pollution Prevention Plan

Storm Water Damage Monitoring and Response Plan

Construction & Demolition Debris Plan

Water Use Offset Plan

Landscape Plans

American Badger and Kit Fox Management Plan

Cultural Resources Monitoring and Mitigation Plan

State Waters Mitigation Management Plan

Avian, Bat, and Golden Eagle Protection Plan

Fire Prevention Plan

Safety Management Plan

Demolition and Construction Waste Management Plan

Detailed Facility Study Plan

Construction Site Security Plan

Pylon Insertion Depth and Heliostat Stability Report

Biological Resources Mitigation Implementation and Monitoring Plan

Subsidence Monitoring Plan

Groundwater Monitoring, Mitigation, and Reporting Plan

1. PROJECT DESCRIPTION

OPENING TESTIMONY OF C.R. MACDONALD, INTERVENOR

I. INTRODUCTION

A. Qualifications: Committee Order Granting Petition To Intervene

B. Prior Filings: In addition to the statements herein, this testimony includes by reference the following documents submitted in this proceeding:

Exhibit's 700, 702, 703, 708, 709, 711, 712

C. Additional Filings:

Exhibits 718, 726, 729, 730, 731, 732, 747

D. Documents Prepared By Others:

Exhibits 714, 726, 727, 728, 733, 734, 741, 744, 746

It is my intent to invoke the requirement that the Applicant bear the burden of proof regarding the information provided in the HHSEGS AFC and subsequent documents throughout this proceeding. This will include requesting where the Applicant has addressed the issues previously raised and to provide evidence that supports the statements and conclusions presented in the AFC and throughout these proceedings.

It is also my intent to invoke Staff's requirements under CEQA and Title 20 to provide evidence of where they have addressed issues previously raised and to provide evidence that supports the statements and conclusions presented in the PSA and/or FSA.

Therefore, I will be focusing on many of the issues raised throughout these proceedings during the Evidentiary Hearings and consider much of my previous submissions as the foundation of my testimony.

To the best of my knowledge, all of the facts contained in this testimony are true and correct or were true and correct at the time they were previously filed. With respect to documents prepared by others, I have endeavored to find the most credible source of facts to incorporate by reference in these proceedings but can make no sworn testimony as to their truth or accuracy on the preparer's behalf. To the extent this testimony contains opinions, such opinions are my own. I make these statements, and render these opinions freely and under oath for the purpose of constituting sworn testimony in this proceeding.

II. PROPOSED FINDING OF FACTS

- The proposed HHSEGS 500 MW utility scale project is a highly experimental, unproven design. As it stands, its viable renewable operations and projected performance are highly speculative.

- There is no basis, data or facts in the AFC that support the proposed design system is capable of generating 270 MWs per plant solely from 85,000 heliostats. To the contrary, the Applicant has provided MW production figures for its design that indicate the proposed HHSEGS project will be incapable of producing the advertised 500 MW's by a large margin.

- There is no basis, data or facts that support the Applicant's claim that its new solar power tower design can generate more megawatts per acre, that the design is more efficient overall, that more heliostats can be placed per acre or that the new design "substantially reduces mirror shading".

- There is no basis, data or facts to support the proposed projects renewable power production capabilities. Analysis has thus far proved inadequate to determine the plant's overall availability for power generation regarding the renewable portion of the facility; specifically, when the sun is shining and what impacts wind speeds will have during operations. However, based on available data and reasonable assumptions, the renewable portion of the proposed HHSEGS will be unavailable for energy production approximately 186 days annually, over 50% of the time.

- There is contradictory data and statements regarding the HHSEGS hours of operation.

- There is no evidence the proposed site is suitable for the reasonable and reliable operation of the *renewable portion* of the proposed HHSEGS facilities. Specifically, the performance of the heliostat/mirror assemblies, the "heart" of facility's renewable energy generating capabilities, have been inadequately reported on or analyzed as a stand-alone subject nor in a site-specific context.

- The Mirror Washing Machines (MWM), dedicated equipment that has been deemed critical for maintenance activities necessary to ensure maximum output of the renewable portion of the facilities, have been inadequately reported on or analyzed as a stand-alone subject nor in context of the facilities operational parameters.

- There is no basis, data or facts to support the proposed projects construction or operational water use and needs.

- The proposed HHSEGS project site lacks reasonable access to the infrastructure components necessary to construct and operate the facilities. This includes an inadequate water supply, roadway conditions and site access, transmission lines, natural gas supply, emergency services, waste disposal services and telecommunications.

- Evidence suggests the construction and operation of the proposed HHSEGS project may, at worst, endanger the general public and at best, create various nuisances for residents, visitors and motorists alike. This includes dangerous "glint" to motorists, unmitigatable uncomfortable and/or debilitating glare from the SRGS's, unmitigated fugitive dust, unmitigatable noise, and unmitigatable visual resource impacts to varying degrees throughout the Pahrump Valley.

- Currently, only the power blocks are being identified as the "power plant" while the remainder of the facilities, the renewable portion that includes the heliostat/mirror assemblies, are being excluded from the power plants definition. If utility scale renewable power plants are going to be constructed and operated on a mass scale, regulators must recognize, respond and incorporate new standards to meet the challenge.

- The AFC and data responses fail to adequately describe, report, analyze or provide adequate evidence or data regarding the most significant components and equipment associated with the renewable portion of the proposed HHSEGS project. Similarly, CEC Staff is deferring the majority of critical data collection, reporting and analysis until after project approval. With respect to describing "what" the HHSEGS project actually is, insufficient attention, data and analysis has been given to the renewable and operational portion of the HHSEGS while the majority of focus has been on the construction and natural gas use of the facility.

- The Applicant has not accurately or truthfully reported materially relevant facts, has falsified material facts, misrepresented material facts, omitted key material facts, has failed to disclose potential risks, possible public safety hazards, reliability and equipment issues associated with the proposed projects design that were self described by Applicant as "significant" and "substantial" and has committed perjury in at least two verifiable instances. As a result, the truthfulness, credibility and accuracy of any past or future statements, data, responses or testimony provided by the Applicant has become suspect and cannot be relied upon with any reasonable degree of certainty.

III. SUMMARY OF TESTIMONY

1. Unsupported MW Production Via Heliostats

There is no basis, data or facts in the AFC that support the proposed design system is capable of generating 270 MWs per plant solely from 85,000 heliostats. To the contrary, the Applicant has provided MW production figures for its design indicating the proposed HHSEGS project will be incapable of producing the advertised 500 MW's by a large margin.

Specifically, in the March 21, 2012, SEC filing by Bright Source Energy, the Applicant reported that:

> *"In the current system design, a 130 MW plant will utilize up to 60,000 heliostats, depending on land area and shape, and site-specific economic optimization."* (1)

BSE made this statement to investors approximately seven months after filing the HHSEGS AFC, which should reasonably indicate the "current system design" being referred to by the Applicant is applicable to the proposed HHSEGS.

However, the AFC claims the proposed HHSEGS will generate 270 MWs using only 85,000 heliostats. If the SEC reported MW/heliostat formula is used to determine the actual HHSEGS's MW/heliostat power production potential, then only 184 MWs can expect to be generated by 85,000 heliostats(2), not 270 MWs (gross) as is currently being claimed.

Therefore, the maximum MW output of the proposed HHSEGS project is 368 MWs under the most optimal conditions. If 40 MWs is subtracted from this total as has been done in the AFC projections, the maximum MW production available for export produced solely from the heliostats is 328 MW at any time while the sun is shining.

2. No Basis For Design Claims

There is no basis, data or facts that support the Applicant's claim that its new solar power tower design can generate more megawatts per acre, that the design is more efficient overall, that more heliostats can be placed per acre or that the new design "substantially reduces mirror shading".

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(1) Exhibit 726, BSE/SEC Excerpts, Heliostats, p. 31

(2) The MW production formula reported in BSE's SEC filing was 60,000 heliostats to produce 130 MWs. The proposed HHSEGS will utilize 85,000 heliostat/mirror assemblies, 25,000 more than the SEC/Heliostat MW formula. As such, 20,000 heliostats were used as the basis for the calculations and resulting conclusions. Specifically, 60,000 divided by 20,000 heliostats equals three. 130 MWs divided by three equals 43.3 MWs per each 20,000 heliostat block. This was further refined by dividing 5,000 heliostats into 20,000 heliostats, which goes four times. 43.3 MWs was then divided by four to determine each 5,000 heliostat block would produce 10.82 MWs. The totals of 43.3 MWs (20,000 additional heliostats) and 10.82 MWs (5,000 additional heliostats) were combined with the 60,000 heliostat 130 MW production to equal 184.12 MWs).

At several places in the HHSEGS AFC, the Applicant reports that:

> *"One principle advantage of the HHSEGS solar power tower design is that it results in more efficient land use and greater power generation. The new, higher, 750-foot solar power tower allows the heliostat rows to be placed closer together, with the mirrors at a steeper angle. This substantially reduces mirror shading and allows more heliostats to be placed per acre. More megawatts can be generated per acre and the design is more efficient overall".*(3)

However, no further evidence, data, discussions, analysis or diagrams are included in the AFC or subsequent data responses that explain, justify, or prove Applicant's claims. There is also contrary positions offered in the above quote, specifically, how is mirror shading substantially reduced *overall* if steeper angles allow more mirrors to be placed per acre and heliostat rows will be placed closer together?

Additionally, the statement that this design will result in "greater power generation" is highly questionable as, from my current understanding, the SRGS's require 600 kW/m2 to operate. Directing additional heliostats at the SRGS will not "increase its power" as all that is required is for the SRGS to reach sufficient temperatures to operate the steam turbine engine. In fact, the Applicant advertises that one advantage of their system is the ability to control and *reduce* heliostat directions to the SRGS to maintain stable temperatures.

3. Plant Availability Based On Environmental Conditions

There is no basis, data or facts to support the proposed projects renewable power production capabilities. There is no available data in the AFC files or subsequent documents that incorporates or analyzes environmental data such as available solarity, wind speeds, or summer storms at the proposed site that would support the Applicant's advertised "peak demand" capabilities of the facility.

Analysis has thus far proved inadequate to determine the plant's overall annual availability for power generation regarding the renewable portion of the facility; specifically, when the sun is shining and what impacts wind speeds will have during operations. There is also contradictory data and statements regarding its hours of operation.

Therefore, the degree to which these factors will affect power production, availability or reliability during "peak" demand times currently remains unknown. Therefore, the proposed projects feasibility, output, performance, availability and reliability cannot be adequately or reasonably evaluated.

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(3) AFC, Executive Summary, p. 1-2.

A. Project Site Available Solarity

The AFC files describe the area as one of "high solarity". However, no data or analysis is provided regarding the annual or seasonal average of sunny days at the proposed site in either the AFC and subsequent documents or the FSA.

With respect to plant availability, the HHSEGS FSA states, "*The plant would be available 92-98% of the time when the source of energy (the sunlight) is available, which is when the plant is expected to be available to come online.*"(4)

While the HHSEGS AFC states, "*HHSEGS is expected to have an annual plant availability of 92 to 98 percent. It will be possible for plant availability to exceed 98 percent for a given 12-month period.*"(5)

According to the Pahrump Chamber of Commerce, the average annual number of sunny days in the Pahrump Valley is 216. Cloudy and rainy days average 65 days per year and partly cloudy days average 84 days per year.(6) Based on these statistics, it can be reasonably assumed the average annual loss of available solarity for operations of the "renewable" portion of the proposed HHSEGS facility totals 149 days (approximately 40%).

B. Wind Speed Thresholds & Heliostat Wind Loads

During times of high wind speeds, heliostat/mirrors will rotate to the "safe" horizontal position to prevent equipment damage. However, no data is provided in the AFC or subsequent documents that describes or determines what wind speeds will trigger maximum thresholds that require heliostat "safe position" rotation, the annual average projected loss of heliostat function due to wind disturbance or seasonal analysis to determine if wind speed thresholds will occur during months of estimated peak power production.

Below, the Applicant describes the operational parameters of the heliostats with respect to how they will be protected from large wind loads.

> *"The wind protection and default position (called the "safe" position or orientation) is the 90- degree elevation - the mirrors being in horizontal position facing the sky. This position minimizes the risk of damage from large wind loads and is also the default orientation of the heliostats in case of loss of communication with the plant's control system or dysfunction of the plant's control system. With the solar field in "safe" position, at the ground level, the flux concentration will be low, similar to the sun's reflection on a lake."*(7) (Emphasis added.)

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(4) HHSEGS, Power Plant Reliability, p. 5.4-1
(5) Project Description, 2.2.12 Generating Facility Operation, p. 2-18.
(6) http://www.pahrumpchamber.com/weather.php
(7) Exhibit 728, 2011-11-17 Data Response Set, 1A, p. 24.

The Applicant has acknowledged heliostat/mirror assemblies will be rotated into the "safe" position to prevent equipment damage from threshold wind speeds. However, no data or analysis was made available by the Applicant that establishes what the threshold wind speeds will be or the estimated percentage of time heliostat/mirror functions will be offline and incapable of solar power production on either an annual or seasonal basis.

Between 1980 and 2010, Pahrump's average wind speed was 21.63 mph, 5 mph higher than the national average of 16.93 mph. Pahrump's three highest annual wind speed *averages* by month are: February (45.6 mph), June (29.6 mph) and August (31.5 mph).(8) Pahrump also ranked #7 out of 154 locations in Nevada with respect to average wind speeds.(9)

Regarding potential impacts of wind speeds in relation to heliostat protection and plant availability and/or reliability, the following relevant questions were submitted to the CEC on March 9, 2012. (10) Unfortunately, they have still yet to be answered by anyone.

> 2. What will be the "trigger level" of sustained wind speeds that will result in heliostat positioning to safe mode during operational hours?
>
> 3. What wind gust or sustained wind speed is projected to be the maximum speed a heliostat/mirror assembly could absorb without damage in both safe position and operating position?
>
> 4. Is there any projected wind event that could result in catastrophic damage to heliostats, production and the surrounding environment? Specifically, how fast would wind have to blow and/or gust to produce a catastrophic event?
>
> 5. How does the applicant's larger mirror design (12' x 8.5' = 204.7 sq.ft) compare to parabolic trough mirrors in terms of projected damage and/or breakage?
>
> 11. Can high winds result in any unusual or nuisance sounds on the heliostats or mirror surfaces?
>
> 13. What are the estimated impacts of wind erosion to mirror surface degradation and system performance on an annual basis and over the life of the project?
>
> 14. What is the projected amount of time per month that heliostats will be in safe positions to protect them from wind damage? For example, on average three days in June, two days in July, six days in February, etc.

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(8) Available online at: http://www.usa.com/pahrump-nv-weather.htm
(9)http://www.usa.com/rank/nevada-state--average-wind-speed—city rank.htm?hl=Pahrump&hlst=NV
(10) Exhibit 700, #14. Heliostat Damage: Large Wind Loads, p. 89-94, Also see Attachment I, p. 104-105, Attachment II, p. 106-111)

Just days after I submitted these questions to the CEC, Bright Source Energy made the following disclosure to investors in their filing with the SEC on March 21, 2012.

> *"Our assumptions could prove to be materially different from the actual long-term performance of our systems, resulting in significant operational problems for us including increased maintenance costs and inability to meet energy delivery requirements or defaults under project or financing documents. For example, a severe wind storm in late November 2011 at the Coalinga Solar-to-Steam for EOR project resulted in movement in some of the pylons on which the heliostats are mounted. As a result, we are deploying redesigned pylons in much of the Ivanpah project. Any similar widespread system or component failures may damage our market reputation and cause our revenue to decline."*(11)

Since Applicant and Staff have remained unresponsive to this issue since I first began questioning impacts of wind on the project design, operations, output, reliability, availability, etc., as well as failing to provide a single forum during workshops or other avenues to address this issue, in desperation I began combing the CEC website on Ivanpah and going through the Monthly Compliance Reports (MCR) trying to determine if any information could be found regarding changes to heliostat designs or reports to the CPM due to the BSE statement that they were redesigning the pylons at Ivanpah.

As a result, I found four reports that may have relevance and immediately put a Public Records Act request into the CEC on November 2, 2012. Two of these reports were titled, "Heliostat Earthquake LAOD Analysis (Project 30003-LH2.2 Rev A), Document # 25542-000-V1A-MXHS-00087" and, "Heliostat Wind Load Analysis (Project 3003-LH2.2 Rev A) Document # 25542-000-V1A-MXHS-00088".(12)

On December 17, 2012, I received an email in response to my PRA request, which in summary stated, these documents contained exclusive proprietary information that would have to be redacted and as such, to provide a redacted document would have "no meaning" and therefore, they would not be supplied.

In summary response, I argued that I didn't care if the Applicant redacted the "proprietary" portions of the documents, that I was looking for the conclusions of the earthquake and windload analysis with respect to the heliostats and that there was nothing proprietary about telling a competitor (or the public) that, for example sake, "Our heliostats can withstand winds up to 150 mph."(13)

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(11) Exhibit 726, BSE/SEC Excerpts, p. 13
(12) Exhibit 729
(13) Exhibit 730

As of January 15, 2013, the last report I have received regarding the status of this PRA is; the CEC is "*working on two fronts regarding my request for seismic and wind tolerance conclusions*". The first is trying to determine if Staff is capable of supplying this information. The second is still waiting on BSE because they are "*looking into it*".(14)

Since the Applicant has failed to provide data regarding maximum wind speed thresholds, no factual analysis of annual averages or seasonal wind speed thresholds in relation to power plant availability or reliability can be performed. However, assuming a factor of 10% annual loss of heliostat/mirror function due to wind speed thresholds (or 3.04 days per month), an additional 36.5 days per year can be projected to impact the power plant's output due to lack of availability of heliostat/mirror functions.

With a loss of heliostat function for an average of 36.5 days per year due to threshold wind speeds and combining it with the annual average loss of solar availability of 149 days, it is reasonable to assume the proposed HHSEGS will be unavailable for power production approximately 50% of the time or on average, 186 days per year. This figure may be higher or lower depending on the maximum wind speed thresholds that trigger heliostat/mirror rotation into the "safe" or horizontal positions.

4. Hours of Operation

There are wide discrepancies in the Applicant and Staff reported hours of operation for the HHSEGS facilities once they become online. Reported hours of operations have been included in a variety of sections in the AFC, subsequent documents and the FSA though the majority of hourly and annual operations analysis have relegated to the Air Quality sections of both the AFC and FSA.

Based on the available data, the Applicant and the FSA has failed to sufficiently provide evidence, data or analysis that supports:

a) The estimated number of hours the proposed HHSEGS facility will generate electricity on a daily, quarterly or annual basis.

b) The projected number of hours the proposed HHSEGS will generate electricity solely from the "renewable" portion of the facility, i.e., the sun, on a daily, quarterly or annual basis.

c) Adequate description and verification of the function, necessity and contribution of natural gas fired boilers towards electrical generation on a daily, quarterly or annual basis.

The descriptions contained within this section come from varying sections of the AFC, the Boiler Optimization Plan, the FSA and the joint Rio Mesa/Hidden Hills workshop held on August 28, 2012. Included references of hourly and annual operation levels taken from the air quality and emissions sections are NOT intended to be evaluated for emissions factors. They are included solely to demonstrate the conflicting data regarding hours of operations that have been scattered through various documents and how these conflicting reports fail to adequately describe when and for how long the proposed HHSEGS will actually be operational on a daily, quarterly and annual basis.

> "*HHSEGS would generate electricity up to 16 hours a day*".(15)
>
> *"The HHSEGS project would operate during the daylight hours (when the sun is shining)."*(16)

"The project, as proposed in the AFC, would be able to operate when the sun is shining." (17)

A. Unknown Solar Radiation Levels Available For Daily Hours of Operations

In the August 28, 2012, joint Rio Mesa/Hidden Hills SEGS workshop, Applicant stated that,

> *"<u>The receiver needs about 600 kW/m2 to generate steam</u>. Therefore, it doesn't matter the size of the solar field because the same amount of flux will be needed by the receiver."* (18)

Q. "*How will operational flux vary throughout the course of a day? What happens to flux at the start and end of operations, i.e., dawn and dusk when birds are known to be most active?"*

A. "*The flux levels during the day stay more or less the same. At the beginning of day and the end of the day the flux levels are significantly lower. We took at the upper boundary, 1,000 kW/m2, a normal day, a good day would be 900 kW/M2, dusk would be around 200 to 250. The intensity will be very, very low."*(19)

Based on the statements above, the "renewable" portion of the proposed HHSEGS power generation abilities is dependent on when the flux levels from the mirrors are capable of reaching 600 kW/m2 at the receiver and that, this level necessary is not achievable during dusk or dawn (200-250 kW/m2).

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(14) Exhibit 731
(15) HHSEGS FSA, Cover, Executive Summary, Introduction, Description, p. 1.1-3
(16) HHSEGS FSA, Noise & Vibration, p. 4.6-10
(17) HHSEGS FSA, Reliability, p. 5.4-4
(18) Joint Rio Mesa/Hidden Hills SEGS Workshop, 8/28/12, at 2:14 minutes.
(19) Joint Rio Mesa/Hidden Hills SEGS Workshop, 8/28/12, at 2:40 minutes.

However, what we still don't know is at what time the required level of solar radiation (per kW/m2) will be achievable at the start of the day (8:00 a.m., 10:00 a.m.?) or when the required solar radiation level will drop below the necessary levels to generate steam (5:00 p.m., 7:00 p.m.?).

Furthermore, based on the information above, it is impossible for the proposed HHSEGS to generate electricity up to 16 hours per day via sunlight. The only way generating electricity up to 16 hours per day is even remotely possible is through a heavy reliance on the boilers and natural gas. If this is the case, then the proposed HHSEGS cannot qualify as a "renewable" power plant.

B. Determining Hours of Operation Via Reported Annual MWh Production

Another potential method for trying to determine the daily hours of operation for the proposed HHSEGS is to use the reported annual generation of 1,400,000 MWh.(20)

The following explanation of what a 500MW power plant is defined as and the formula for converting MWs production potential to megawatt hours (MWh) was provided courtesy of a CEC Staff member.(21)

> *"The value represents the maximum that the facility can generate instantaneously. A 500 MW (megawatt) power plant is one that can potentially generate 500 MW at any point in time. If it were to do so for an hour, it would produce 500 MWh (megawatt hours). If it were to do so for 2 hours it would produce 1000 (= 2x500) MWh. For an entire day, 12,000 MWh. For 15, minutes, 125 MWh."*

Since the proposed HHSEGS is a 500 MW facility, then dividing 500 MWh's into 1,400,000 MWh's should provide the number of hours the proposed facility is estimated to generate electricity on an annual basis, which equals 2,800 hours. If this is further refined by dividing 2,800 hours by 345 days (subtracting 20 days for down time during December), it equates to 8.1 hours per day.

C. Conflicting Hours of Operations Via Emissions Reporting

Since there is no reported data or analysis regarding the daily availability of solar input to generate steam, there is equally no way to verify the accuracy or validity of the boilers reported hours of operation or their contributions towards electrical generation on a daily, quarterly or annual basis. However, given the general number of reported full load hours the boiler's are expected to be operating, combined with the MWh results equating to 8.1 hours of daily operations, evidence suggests the HHSEGS will be largely fueled by natural gas.

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(20) Applicants Testimony, Executive Summary, p. 3
(21) Exhibit 732, Email comm.. re: MW/MWhs

D. Reported Annual Full Load Hours And Capacity Factor

Based on the Applicant's description of the annualized capacity factor, the proposed HHSEGS is expected to operate at approximately the equivalent hours identified in converting the MWhs (2,800 hours annually or 8.1 hours per day) as explained below.

> *"However, as a solar power plant, the project is not designed or intended for base load generation. The EPS applies only to procurements that entail an annualized capacity factor in excess of 60 percent. With <u>an expected operating capacity that is the equivalent of approximately 3,000 full-load hours per year,</u> the project's annualized capacity factor will be less than 50 percent. Therefore, the SB 1368 limitation does not apply to this facility*." (22) [Emphasis added]

E. Operational Hours Via Emissions Data

There are a significant amount of discrepancies regarding boiler hours of operations in many different areas of the AFC, the Boiler Optimization Plan and the Permit To Construct. However, the following examples have been chosen to best represent the issues surrounding hours of operations as well as, out of these hours, how many hours of electricity are being generated from the "renewable" portion of the facility (the sun) and how many hours of electrical generation is a result of natural gas fired boilers.

Figure 1.

Source: Boiler Optimization, Supplemental Data Response, Set 2, TN64558, Appendix 5.1B, Revised April 2012, Emissions and Operating Parameters p. 5.1B-8

Table 5.1B-8R
Typical Annual Operating Schedule, Each Plant
Hidden Hills Solar Electric Generating System
Revised April 2012

Auxiliary boiler operation[1]	Summer	Winter	
operation , hours/day[2] (average)	5	5	
Equivalent full-load hours/yr[2]			1,100
Expected startup hours/yr			865

Nighttime boiler operation	Summer	Winter	
operation , hours/day[2] (average)	12	16	
Equivalent full-load hours/yr[2]			4,780
Expected startup hours/yr			345

Notes:
1. These 249 MMBtu/hr boilers were called "startup boilers" in the original project design.
2. Hours shown are equivalent full load hours; boilers may operate more hours on some days and/or at lower loads. See text.

(22) 2012-04-09 Supplemental Data Response, Set 2, TN-64558, pdf. pp. 133

As seen in Figure 1., the estimated typical number of full load hours for an auxiliary boiler is five hours per day and 1,100 hours annually, more than one third of the 3,000 annual operating hours described during the capacity factor discussion.

However, 1,100 annual hours divided by five hours only equates to 220 days per year. If five hours is a "typical day" and is multiplied by 345 days (subtracting 20 days of down time in December), then the auxiliary boiler would be operational for 1,725 hours annually at full load or well over half the annual reported hours of operations (57.5%).

From a daily calculation, if the plant is estimated to only produce power for 8 hours per day on average, then on a typical day, the auxiliary boilers will be used during 5 of these 8 hours.

Now the question is, will the auxiliary boilers be generating power as a stand alone generational source for five hours a day (perhaps during peak demand times?) <u>or</u> are they required to supplement the solar radiation from the heliostats because it is insufficient to generate steam for more than three hours per day. As it stands, the Applicant has failed to sufficiently or adequately explain the "renewable" portion of the facility's power generation.

What these figures also tell us is, this renewable power plant will "typically" require natural gas to operate for 21 hours p/day while only generating electricity 8 hours p/day – and yet, it is still qualifying as a "renewable facility".

Trying to determine the daily average "typical" hours of operations is further muddied by the fact that Staff and the GBUAPCD is unconcerned by annual daily average plant operations, deferring instead to allow the HHSEGS flexibility to utilize natural gas any time it wants, as long as it wants, to meet demand.

The focus of Staff and the GBUAPCD's analysis of daily/hourly operations is maintained exclusively through the lens of limitations on natural gas use incorporated in the COC and PTO. The idea being, incorporated natural gas use limitations in the COC's and PTO's will act as the enforcement mechanism to ensure the facility is not, in essence, using natural gas as the main source of fuel on an annual basis.

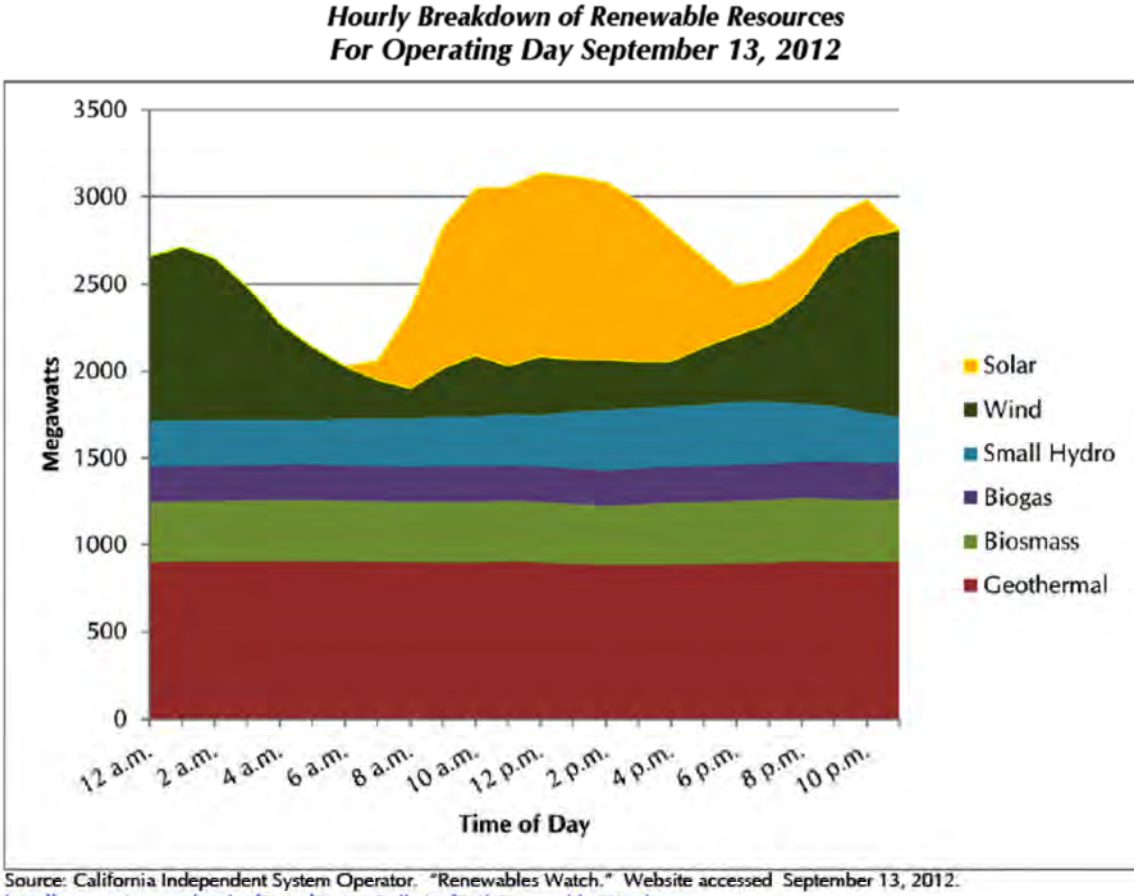
However, these limitations have a variety of caveats, including rolling annual averages and the option to submit modifications to the facility and Permit To Operate (PTO) within as little as five days (AQ-SC8). Additionally, though the Applicant is required to report violations of exceeding natural gas use to regulators, there are no enforcement provisions contained in the COC's and no shut down requirements if natural gas use is exceeded.

As such, what is to stop the proposed HHSEGS from relying on natural gas for the majority of its' power production, especially during "peak hours" (through 10 p.m. at night) when the plant can command its highest rates and simply just pay any associated fines for reported violations, sometimes known as "the price of doing business"?

To illustrate this point further, Figure 2 shows the hourly breakdown of megawatt generation from renewable resources. Note that the maximum megawatt production for the majority of solar power occurs between 10:00 a.m. and 5:00 p.m. However, megawatt production via "solar" energy is shown as extending to 11:00 p.m. at night. How much of this "qualified" solar energy is being driven by natural gas instead?

Figure 2.

Source: Rewiring California: Integrating Agendas For Energy Reform.
p. 34, Little Hoover Commission, December 2012.



Source: California Independent System Operator. "Renewables Watch." Website accessed September 13, 2012.
http://www.caiso.com/market/Pages/ReportsBulletins/DailyRenewablesWatch.aspx

Unfortunately, there does not seem to be any reasonably established criteria yet developed to adequately measure these issues and make determinations on solar versus natural gas for these types of facilities. The only means staff had to estimate the project's operations via availability was to substitute natural gas statistics for the BSE design as outlined below. Either that or it is a predominately natural gas-fired facility and that is why Staff found it reasonable to use natural gas statistics.

> "*Because natural gas is the primary type of fossil fuel used in California, staff finds it reasonable to compare the project's availability factor to the average availability factor of natural gas-fired fossil fuel units. Also, because the project's total net power output would be 500 MW, staff uses the NERC statistics for 400–599 MW units. The NERC reported an availability factor of 85.15% as the generating unit average for the years 2005 through 2009 for natural gas units of 400–599 MW (NERC 2010)".*(23)

In my Supplemental Comments submitted regarding the PSA, questions where submitted regarding annual power production that were not addressed. Specifically, in my Air Quality section, #7. Annual Power Production, Q-1. and Q-2., p. 3-7. In the FSA, Air Quality, Appendix 1- PSA Response To Public Comments, p. 4, Staff's response indicated answers to these questions would be addressed in the Power Plant Efficiency and Facility Design sections of the FSA. However, there is no mention of them in either section and therefore, they still remain unanswered. Also see Exhibit 700, Section: Operations, p. 128-130, Exhibit 702, Section 12, Operations, #1, #2, p. 12-1, 12-2

As a result of all these variables, inconsistencies, lack of established means to generally separate power production between solar sources and natural gas sources as is so clearly evident in the proposed HHSEGS, the Committee should determine standards that allow for clear distinction, measurements, standards and reporting requirements that ensure facility's such as these are capable of producing energy predominately from solar sources. Enforcement provisions should also be incorporated in the COC's mandating shut down requirements if natural gas use exceeds these renewable standards.

5. Heliostats: The "Renewable" Equipment

There is no evidence the proposed site is suitable for the reasonable and reliable operation of the <u>*renewable portion*</u> of the proposed HHSEGS facilities. Specifically, the performance of the heliostat/mirror assemblies, the "heart" of facility's renewable energy generating capabilities, have been inadequately reported on or analyzed as a stand-alone subject nor in a site-specific context.

I have submitted a significant amount of discussion on this issue as well as raising a large amount of questions since March 2012, most of which have continued to go unanswered. (*See* Exhibit 703, Exhibit 706, Exhibit 711: Section III, IV (plus Exhibits III-VI), Exhibit 712, and, Exhibit 700: Heliostats/Mirrors: All, p. 73-111, Soils: All, 155-162 Exhibit 702: Section 3: Air Quality #8, p. 3-9, #10, p. 3-10, Section 7: Facility Design p. 7-1, 7-2, Section 9: Heliostats #1, p. 9-1,9-2, #2, p. 9-3,9-4, Section 12: Operations, #4, p. 12-4, Section 14: Soils & Surface Waters, #2, p. 14-2 – 14-6, #3, p. 14-6 – 14-9, #4, p. 14-9 – 14-13, #5, p. 14-13 –14-15.

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(23) HHSEGS FSA, Reliability, p. 5.4-6

The following discussion, photos and excerpts are included below to illustrate conflicting data, information, and adequate project descriptions regarding facility system components that are deemed critical for the operational and maintenance requirements of the renewable portion of the facility.

To begin, at the 11-03-11 Informational Hearing(24), a Mr. Warren asks the Applicant about water usage as it related to mirror cleaning.

> *"I want to ask the applicants about the amount of water that's currently projected at 140acre feet. So as your project continues and if you discover that you need substantially more water for cleaning, if it's more dirty of an area or more wind, more caking of mud and stuff that gets on the mirrors during bad weather, is there a provision to – you know, basically I'm asking what happens if you need a lot more water than you've got, is the question?"*

With respect to Mr. Warren question about potential increases in water requirements for mirror cleaning activities, it has yet to answered and as far as I know, no one has required an answer. Now, as I have repeatedly stated throughout these proceedings, the Applicant has disclosed to investors that:

> "*Our largely unproven mirror cleaning equipment may perform below our expectations. The primary maintenance activity for solar thermal projects using our systems will be the routine and continuous washing of reflective mirror surfaces. We anticipate each mirror may need to be cleaned every two weeks* ***to prevent a buildup of dust which would significantly degrade the system performance****. Mirrors will be washed at night by a dedicated crew using specialized mobile equipment. A truck is being designed that will bring purified water simultaneously to a number of mirrors. We are still designing and testing the specialized equipment to be used in this process.* ***If the mirror washing equipment and process are not effective, actual operating costs may be substantially higher than forecasted or total electrical production may fall short of estimates****.*" [emphasis added].

As a result, it is reasonable to assume that the mirror cleaning equipment is largely unproven, the maintenance activities on a utility scale have never been tried, the equipment was still being designed approximately six months *after* the HHSEGS AFC was filed (that we still know nothing about over a year and a half later), and if the equipment and process are not effective, costs will be substantially higher and/or electrical production may fall short – how much shorter also remains a mystery.

Despite the completely unproven, experimental and "still designing" nature of the equipment and processes, the AFC provides water requirements for mirror cleaning as illustrated in the following quote.

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(24) Exhibit 700, p. 171/172

> *"Heliostat washing will require up to 52,834 gallons of water per day. Heliostat wash water will not be collected for disposal—it is expected that the wash water will evaporate at or near the ground surface."*(25)

What is the basis for the Applicant's water requirement estimates if both mirror washing equipment and processes are largely unproven and still experimental at the time the AFC was filed? Where is this substantiated in the AFC or subsequent documents, how was it determined, and how was it determined to be reasonably accurate by Staff? And, as Mr. Warren so appropriately queried, what happens if it is discovered the project needs substantially more water for cleaning, if it's dirty, has more wind, more caking of mud and stuff that gets on the mirror during bad weather (i.e., water spotting from sprinkling rain)?

The following photos evidence the need to adequately address and resolve this matter as it is at the heart of the "renewable" portion of the proposed HHSEGS's ability to operate. Photo 1 and Photo 2 are before and after photos of the same mirror placed on an area that was subject to any close activities from the surrounding area during the time frame it was "collecting dust", which was 35 days.

Photo 1
Freshly cleaned mirror placed outside to element exposure. 8/29/12

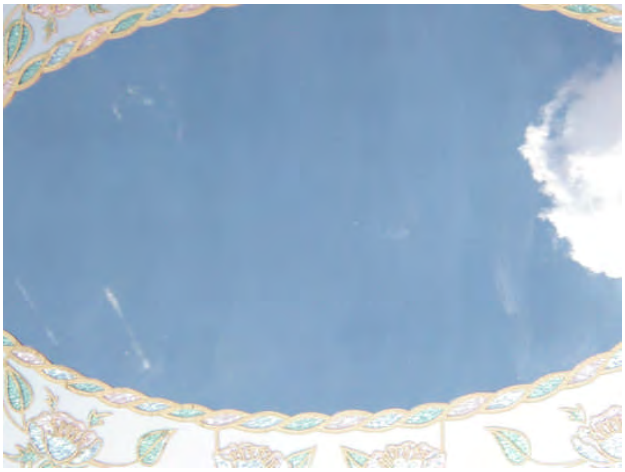

Photo 2
Same mirror after 35 days. 10/3/12

Note the water spotting on the mirror? This was caused from a light sprinkling of rain, which often occurs in the late summer months. I believe this will have a significant effect on the HHSEGS's output and performance if maintenance activities are incapable of addressing these mirror distortions.

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(25) HHSEGS, AFC, Section 5.15, Water Resource Management, p. 15.

Photo 3 was taken of a windshield at a residence in Charleston View. The windshield had been cleaned exactly 14 days from the time this photo was taken. The area around the vehicle was surrounded by gravel and has been compacted for a very long time.

Photo 3

Photo of vehicle windshield located in Charleston View. This dust is exactly 14 days old from when the windshield was last cleaned.

Besides impacts to the renewable portion of the facility's performance, mirror degradation, unproven processes and equipment as well as unsubstantiated claims in the AFC (such as water requirements), there are also environmental considerations that may impact the heliostat/mirror assemblies.

As previously discussed, there are potentially significant wind impacts as well as potential impacts from flooding, expansive soils, soil collapse, shifting of the heliostat assemblies and corrosive soil types recorded in the area.

For example, Staff dismisses pylon impacts due to expansive soils by stating that the amount of heliostat material (pylons) is much smaller than larger structures. They also cite pylons will be driven into the ground at least 10 feet and that the design of the heliostat foundation will not allow flow or infiltration of runoff beneath the pylon.(26)

(26) HHSEGS FSA, Soil and Surface Water, Response To Agency & Public Comments, Response to Comment 10.7/10.8, p. 4.9-50, 4.9-51.

With respect to the pylons and the attached heliostat/mirror assemblies (how much do they weigh?), even relatively "small" vehicles have sunk in the expansive desert soils when saturated. (*See* Exhibit 718, Section II: Soils, Photos 1-5)

Staff states that the heliostat foundations will not allow flow or infiltration of runoff beneath the pylon. I'm not sure what foundations Staff is referring too as my understanding of the pylon/heliostat design from the AFC is the pylons will be placed directly into the soil per the Low Impact Design (LID). What is Staff's source for the pylon/heliostat foundation descriptions in the AFC, data responses or FSA?

Significant issues were also raised by BLM regarding pylon/heliostat assembly stability and site suitability during the Ivanpah AFC process, most of which have NOT been covered in the HHSEGS AFC proceedings. At that time, stormwater flow calculations suggested modifying pylon insertion depths from four feet to five feet.(27) Now Staff states pylons will be inserted 10 feet or more. What is the source of this data and where was it analyzed in the AFC, data responses or FSA?

Also, BLM mentioned a high degree of variability at the Ivanpah site for water/soil infiltration rates. The Preliminary Geotechnical Report suggests similar variances in soil types are present at the proposed HHSEGS site. Staff has incorporated a requirement to test pylon stabilization with saturated soil and standing water under SOILS-5, which I highly support.

However, my question is, if Staff will request extensive surveys to be performed and data required for biological resources, cultural resources, visual resources, water supply, etc. during the AFC proceedings and prior to project approval, why on earth wouldn't something as fundamental as testing pylon stability at various locations throughout the HHSEGS site also be required prior to project approval? How much could it cost or time would it take to install a number of heliostats across the project site, saturate the soil, let the pylons stand in water for a day or two and see what happens?

When the heliostat installation began at Ivanpah, it must have been approved by the CBO and CPM and were found to be in "compliance" with structural and building LORS. And yet, the deficiencies found in these same designs discovered by the Applicant due to the wind event at the Coalinga facility had received CBO and CPM approval for Ivanpah, that then had to be redesigned and changed out. This illustrates how new this technology is and how current LORS may be inadequate for these components of the facility.

An additional consideration is the potential impacts of earth shaking on the heliostats due to seismic activity. While there will most likely be sufficient scrutiny of design requirements for large structures, what about the almost 5 square miles of heliostats?

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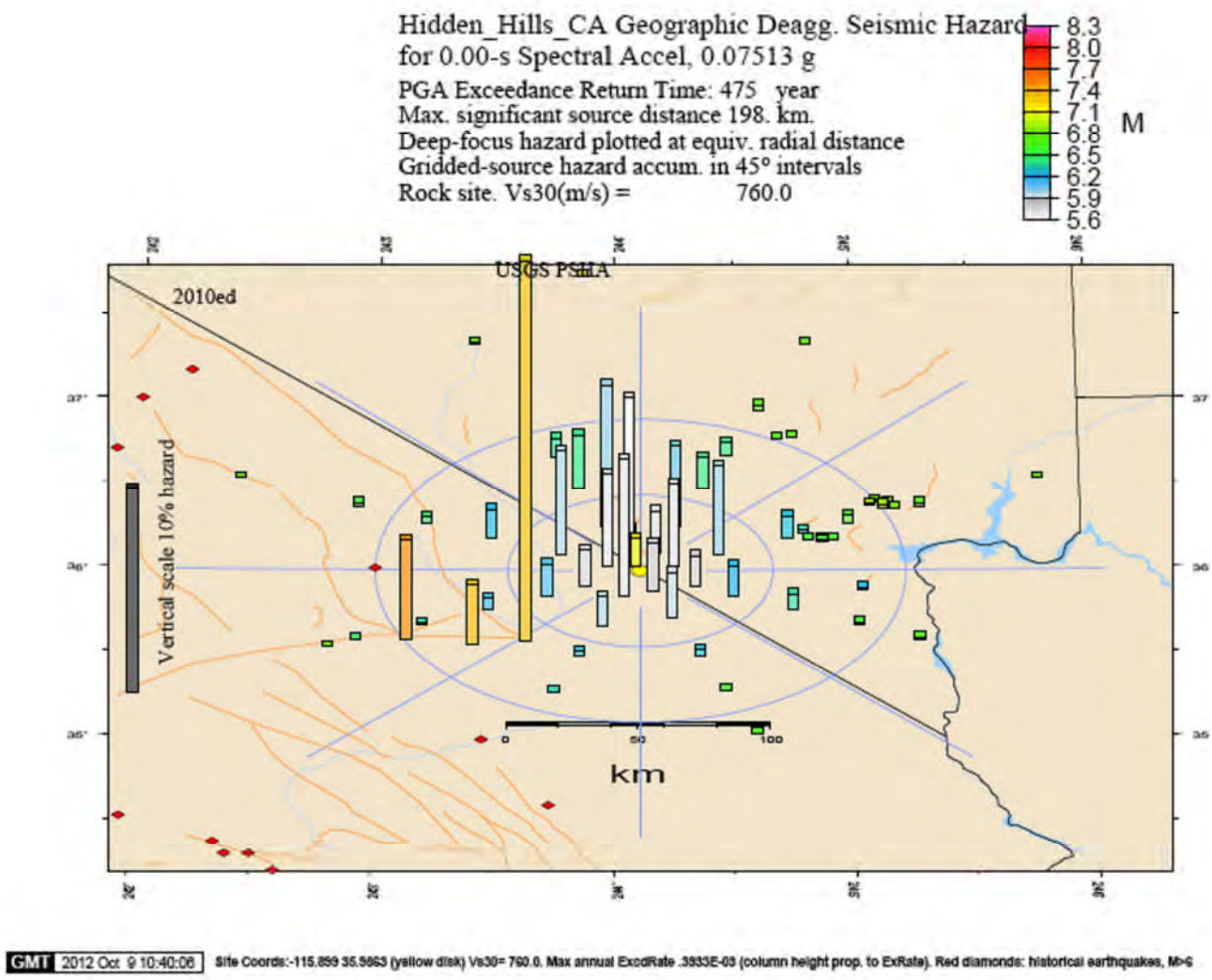
(27) Exhibit 733, p. 4.

Figure 3, below, was a computer generated model of earthquake potentials at the proposed project site using latitude and longitude degrees provided in the AFC at 10% for 50 years.(28) The model was run using the USGS Earthquake Hazards Program, Interpolated Probabilistic Ground Motion for the Conterminous 48 states.(29) This helps visually illustrate potential earthquake impacts throughout the heliostat fields and area as well as why I have been attempting to pursue heliostat earthquake tolerances via the CEC Public Record Acts requests.

Figure 3

Peak ground accelerations for the proposed HHSEGS site modeled by USGS using a 10% 50-year parameter.



A. Mirror Washing Machines

To continue the trend of the Applicant's haphazard approach in the AFC to descriptions of the renewable portions of the proposed HHSEGS project, including its equipment, processes, performance standards, output, etc. the following excerpts clearly illustrate how "anything goes" when it comes to describing the proposed project.

In the AFC Project Description, Applicant describes the number of necessary Mirror Washing Machine Operators as;

> *"HHSEGS is expected to employ up to 120 full-time employees: 36 at Solar Plant 1 (including mirror washing machine operators), 36 at Solar Plant 2 (including mirror washing machine operators), and 48 at the administration complex. The facility will operate 7 days a week."*(28)

In November, just three months later, the Applicant again describes the number of Mirror Washing Operators as now being 42 as illustrated in Figure 4 below.(29)

Figure 4

TABLE DR24-1
HHSEGS Plant Operation Workforce

Department	Personnel	Shift
Operations	42 MWM operators 24 Technicians 6 Support staff	All night shift, 21 per plant 2 shifts, 6 technicians each shift, per plant. 3 per plant, day or night shift?
Warehouse & Maintenance	13 personnel	12-hour night shift for maintenance?
Administration	31 Administration staff 4 Support staff	Day shift
Total	120	

MWM = mirror washing machine

In April, Applicant appears to drop the number of MWM operators significantly by citing that the plant will now only utilize 16 MWM's total (one operator p/machine?).(30)

In October, new figures are provided by the Applicant that are even more obscure, but seem to indicate MWM operators may now total 24 as illustrated in Figure 5.(31)

(28) AFC, Project Description, 2.2.12 Generating Facility Operation, p. 2.18.
(29) Exhibit 728, Applicant's Data Response Set 1A, 11/17/11, p. 18.
(30) Exhibit 703, Section 1, Baseline Data, #3, p. 2.
(31) Updated Workforce Analaysis, TN-67434, 10/01/12, p. 3-6.

Figure 5

TABLE 5.10-21R1
Operational Workforce

Staff	Solar Plant 1	Solar Plant 2	Common Area	Total
Solar fields and Power Block Workers	12	12	—	24
Technicians	8	8	—	16
Operators (Administration Building: shower and sewage calculations)	—	—	15	15
Warehouse & Maintenance Personnel	—	—	13	13
Admin Personal – day shift only	—	—	12	12
TOTAL (actual)	**20**	**20**	**40**	**80**
Misc. Support	10	10	—	20
TOTAL (max)	**30**	**30**	**40**	**100**

Meanwhile, as illustrated in Figure 6, the HHSEGS FSA describes the number of Mirror Washing Operators as 15 – even though the Applicant has described 16 Mirror Washing Machines will be required for the HHSEGS!(32)

Figure 6.

SOCIOECONOMICS Table 6
HHSEGS Plant Operation Workforce

Operations Workforce	
Solar fields and Power Block Workers	24
Technicians	16
MWM Operators	15
Warehouse & Maintenance Staff	13
Administration & Support Staff	32
TOTAL	100

Note: Total workforce includes only the crafts specifically needed for the HHSEGS. See **SOCIOECONOMICS Table 5** for a list of crafts included in the total workforce figures. MWM = mirror washing machine. Source: CH2 2012jj

SUMMARY CONCLUSIONS

The AFC and data responses fail to adequately describe, report, analyze or provide adequate evidence or data regarding the most significant components and equipment associated with the renewable portion of the proposed HHSEGS project. Similarly, CEC Staff is deferring the majority of critical data collection, reporting and analysis until after project approval. With respect to describing "what" the HHSEGS project actually is, insufficient attention, data and analysis has been given to the Renewable and Operational portion of the HHSEGS while the majority of focus has been on the Construction and natural gas use of the facility.

(32) HHSEGS FSA, Socioeconomics, p. 4.8-14.

6. Termination of HHSEGS Application For Certification

The Applicant has not accurately or truthfully reported materially relevant facts, has falsified material facts, misrepresented material facts, omitted key material facts, has failed to disclose potential risks, possible public safety hazards, reliability and equipment issues associated with the proposed projects design that were self described by Applicant as "significant" and "substantial" and has committed perjury in at least two verifiable instances. As a result, the truthfulness, credibility and accuracy of any past or future statements, data, responses or testimony provided by the Applicant has become suspect and cannot be relied upon with any reasonable degree of certainty.

Consequently, I filed a "Motion To Terminate Application For Certification for the Hidden Hills Solar Electric Generating System" on November 21, 2012, under the authority granted by § 20 C.C.R. 1720.2. Termination of NOI, AFC, and SPPE Proceedings, (a) The committee or any party may, based upon the applicant's failure to pursue an application or notice with due diligence, file a motion to terminate the notice or application proceeding. (*See* Exhibit 711)

Additional supporting documentation includes:

Exhibit 708: "Objection To Response Letter, Motion To Correct Factual and Legal Errors, Request for Cease and Desist Order", TN#67058, 9/08/12.

Exhibit 709: "Response To Motion In Limine", TN#67264, 9/24/12

Exhibit 712: "Objection To Order Denying Motion To Terminate Application For Certification For the HHSEGS", TN#68789, 12/06/12

There were also multiple examples that occurred throughout various workshops I attended where the Applicant's responses were "less than accurate" at very least, but I did not have time to go through multiple sessions of up to eight hours each to identify the specific comments and times these occurred.

However, the following excerpts are supportive of the Applicant's habitual trend towards misrepresentation and "less than accurate" reporting, disclosures and analysis as well as issuing false statements.

> "*<u>Less than accurate efforts were made</u> in the FESNA submitted <u>by the applicant</u> to show all hazards as being mitigated to "Less than significant" through compliance with applicable safety LORS and on-site measures*". County of Riverside Comments on the Rio Mesa SEGS.(33)

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(33) County of Riverside Comments on the Rio Mesa SEGS, 11-AFC-04, TN#68925, p. 20, available online at: http://www.energy.ca.gov/sitingcases/riomesa/documents/others/comments/2012-12-18_Riverside_County_Comments_TN-68925.pdf

"*To reduce project effects from the large-scale loss of desert tortoise habitat of the large scale land use conversion, staff has proposed the acquisition of compensatory mitigation lands. This compensatory mitigation is designed to fully mitigate impacts to this species as required under the California Endangered Species Act (CESA). Energy Commission staff proposes compensation at a 3:1 ratio for the loss of desert tortoise habitat that occurs in creosote bush scrub vegetation and a 1:1 ratio for areas dominated by shadscale scrub vegetation. Staff has not required compensatory mitigation for impacts to heavily disturbed lands such as dirt roads, a fallow orchard or graded areas. Currently, the applicant contends that this approach should be further refined to reflect the physical characteristics of the site and provided an alternative approach to determining compensatory mitigation ratios for the site. These ratios varied from a low of 0.5:1 for areas characterized as weed infested to 1.5:1 for areas considered more intact habitat. Staff reviewed the proposal in coordination with the CDFG and determined the approach had merit* ***but failed to accurately characterize habitat conditions at the site****. Staff proposed to workshop this issue further to gain resolution, however the applicant declined this offer*." (*See* HHSEGS FSA, Biological Resources, p. 4.2-3)

"Notwithstanding the variability in the applicant's description of the resource ***and outstanding concerns about the accuracy*** *of artifact material type identifications, enough information exists to characterize, interpret, and evaluate site S-3. Site S-3 is a relatively small and discrete scatter of eight to eleven stone artifacts."* (*See* HHSEGS FSA, Cultural Resources, p. 4.3-61)

Staff Response to BSE Comment:

"***The Applicant's statements are false****. Staff's alternatives analysis is substantially based on the Applicant's project objectives; staff eliminated the project objectives that specifically address implementing the Applicant's proposed project. It is not correct that staff's alternatives analysis must only use the project objectives provided by the Applicant in the AFC. There is no such requirement. See also responses to comments 13.15, 13.16, 13.17, and 13.18, above. Staff edited this sentence in the alternatives analysis, which now reads: "The alternatives analysis cannot be guided by project objectives that specifically target implementation of the project as proposed; this approach would lead the analysis toward a conclusion that no alternative is as valid as the applicant's proposal, which would be inconsistent with CEQA's purpose for an alternatives analysis.*" (*See* Alternatives, Appendix 5: Response to Public Comments: Alternatives, p. 17, BSE Comment 13.36, p. 27, #23)

As previously stated, there are numerous examples of the Applicant's failure to apply due diligence throughout the AFC proceedings, to accurately and honestly disclose, describe, or report on materially relevant facts that adequately describe the proposed project.

As a result, the truthfulness, credibility and accuracy of any past or future statements, data, responses or testimony provided by the Applicant has become suspect and cannot be relied upon with any reasonable degree of certainty.

By extension, it is reasonable to assume more of the same will continue to occur during the construction and operation of the proposed HHSEGS facilities, especially so if the Commission turns a blind eye to the facts that have been so clearly laid at their feet during these proceedings and approves the HHSEGS AFC anyway.

2. PROJECT ALTERNATIVES

TESTIMONY OF C.R. MACDONALD, INTERVENOR

I. INTRODUCTION

A. Qualifications: Committee Order Granting Petition To Intervene

E. Prior Filings: In addition to the statements herein, this testimony includes by reference the following documents submitted in this proceeding:

Exhibits 700, 702, 704, 708, 709, 710, 711, 712, 738

F. Additional Filings:

Exhibits 715, 718, 719, 720, 724, 725, 729, 730, 731, 732, 747

G. Documents Prepared By Others:

Exhibits 726, 727, 728, 737, 744, 745, 746

It is my intent to invoke the requirement that the Applicant bear the burden of proof regarding the information provided in the HHSEGS AFC and subsequent documents throughout this proceeding. This will include requesting where the Applicant has addressed the issues previously raised and to provide evidence that supports the statements and conclusions presented in the AFC and throughout these proceedings.

It is also my intent to invoke Staff's requirements under CEQA and Title 20 to provide evidence of where they have addressed issues previously raised and to provide evidence that supports the statements and conclusions presented in the PSA and/or FSA.

Therefore, I will be focusing on many of the issues raised throughout these proceedings during the Evidentiary Hearings and consider much of my previous submissions as the foundation of my testimony.

To the best of my knowledge, all of the facts contained in this testimony are true and correct or were true and correct at the time they were previously filed. With respect to documents prepared by others, I have endeavored to find the most credible source of facts to incorporate by reference in these proceedings but can make no sworn testimony as to their truth or accuracy on the preparer's behalf. To the extent this testimony contains opinions, such opinions are my own. I make these statements, and render these opinions freely and under oath for the purpose of constituting sworn testimony in this proceeding.

II. PROPOSED FINDING OF FACTS

- The FSA concluded the proposed HHSEGS project would result in direct environmental effects that are both severe and substantial. Furthermore, because of the severity of environmental impacts associated with the Applicant's "proprietary technology", the proposed site was found to be more suitable for an alternative type of utility scale power plant, which in this instance is Solar Photovoltaics (PV).

- The proposed siting location is not capable of achieving the Applicant's business objectives in conjunction with serving the public interest. As such, the substantive requirements of CEQA and the intent of the AFC review process demand a decision to deny the approval of the HHSEGS AFC so as to leave the site available for a business that *is* in the business of building and operating utility scale Solar PV. This would ensure more prudent use of resources that are also capable of fulfilling California's RPS requirements without causing the severe and substantial environmental impacts of the proposed HHSEGS.

- The Applicant's insistence on using their highly speculative and unsupportable "Residential Development Alternative" in replacement of the "No Project Alternative" is neither reasonable nor feasible. The proposed project site lacks access to power and consequently, water. No significant development can occur without these two critical infrastructure components and the cost of supplying power to an individual residential lot on the project site is cost prohibitive to the average landowner.

- The "renewable" portion of the proposed HHSEGS facility has been inadequately described or analyzed. Currently, the proposed HHSEGS "power plant" is defined and regulated solely by those components that require natural gas use in the FDOC and PTO. The HHSEGS will also utilize natural gas for approximately 21 hours per day in order to operate the facility. It boasts of power plant reliability features that depend completely on the use of natural gas. As such, there are more prudent ways to build natural gas fired power plants to ensure reliability than the proposed HHSEGS.

- An alternative roadway option for site access that would relieve many significant impacts associated with the proposed project was submitted to the CEC but never analyzed or addressed. This needs to be remedied.

- The Applicant has refused to consider the use of alternative fuels to power the Mirror Washing Machines. A bio-diesel manufacturing facility is located in Las Vegas. As such, the Applicant should be required to use bio-diesel to power the MWMs as a COC to help meet the requirements of SB1007.

- An alternative was submitted to CEC Staff recommending the analysis and feasibility of incorporating fees in the COC for the Applicant's water use for the proposed project that was never addressed or analyzed. (*See* Exhibit 700, Water Supply, #2, Recommendations, p. 173; #3, Recommendations, p. 174)

- An alternative was submitted to CEC Staff recommending the analysis and feasibility of incorporating fees for the Applicant's offsite wastewater disposal, limiting the Applicant's wastewater disposal over the life of the project as well as assessing the feasibility of transporting treated wastewater back to the HHSEGS for reuse as COC's.

- There is a large amount of land in the Charleston View area that will be up for public auction by Inyo County in March 2013 due to tax defaults.

- There is no adequate power supply throughout the proposed project site to make the Applicant's speculatory residential "build" alternative feasible or reasonably foreseeable in the future.

III. SUMMARY OF TESTIMONY

1. Applicant's Business Objectives Demand Denial of HHSEGS AFC

The Applicant has presented arguments throughout much of the HHSEGS AFC proceedings that the substantive requirements of CEQA preclude consideration of alternative power plant technologies based on the Applicant's business objectives.

As a result, the Applicant has attempted to blur two separate processes that are contained in the AFC/CEQA regulatory review. The first process is the filing of an Application for Certification of a power plant. This process is summarily an application for a business license that provides a place of business for a commercial entity to offer their products or services, which in this case is a power plant for purposes of generating electricity for retail sales.

The second process is evaluating the appropriateness of the proposed business under the substantive requirements of CEQA so that adequate impacts have been disclosed and analyzed regarding the proposed project.

The intent for inclusion of an alternative analysis under CEQA is to measure the impacts of the proposed business at the proposed location in order to determine if the proposed site is sufficiently suitable for accommodating the needs of the business in comparison to other, similar type businesses while protecting the public interest and surrounding environment.

An AFC is filed for the singular purpose of obtaining a license to build and operate a power plant. Therefore, the only alternatives that can be considered "reasonable" under the AFC and CEQA equivalency process are comparing alternative types of power generating technologies against the proposed project at the chosen siting location.

The AFC/CEQA alternative process also mandates the review and comparison of alternative siting locations to determine if the construction and operation of a power plant at an alternative location would be more suitable for power plant siting purposes, have reduced impacts, yield more prudent use of natural resources and/or better protect the environment and public health.

Due to the nature of the Applicant's objectives to construct and operate a "renewable" power plant, the FSA restricted its alternative analysis to only those types of power generating technologies as they were similar and solar based. The FSA did not examine dissimilar power plant technologies such as coal fired or natural gas facilities.

After analyzing the environmental impacts of the proposed HHSEGS in comparison with similar renewable technologies at the Applicant's chosen siting location, the FSA concluded the following:

> ***"If substantially reducing the extent and severity of direct environmental effects is the priority, then the Solar PV Alternative would be environmentally superior to the proposed project."*** (1)

In other words, the FSA determined that the proposed project would result in direct environmental effects that are both severe and substantial. Furthermore, because of the severity of environmental impacts associated with the Applicant's "proprietary technology", the proposed site was found to be more suitable for an alternative type of utility scale power plant, which in this instance is Solar Photovoltaics (PV).

However, the Applicant contends that;

> *"The Applicant is not in the business of designing, constructing or operating PV projects. The substantial lead time in project development, the required renegotiation of existing power purchase agreements (PPAs) to accommodate a different technology, and additional permitting requirements render the PV alternative incapable of being accomplished in a reasonable period, as required by CEQA."* (2)

In solely focusing on the Applicant's business background and needs, I have to agree with the Applicant on the point that it would be unreasonable to demand the Applicant abandon their primary business purpose and structure and require a complete reorientation of that business structure to construct and operate a PV power plant instead.

However, once outside the narrow parameters of the Applicant's business objectives, their contentions lose substance as they wholly fail to understand or represent the broader intent of CEQA, the AFC process or the purpose of filing an AFC for power plant siting purposes.

To summarize in plain language, just because a business files an application for a business license doesn't engender it the right of automatic approval to construct, operate or conduct their business at any chosen location, at any time or in any manner they desire as the needs of the business must be weighed against how to best serve the public.

Some examples might include licensing an adult bookstore across from an elementary school, licensing a strip club next to a church, licensing a bar next to a high school, approving residential development around a non-contained shooting range, building a library next to an airport, and so on. While all of these examples are "feasible", none of them would be considered particularly prudent or as reasonably serving the public interest.

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(1) HHSEGS FSA, Alternatives, p. 6.1-1
(2) Applicant's Alternatives Testimony, p. 4

The CEQA analysis has found the Applicant's chosen siting location to be unsuitable for the particular technology they are in the business of deploying because of the extent and severity of environmental impacts that would occur from the construction and operation of the proposed HHSEGS at the site.

It is not the CEC's responsibility or Staff's obligation to subordinate the AFC process and the substantive requirements of CEQA to the Applicant's business choices, including the type of technology they employ, their business structure, business agreements or the locations chosen to try and license their business.

Instead, the AFC CEQA equivalency alternatives process is designed to weigh the proposal against potential alternatives to determine the most prudent use of resources in efforts to best serve the public interest.

If the proposed siting location is not capable of achieving the Applicant's objectives in conjunction with serving the public interest, then the substantive requirements of CEQA and the intent of the AFC review process demand a decision to deny the approval of the HHSEGS AFC. Denial would allow the site to remain available for a business that *is* in the business of building and operating utility scale Solar PV so as to ensure more prudent use of resources that are also capable of fulfilling California's RPS requirements without causing the severe and substantial environmental impacts of the proposed HHSEGS.

2. Alternative Gas Fired Power Production

As explained in other portions of this testimony, the "renewable" portion of the proposed HHSEGS facility has been inadequately described or analyzed. Currently, the proposed HHSEGS "power plant" is defined and regulated solely by those components that require natural gas use in the FDOC and PTO. The HHSEGS will also utilize natural gas for approximately 21 hours per day in order to operate the facility. It boasts of power plant reliability features that depend completely on the use of natural gas.

As such, there are more prudent ways to build natural gas fired power plants to ensure reliability than the proposed HHSEGS. One such example is the recently emerging technology of fuel cells, such as the Bloom Energy Servers I have repeatedly advocated for throughout these proceedings. (*See* Exhibit 738)

While the comparison analysis in Exhibit 738 was developed without the understanding of megawatt definitions (though it was not from a lack of trying, I just couldn't get an answer!), based on my updated understanding, it is still useful for comparison as the comparison statistics of the Bloom Energy Servers™ used in the old analysis would need to be multiplied by three.

As such, instead of requiring one acre of land, a 500 MW facility would require three acres of land instead. Comparing the need for 3,000 acres of the HHSEGS to the 3 acres required by fuel cells such as manufactured by the Bloom Energy Servers™ is obviously an environmentally superior alterative for a natural gas based facility.

Furthermore, in the event California and the CEC ever begin to pursue the State Alternative Fuels Plan(3) and AB1007 as aggressively as they have pursued PPA's and AFC's for renewable energy based power plants, bio gas will become readily available to allow the fuel cells and their resulting power generation to become carbon neutral.

3. Site Access Via Alternative Road Construction

I submitted an alternative roadway option for site access that would relieve many significant impacts associated with the proposed project that were never analyzed or addressed. (*See* Exhibit 704)

4. Alternative Fuel Use For Mirror Washing Machines (MWMs)

The Applicant has refused to consider the use of alternative fuels to power the MWMs. A bio-diesel manufacturing facility is located in Las Vegas.(4) As such, the Applicant should be required to use bio-diesel to power the MWMs as a COC.

5. Alternative Water COC

An alternative was submitted to CEC Staff recommending the analysis and feasibility of incorporating fees in the COC for the Applicant's water use for the proposed project that was never addressed or analyzed. (*See* Exhibit 700, Water Supply, #2, Recommendations, p. 173; #3, Recommendations, p. 174)

Given the high value of water in California and the area as well as the Applicant's intent to utilize local water resources for commercial gain, it is more than reasonable to incorporate fees for water extraction during the operations of the proposed HHSEGS AFC to compensate the public for the water's commercial use.

6. Alternative HHSEGS Wastewater Recycling

An alternative was submitted to CEC Staff recommending the analysis and feasibility of incorporating fees for the Applicant's offsite wastewater disposal, limiting the Applicant's wastewater disposal over the life of the project as well as assessing the feasibility of transporting treated wastewater back to the HHSEGS for reuse as COC's. (*See* Exhibit 700, Water Supply, #4, Q.#2 & Recommendations, p. 175; #5, Q.#2, p. 179 and Recommendations, p. 180; #6, Recommendations, p. 181)

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(3) California State Alternative Fuel Plans, CEC-600-2007-011-CMF, December 2007. Available online at: http://www.energy.ca.gov/2007publications/CEC-600-2007-011/CEC-600-2007-011-CMF.PDF
(4) Biodiesel of Las Vegas, available online at: http://www.biodieseloflasvegas.com/

However, these alternatives was never addressed or analyzed. Given the high value of water in California and the area as well as the Applicant's intent to utilize local water resources for commercial gain, it is more than reasonable to incorporate fees for water that is permanently removed from the site, limiting the Applicant's wastewater dispoal volumes as well as assessing the feasibility of transporting treated wastewater back to the HHSEGS for reuse during the operations as COC's in order to compensate the public for its commercial use and in the interest of recycling this precious resource.

3. FACILITY DESIGN

TESTIMONY OF C.R. MACDONALD, INTERVENOR

I. INTRODUCTION

A. Qualifications: Committee Order Granting Petition To Intervene

B. Prior Filings: In addition to the statements herein, this testimony includes by reference the following documents submitted in this proceeding:

Exhibit's 700, 702, 703, 708, 709, 711, 712

C. Additional Filings:

Exhibit 717, 718, 726, 729, 730, 731, 732, 739, 741, 742, 747

D. Documents Prepared By Others:

Exhibits 726, 727, 728, 733, 734

It is my intent to invoke the requirement that the Applicant bear the burden of proof regarding the information provided in the HHSEGS AFC and subsequent documents throughout this proceeding. This will include requesting where the Applicant has addressed the issues previously raised and to provide evidence that supports the statements and conclusions presented in the AFC and throughout these proceedings.

It is also my intent to invoke Staff's requirements under CEQA and Title 20 to provide evidence of where they have addressed issues previously raised and to provide evidence that supports the statements and conclusions presented in the PSA and/or FSA.

Therefore, I will be focusing on many of the issues raised throughout these proceedings during the Evidentiary Hearings and consider much of my previous submissions as the foundation of my testimony.

To the best of my knowledge, all of the facts contained in this testimony are true and correct or were true and correct at the time they were previously filed. With respect to documents prepared by others, I have endeavored to find the most credible source of facts to incorporate by reference in these proceedings but can make no sworn testimony as to their truth or accuracy on the preparer's behalf. To the extent this testimony contains opinions, such opinions are my own. I make these statements, and render these opinions freely and under oath for the purpose of constituting sworn testimony in this proceeding.

II. PROPOSED FINDING OF FACTS

- The proposed HHSEGS 500 MW utility scale project is a highly experimental, unproven design. As it stands, its viable renewable operations and projected performance are highly speculative.

- There is no basis, data or facts in the AFC that support the proposed design system is capable of generating 270 MWs per plant solely from 85,000 heliostats. To the contrary, the Applicant has provided MW production figures for its design that indicate the proposed HHSEGS project will be incapable of producing the advertised 500 MW's by a large margin therefore reducing land use efficiency calculations.

- There is no basis, data or facts that support the Applicant's claim that its new solar power tower design can generate more megawatts per acre, that the design is more efficient overall, that more heliostats can be placed per acre or that the new design "substantially reduces mirror shading".

- There is no basis, data or facts to support the proposed projects renewable power production capabilities. Analysis has thus far proved inadequate to determine the plant's overall availability for power generation regarding the renewable portion of the facility; specifically, when the sun is shining and what impacts wind speeds will have during operations. However, based on available data and reasonable assumptions, the renewable portion of the proposed HHSEGS design will be unavailable for energy production approximately 186 days annually, over 50% of the time.

- There is no evidence the proposed site is suitable for the reasonable and reliable operation of the *renewable portion* of the proposed HHSEGS facilities. Specifically, the performance of the heliostat/mirror assemblies, the "heart" of facility's renewable energy generating capabilities, have been inadequately reported on or analyzed as a stand-alone subject nor in a site-specific context.

- The Mirror Washing Machines (MWM), dedicated equipment that has been deemed critical for maintenance activities necessary to ensure maximum output and efficiency of the renewable portion of the facilities, i.e., the mirrors, have been inadequately reported on or analyzed as a stand-alone subject nor in context of the facilities design for operational parameters.

- Due to the emerging nature of these new technologies, the need to evaluate the systems capabilities and parameters has never been more critical. Based on the available data, the HHSEGS efficient use of both land and renewable power sources is highly questionable. As such, the current parameters that are being applied to measure the proposed HHSEGS facility are inadequate to ensure informed decision making prior to approval.

III. SUMMARY OF TESTIMONY

1. Unsupported MW Production Via Heliostats

There is no basis, data or facts in the AFC that support the proposed design system is capable of generating 270 MWs per plant solely from 85,000 heliostats. To the contrary, the Applicant has provided MW production figures for its design indicating the proposed HHSEGS project will be incapable of producing the advertised 500 MW's by a large margin.

Specifically, in the March 21, 2012, SEC filing by Bright Source Energy, the Applicant reported that:

> *"In the current system design, a 130 MW plant will utilize up to 60,000 heliostats, depending on land area and shape, and site-specific economic optimization."* (1)

BSE made this statement to investors approximately seven months after filing the HHSEGS AFC, which should reasonably indicate the "current system design" being referred to by the Applicant is applicable to the proposed HHSEGS.

However, the AFC claims the proposed HHSEGS will generate 270 MWs using only 85,000 heliostats. If the SEC reported MW/heliostat formula is used to determine the actual HHSEGS's MW/heliostat power production potential, then only 184 MWs can expect to be generated by 85,000 heliostats(2), not 270 MWs (gross) as is currently being claimed.

Therefore, the maximum MW output of the proposed HHSEGS project is 368 MWs under the most optimal conditions. If 40 MWs is subtracted from this total as has been done in the AFC projections, the maximum MW production available for export produced solely from the heliostats is 328 MW at any time while the sun is shining.

2. No Basis For Design Claims

There is no basis, data or facts that support the Applicant's claim that its new solar power tower design can generate more megawatts per acre, that the design is more efficient overall, that more heliostats can be placed per acre or that the new design "substantially reduces mirror shading".

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(1) Exhibit 726, BSE/SEC Excerpts, Heliostats, p. 31

(2) The MW production formula reported in BSE's SEC filing was 60,000 heliostats to produce 130 MWs. The proposed HHSEGS will utilize 85,000 heliostat/mirror assemblies, 25,000 more than the SEC/Heliostat MW formula. As such, 20,000 heliostats were used as the basis for the calculations and resulting conclusions. Specifically, 60,000 divided by 20,000 heliostats equals three. 130 MWs divided by three equals 43.3 MWs per each 20,000 heliostat block. This was further refined by dividing 5,000 heliostats into 20,000 heliostats, which goes four times. 43.3 MWs was then divided by four to determine each 5,000 heliostat block would produce 10.82 MWs. The totals of 43.3 MWs (20,000 additional heliostats) and 10.82 MWs (5,000 additional heliostats) were combined with the 60,000 heliostat 130 MW production to equal 184.12 MWs).

At several places in the HHSEGS AFC, the Applicant reports that:

> *"One principle advantage of the HHSEGS solar power tower design is that it results in more efficient land use and greater power generation. The new, higher, 750-foot solar power tower allows the heliostat rows to be placed closer together, with the mirrors at a steeper angle. This substantially reduces mirror shading and allows more heliostats to be placed per acre. More megawatts can be generated per acre and the design is more efficient overall".*(3)

However, no further evidence, data, discussions, analysis or diagrams are included in the AFC or subsequent data responses that explain, justify, or prove Applicant's claims. There is also contrary positions offered in the above quote, specifically, how is mirror shading substantially reduced *overall* if steeper angles allow more mirrors to be placed per acre and heliostat rows will be placed closer together?

The following questions were submitted to the CEC on March 9, 2012, regarding questions surrounding the "new" design, which to date have remained unanswered. (*See* Exhibit 700, Section Heliostat/Mirrors, #5, p. 77/78)

1. What is the source and where is the data proving the credibility of applicant's assertion that the "design incorporates an important technology advancement"? Where was this technology advancement developed, tested and verified?

2. By what degree does this technological advancement increase power production versus the "old design"?

3. How does the height of the 750-foot power tower correlate to the heliostat row placement and how does it compare to lower power towers?

4. What will be the placement distance between each heliostat with the new system? How does it compare to the old system?

5. If each mirror is placed at a different angle that reduces shading but more mirrors are placed as a result, how is mirror shading "reduced" if mirror density is increased?

6. What is the comparison value between the new "steeper angle" heliostats versus the "old angles" of heliostat placement in terms of:

   a) power generation, b) shading, c) sunlight capture efficiency, d) megawatts generated per acre, e) impacts to vegetative resources, f) impacts to soil stability

(3) AFC, Executive Summary, p. 1-2.

7. What is the efficiency rate "overall" between the new technology versus the old in terms of percentages? What is the efficiency increase percentage rate specific to each component of the new technology?

8. Is there any decrease in power tower height possible that still yields the same advertised efficiency rate? By what percentage rate does efficiency decrease as tower height decreases?

The Applicant has also made public declarations regarding a number of assumptions regarding their systems that may result in materially different performance for their systems as illustrated in the quote below.

> "*Because of the limited operating history of our solar thermal systems, we have been required to make assumptions and apply judgments regarding a number of factors, including our anticipated rate of warranty claims, the durability and reliability of our systems and the performance of our equipment, including heliostats in the field. Our assumptions could prove to be materially different from the actual long-term performance of our systems, resulting in significant operational problems for us including increased maintenance costs and inability to meet energy delivery requirements or defaults under project or financing documents.*"(4) [emphasis added]

Since there is no viable information yet available about this component of the systems operating parameters, no recommendation or possible mitigation measures can be addressed. Failure to disclose, analyze, define, discuss or address these critical operational and performance issues should yield a lack of data adequacy decision from the CEC.

3. Sunlight Efficiency In Power Production

Additionally, the statement that this design will result in "greater power generation" is highly questionable as, from my current understanding, the SRGS's require 600 kW/m2 to operate. Directing additional heliostats at the SRGS will not "increase its power" as all that is required is for the SRGS to reach sufficient temperatures to operate the steam turbine engine. In fact, the Applicant advertises that one advantage of their system is the ability to control and *reduce* heliostat directions to the SRGS to maintain stable temperatures.

Furthermore, during a joint workshop for the Rio Mesa/Hidden Hills SEGS on solar flux, while describing the impact of solar flux to avian species, two comments were made specifically regarding how the efficiency of solar flux to heat something.

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(4) Exhibit 726, BSE/SEC Excerpts, p. 12/13

As a result, I submitted questions during a November 14, 2012 workshop for the Rio Mesa SEGS in attempts to get answers regarding critical questions surrounding the efficiency of the Applicant's designs, which asked;

> 14. Around 1:10 in the 8/28/12 workshop, the following statement is made: "*As I understand it, solar flux, the efficiency of the energy, isn't very efficient for heating water molecules.*" Around 43:30 into the 8/28/12 workshop, the following statement is made: "*What this tells me is this is not a very efficient way to heat something"*.
>
> Please explain how this relates to the use of flux to heat the receiver and power the solar plant if it is not a very efficient way to heat something.(5)

So far, no answers have been forthcoming and as such, known and potential efficiency issues associated with the proposed HHSEGS system and designs must be addressed to meet the substantive requirements of CEQA and Title 20.

4. Plant Efficiency Based On Environmental Conditions

There is no basis, data or facts to support the proposed projects renewable power production capabilities. There is no available data in the AFC files or subsequent documents that incorporates or analyzes environmental data such as available solarity, wind speeds, or summer storms at the proposed site that would support the Applicant's advertised "peak demand" capabilities of the facility.

Analysis has thus far proved inadequate to determine the plant's overall annual availability for power generation regarding the renewable portion of the facility; specifically, when the sun is shining and what impacts wind speeds will have during operations. There is also contradictory data and statements regarding its hours of operation.

Therefore, the degree to which these factors will affect power production, availability or reliability during "peak" demand times currently remains unknown. Therefore, the proposed projects feasibility, output, performance, efficiency, availability and reliability cannot be adequately or reasonably evaluated.

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(5) Exhibit 739, p. Rio Mesa Workshop: November 14, 2012, Biological Resources, Alternatives & Technical Questions, C.R. MacDonald, p. 2, available online at:
http://www.energy.ca.gov/sitingcases/riomesa/documents/others/2012-11-14_Questions_from_Cindy_MacDonald_for_November_14_2012_Workshop_TN-68546.pdf

A. Project Site Available Solarity

The AFC files describe the area as one of "high solarity". However, no data or analysis is provided regarding the annual or seasonal average of sunny days at the proposed site in either the AFC and subsequent documents or the FSA.

With respect to plant availability, the HHSEGS FSA states, "*The plant would be available 92-98% of the time when the source of energy (the sunlight) is available, which is when the plant is expected to be available to come online.*"(6)

While the HHSEGS AFC states, "*HHSEGS is expected to have an annual plant availability of 92 to 98 percent. It will be possible for plant availability to exceed 98 percent for a given 12-month period.*"(7)

According to the Pahrump Chamber of Commerce, the average annual number of sunny days in the Pahrump Valley is 216. Cloudy and rainy days average 65 days per year and partly cloudy days average 84 days per year.(8) Based on these statistics, it can be reasonably assumed the average annual loss of available solarity for operations of the "renewable" portion of the proposed HHSEGS facility totals 149 days (approximately 40%).

The Applicant is well aware of the need to evaluate site solarity in relation to system performance and output as illustrated from the declaration quoted below, which was disclosed to investors but not in the AFC proceedings.

> *"The production of solar energy depends heavily on suitable meteorological conditions. If solar conditions are unfavorable, our electricity production, and therefore revenue from projects using our systems, may be substantially below our expectations. The electricity produced and revenues generated by a solar energy project will be highly dependent on suitable solar conditions and associated weather conditions, which are beyond our control. Furthermore, components of our system, such as the heliostats, could be damaged by severe weather, such as hailstorms or tornadoes. Unfavorable weather and atmospheric conditions could impair the effectiveness or require shutdown of key equipment, impeding operation of our projects, which would result in reduced energy production and decreased revenues and, if these problems persist, potential payments, deductions or defaults under key project documents, including our projects' PPAs or other financing arrangements."* (*See* Exhibit 726, BSE/SEC Excerpts, p. 13)

If the proposed HHSEGS systems are incapable of producing power from renewable sources for a significant portion of the year, then land use efficiency is an invalid stand alone parameter to measure system efficiency by as the inability of that same land to yield energy production a significant portion of the time greatly reduces that same land use efficiency.

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(6) HHSEGS, Power Plant Reliability, p. 5.4-1
(7) Project Description, 2.2.12 Generating Facility Operation, p. 2-18.
(8) http://www.pahrumpchamber.com/weather.php

B. Wind Speed Thresholds & Heliostat Wind Loads

During times of high wind speeds, heliostat/mirrors will rotate to the "safe" horizontal position to prevent equipment damage. However, no data is provided in the AFC or subsequent documents that describes or determines what wind speeds will trigger maximum thresholds that require heliostat "safe position" rotation, the annual average projected loss of heliostat function due to wind disturbance or seasonal analysis to determine if wind speed thresholds will occur during months of estimated peak power production.

Below, the Applicant describes the operational parameters of the heliostats with respect to how they will be protected from large wind loads.

> *"The wind protection and default position (called the "safe" position or orientation) is the 90- degree elevation - the mirrors being in horizontal position facing the sky. This position minimizes the risk of damage from large wind loads and is also the default orientation of the heliostats in case of loss of communication with the plant's control system or dysfunction of the plant's control system. With the solar field in "safe" position, at the ground level, the flux concentration will be low, similar to the sun's reflection on a lake."*(9) (Emphasis added.)

The Applicant has acknowledged heliostat/mirror assemblies will be rotated into the "safe" position to prevent equipment damage from threshold wind speeds. However, no data or analysis was made available by the Applicant that establishes what the threshold wind speeds will be or the estimated percentage of time heliostat/mirror functions will be offline and incapable of solar power production on either an annual or seasonal basis.

Between 1980 and 2010, Pahrump's average wind speed was 21.63 mph, 5 mph higher than the national average of 16.93 mph. Pahrump's three highest annual wind speed *averages* by month are: February (45.6 mph), June (29.6 mph) and August (31.5 mph).(10) Pahrump also ranked #7 out of 154 locations in Nevada with respect to average wind speeds.(11)

Regarding potential impacts of wind speeds in relation to heliostat protection and plant availability, reliability, or efficiency the following relevant questions were submitted to the CEC on March 9, 2012.(12) Unfortunately, they have still yet to be answered by anyone.

> 2. What will be the "trigger level" of sustained wind speeds that will result in heliostat positioning to safe mode during operational hours?

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(9) Exhibit 728, 2011-11-17 Data Response Set, 1A, p. 24.
(10) Available online at: http://www.usa.com/pahrump-nv-weather.htm
(11)http://www.usa.com/rank/nevada-state--average-wind-speed—city rank.htm?hl=Pahrump&hlst=NV
(12) Exhibit 700, #14. Heliostat Damage: Large Wind Loads, p. 89-94, Also see Attachment I, p. 104-105, Attachment II, p. 106-111)

3. What wind gust or sustained wind speed is projected to be the maximum speed a heliostat/mirror assembly could absorb without damage in both safe position and operating position?

4. Is there any projected wind event that could result in catastrophic damage to heliostats, production and the surrounding environment? Specifically, how fast would wind have to blow and/or gust to produce a catastrophic event?

5. How does the applicant's larger mirror design (12' x 8.5' = 204.7 sq.ft) compare to parabolic trough mirrors in terms of projected damage and/or breakage?

11. Can high winds result in any unusual or nuisance sounds on the heliostats or mirror surfaces?

13. What are the estimated impacts of wind erosion to mirror surface degradation and system performance on an annual basis and over the life of the project?

14. What is the projected amount of time per month that heliostats will be in safe positions to protect them from wind damage? For example, on average three days in June, two days in July, six days in February, etc.

Just days after I submitted these questions to the CEC, Bright Source Energy made the following disclosure to investors in their filing with the SEC on March 21, 2012.

> *"Our assumptions could prove to be materially different from the actual long-term performance of our systems, resulting in significant operational problems for us including increased maintenance costs and inability to meet energy delivery requirements or defaults under project or financing documents. For example, a severe wind storm in late November 2011 at the Coalinga Solar-to-Steam for EOR project resulted in movement in some of the pylons on which the heliostats are mounted. As a result, we are deploying redesigned pylons in much of the Ivanpah project. Any similar widespread system or component failures may damage our market reputation and cause our revenue to decline."*(13)

Since Applicant and Staff have remained unresponsive to this issue since I first began questioning impacts of wind on the project design, operations, output, reliability, availability, efficiency, etc., as well as failing to provide a single forum during workshops or other avenues to address this issue, in desperation I began combing the CEC website on Ivanpah and going through the Monthly Compliance Reports (MCR) trying to determine if any information could be found regarding changes to heliostat designs or reports to the CPM due to the BSE statement that they were redesigning the pylons at Ivanpah.

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(13) Exhibit 726, BSE/SEC Excerpts, p. 13

As a result, I found four reports that may have relevance and immediately put a Public Records Act request into the CEC on November 2, 2012. Two of these reports were titled, "Heliostat Earthquake LAOD Analysis (Project 30003-LH2.2 Rev A), Document # 25542-000-V1A-MXHS-00087" and, "Heliostat Wind Load Analysis (Project 3003-LH2.2 Rev A) Document # 25542-000-V1A-MXHS-00088".(14)

On December 17, 2012, I received an email in response to my PRA request, which in summary stated, these documents contained exclusive proprietary information that would have to be redacted and as such, to provide a redacted document would have "no meaning" and therefore, they would not be supplied.

In summary response, I argued that I didn't care if the Applicant redacted the "proprietary" portions of the documents, that I was looking for the conclusions of the earthquake and windload analysis with respect to the heliostats and that there was nothing proprietary about telling a competitor (or the public) that, for example sake, "Our heliostats can withstand winds up to 150 mph."(15)

As of January 15, 2013, the last report I have received regarding the status of this PRA is; the CEC is "*working on two fronts regarding my request for seismic and wind tolerance conclusions*". The first is trying to determine if Staff is capable of supplying this information. The second is still waiting on BSE because they are "*looking into it*".(16)

Since the Applicant has failed to provide data regarding maximum wind speed thresholds, no factual analysis of annual averages or seasonal wind speed thresholds in relation to power plant availability or reliability can be performed. However, assuming a factor of 10% annual loss of heliostat/mirror function due to wind speed thresholds (or 3.04 days per month), an additional 36.5 days per year can be projected to impact the power plant's output due to lack of availability of heliostat/mirror functions.

With a loss of heliostat function for an average of 36.5 days per year due to threshold wind speeds and combining it with the annual average loss of solar availability of 149 days, it is reasonable to assume the proposed HHSEGS will be unavailable for power production approximately 50% of the time or on average, 186 days per year. This figure may be higher or lower depending on the maximum wind speed thresholds that trigger heliostat/mirror rotation into the "safe" or horizontal positions.

If the proposed HHSEGS systems are incapable of producing power from renewable sources for a significant portion of the year, then land use efficiency is an invalid stand alone parameter to measure system efficiency by as the inability of that same land to yield energy production a significant portion of the time greatly reduces that same land use efficiency.

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(14) Exhibit 729
(15) Exhibit 730
(16) Exhibit 731

5. Hours of Operation

There are wide discrepancies in the Applicant and Staff reported hours of operation for the HHSEGS facilities once they become online. Reported hours of operations have been included in a variety of sections in the AFC, subsequent documents and the FSA though the majority of hourly and annual operations analysis have relegated to the Air Quality sections of both the AFC and FSA.

Based on the available data, the Applicant and the FSA has failed to sufficiently provide evidence, data or analysis that supports:

> a) The estimated number of hours the proposed HHSEGS facility will generate electricity on a daily, quarterly or annual basis.
>
> b) The projected number of hours the proposed HHSEGS will generate electricity solely from the "renewable" portion of the facility, i.e., the sun, on a daily, quarterly or annual basis.
>
> c) Adequate description and verification of the function, necessity and contribution of natural gas fired boilers towards electrical generation on a daily, quarterly or annual basis.

The descriptions contained within this section come from varying sections of the AFC, the Boiler Optimization Plan, the FSA and the joint Rio Mesa/Hidden Hills workshop held on August 28, 2012. Included references of hourly and annual operation levels taken from the air quality and emissions sections are NOT intended to be evaluated for emissions factors. They are included solely to demonstrate the conflicting data regarding hours of operations that have been scattered through various documents and how these conflicting reports fail to adequately describe when and for how long the proposed HHSEGS will actually be operational on a daily, quarterly and annual basis.

> "*HHSEGS would generate electricity up to 16 hours a day*".(17)
>
> *"The HHSEGS project would operate during the daylight hours (when the sun is shining)."*(18)

"The project, as proposed in the AFC, would be able to operate when the sun is shining." (19)

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(17) HHSEGS FSA, Cover, Executive Summary, Introduction, Description, p. 1.1-3
(18) HHSEGS FSA, Noise & Vibration, p. 4.6-10
(19) HHSEGS FSA, Reliability, p. 5.4-4

A. Unknown Solar Radiation Levels Available For Daily Hours of Operations
In the August 28, 2012, joint Rio Mesa/Hidden Hills SEGS workshop, Applicant stated that,

> *"<u>The receiver needs about 600 kW/m2 to generate steam</u>. Therefore, it doesn't matter the size of the solar field because the same amount of flux will be needed by the receiver."* (20)

R. "*How will operational flux vary throughout the course of a day? What happens to flux at the start and end of operations, i.e., dawn and dusk when birds are known to be most active?*"

B. "*The flux levels during the day stay more or less the same. At the beginning of day and the end of the day the flux levels are significantly lower. We took at the upper boundary, 1,000 kW/m2, a normal day, a good day would be 900 kW/M2, dusk would be around 200 to 250. The intensity will be very, very low.*"(21)

Based on the statements above, the "renewable" portion of the proposed HHSEGS power generation abilities is dependent on when the flux levels from the mirrors are capable of reaching 600 kW/m2 at the receiver and that, this level necessary is not achievable during dusk or dawn (200-250 kW/m2).

However, what we still don't know is at what time the required level of solar radiation (per kW/m2) will be achievable at the start of the day (8:00 a.m., 10:00 a.m.?) or when the required solar radiation level will drop below the necessary levels to generate steam (5:00 p.m., 7:00 p.m.?).

Furthermore, based on the information above, it is impossible for the proposed HHSEGS to generate electricity up to 16 hours per day via sunlight. The only way generating electricity up to 16 hours per day is even remotely possible is through a heavy reliance on the boilers and natural gas. If this is the case, then the proposed HHSEGS cannot qualify as a "renewable" power plant.

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(20) Joint Rio Mesa/Hidden Hills SEGS Workshop, 8/28/12, at 2:14 minutes.
(21) Joint Rio Mesa/Hidden Hills SEGS Workshop, 8/28/12, at 2:40 minutes.

B. Determining Hours of Operation Via Reported Annual MWh Production

Another potential method for trying to determine the daily hours of operation for the proposed HHSEGS is to use the reported annual generation of 1,400,000 MWh.(22)

The following explanation of what a 500MW power plant is defined as and the formula for converting MWs production potential to megawatt hours (MWh) was provided courtesy of a CEC Staff member.(23)

> *"The value represents the maximum that the facility can generate instantaneously. A 500 MW (megawatt) power plant is one that can potentially generate 500 MW at any point in time. If it were to do so for an hour, it would produce 500 MWh (megawatt hours). If it were to do so for 2 hours it would produce 1000 (= 2x500) MWh. For an entire day, 12,000 MWh. For 15, minutes, 125 MWh."*

Since the proposed HHSEGS is a 500 MW facility, then dividing 500 MWh's into 1,400,000 MWh's should provide the number of hours the proposed facility is estimated to generate electricity on an annual basis, which equals 2,800 hours. If this is further refined by dividing 2,800 hours by 345 days (subtracting 20 days for down time during December), it equates to 8.1 hours per day.

C. Conflicting Hours of Operations Via Emissions Reporting

Since there is no reported data or analysis regarding the daily availability of solar input to generate steam, there is equally no way to verify the accuracy or validity of the boilers reported hours of operation or their contributions towards electrical generation on a daily, quarterly or annual basis. However, given the general number of reported full load hours the boiler's are expected to be operating, combined with the MWh results equating to 8.1 hours of daily operations, evidence suggests the HHSEGS will be largely fueled by natural gas.

D. Reported Annual Full Load Hours And Capacity Factor

Based on the Applicant's description of the annualized capacity factor, the proposed HHSEGS is expected to operate at approximately the equivalent hours identified in converting the MWhs (2,800 hours annually or 8.1 hours per day) as explained below.

> *"However, as a solar power plant, the project is not designed or intended for base load generation. The EPS applies only to procurements that entail an annualized capacity factor in excess of 60 percent. With <u>an expected operating capacity that is the equivalent of approximately 3,000 full-load hours per year,</u> the project's annualized capacity factor will be less than 50 percent. Therefore, the SB 1368 limitation does not apply to this facility*."(24) [Emphasis added]

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(22) Applicants Testimony, Executive Summary, p. 3
(23) Exhibit 732, Email comm.. re: MW/MWhs
(24) 2012-04-09 Supplemental Data Response, Set 2, TN-64558, pdf. pp. 133

E. Operational Hours Via Emissions Data

There are a significant amount of discrepancies regarding boiler hours of operations in many different areas of the AFC, the Boiler Optimization Plan and the Permit To Construct. However, the following examples have been chosen to best represent the issues surrounding hours of operations as well as, out of these hours, how many hours of electricity are being generated from the "renewable" portion of the facility (the sun) and how many hours of electrical generation is a result of natural gas fired boilers.

Figure 1.

Source: Boiler Optimization, Supplemental Data Response, Set 2, TN64558, Appendix 5.1B, Revised April 2012, Emissions and Operating Parameters p. 5.1B-8

Table 5.1B-8R
Typical Annual Operating Schedule, Each Plant
Hidden Hills Solar Electric Generating System
Revised April 2012

Auxiliary boiler operation[1]	Summer	Winter	
operation , hours/day[2] (average)	5	5	
Equivalent full-load hours/yr[2]			1,100
Expected startup hours/yr			865

Nighttime boiler operation	Summer	Winter	
operation , hours/day[2] (average)	12	16	
Equivalent full-load hours/yr[2]			4,780
Expected startup hours/yr			345

Notes:
1. These 249 MMBtu/hr boilers were called "startup boilers" in the original project design.
2. Hours shown are equivalent full load hours; boilers may operate more hours on some days and/or at lower loads. See text.

As seen in Figure 1., the estimated typical number of full load hours for an auxiliary boiler is five hours per day and 1,100 hours annually, more than one third of the 3,000 annual operating hours described during the capacity factor discussion.

However, 1,100 annual hours divided by five hours only equates to 220 days per year. If five hours is a "typical day" and is multiplied by 345 days (subtracting 20 days of down time in December), then the auxiliary boiler would be operational for 1,725 hours annually at full load or well over half the annual reported hours of operations (57.5%).

From a daily calculation, if the plant is estimated to only produce power for 8 hours per day on average, then on a typical day, the auxiliary boilers will be used during 5 of these 8 hours.

Now the question is, will the auxiliary boilers be generating power as a stand alone generational source for five hours a day (perhaps during peak demand times?) <u>or</u> are they required to supplement the solar radiation from the heliostats because it is insufficient to generate steam for more than three hours per day. As it stands, the Applicant has failed to sufficiently or adequately explain the "renewable" portion of the facility's power generation.

What these figures also tell us is, this renewable power plant will "typically" require natural gas to operate for 21 hours p/day while only generating electricity 8 hours p/day – and yet, it is still qualifying as a "renewable facility".

Trying to determine the daily average "typical" hours of operations is further muddied by the fact that Staff and the GBUAPCD is unconcerned by annual daily average plant operations, deferring instead to allow the HHSEGS flexibility to utilize natural gas any time it wants, as long as it wants, to meet demand.

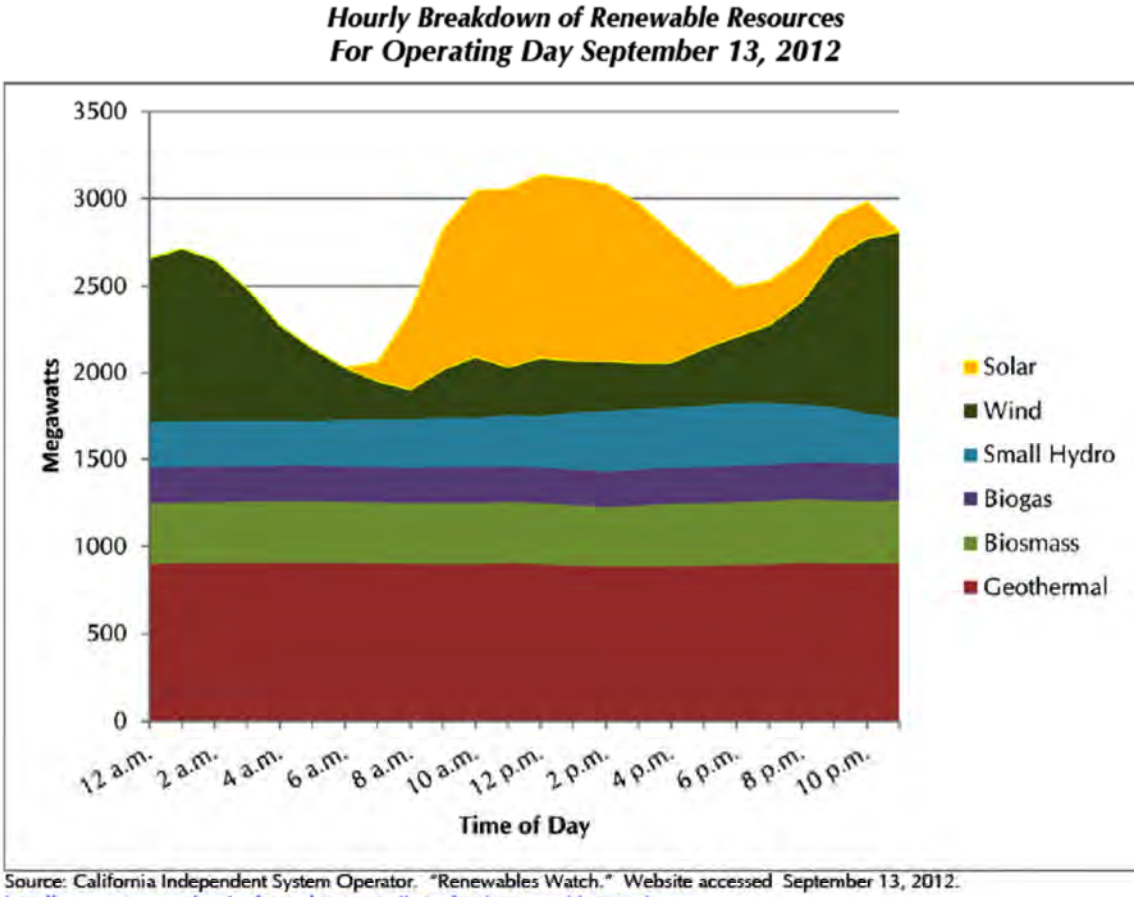
The focus of Staff and the GBUAPCD's analysis of daily/hourly operations is maintained exclusively through the lens of limitations on natural gas use incorporated in the COC and PTO. The idea being, incorporated natural gas use limitations in the COC's and PTO's will act as the enforcement mechanism to ensure the facility is not, in essence, using natural gas as the main source of fuel on an annual basis.

However, these limitations have a variety of caveats, including rolling annual averages and the option to submit modifications to the facility and Permit To Operate (PTO) within as little as five days (AQ-SC8). Additionally, though the Applicant is required to report violations of exceeding natural gas use to regulators, there are no enforcement provisions contained in the COC's and no shut down requirements if natural gas use is exceeded.

As such, what is to stop the proposed HHSEGS from relying on natural gas for the majority of its' power production, especially during "peak hours" (through 10 p.m. at night) when the plant can command its highest rates and simply just pay any associated fines for reported violations, sometimes known as "the price of doing business"?

To illustrate this point further, Figure 2 shows the hourly breakdown of megawatt generation from renewable resources. Note that the maximum megawatt production for the majority of solar power occurs between 10:00 a.m. and 5:00 p.m. However, megawatt production via "solar" energy is shown as extending to 11:00 p.m. at night. How much of this "qualified" solar energy is being driven by natural gas instead?

Figure 2.
Source: Rewiring California: Integrating Agendas For Energy Reform.
p. 34, Little Hoover Commission, December 2012.



Source: California Independent System Operator. "Renewables Watch." Website accessed September 13, 2012.
http://www.caiso.com/market/Pages/ReportsBulletins/DailyRenewablesWatch.aspx

Unfortunately, there does not seem to be any reasonably established criteria yet developed to adequately measure these issues and make determinations on solar versus natural gas for these types of facilities. The only means staff had to estimate the project's operations via availability was to substitute natural gas statistics for the BSE design as outlined below. Either that or it is a predominately natural gas-fired facility and that is why Staff found it reasonable to use natural gas statistics.

> "*Because natural gas is the primary type of fossil fuel used in California, staff finds it reasonable to compare the project's availability factor to the average availability factor of natural gas-fired fossil fuel units. Also, because the project's total net power output would be 500 MW, staff uses the NERC statistics for 400–599 MW units. The NERC reported an availability factor of 85.15% as the generating unit average for the years 2005 through 2009 for natural gas units of 400–599 MW (NERC 2010)".*(25)

(25) HHSEGS FSA, Reliability, p. 5.4-6

In my Supplemental Comments submitted regarding the PSA, questions where submitted regarding annual power production that were not addressed. Specifically, in my Air Quality section, #7. Annual Power Production, Q-1. and Q-2., p. 3-7. In the FSA, Air Quality, Appendix 1- PSA Response To Public Comments, p. 4, Staff's response indicated answers to these questions would be addressed in the Power Plant Efficiency and Facility Design sections of the FSA. However, there is no mention of them in either section and therefore, they still remain unanswered. Also see Exhibit 700, Section: Operations, p. 128-130, Exhibit 702, Section 12, Operations, #1, #2, p. 12-1, 12-2

As a result of all these variables, inconsistencies, lack of established means to generally separate power production between solar sources and natural gas sources as is so clearly evident in the proposed HHSEGS, the Committee should determine standards that allow for clear distinction, measurements, standards and reporting requirements that ensure facility's such as these are capable of producing energy predominately from solar sources. Enforcement provisions should also be incorporated in the COC's mandating shut down requirements if natural gas use exceeds these renewable standards.

6. Heliostats: The "Renewable" Equipment

There is no evidence the proposed site is suitable for the reasonable and reliable operation of the *renewable portion* of the proposed HHSEGS facilities. Specifically, the performance of the heliostat/mirror assemblies, the "heart" of facility's renewable energy generating capabilities, have been inadequately reported on or analyzed as a stand-alone subject nor in a site-specific context.

I have submitted a significant amount of discussion on this issue as well as raising a large amount of questions since March 2012, most of which have continued to go unanswered. (*See* Exhibit 703, Exhibit 706, Exhibit 711: Section III, IV (plus Exhibits III-VI), Exhibit 712, and, Exhibit 700: Heliostats/Mirrors: All, p. 73-111, Soils: All, 155-162 Exhibit 702: Section 3: Air Quality #8, p. 3-9, #10, p. 3-10, Section 7: Facility Design p. 7-1, 7-2, Section 9: Heliostats #1, p. 9-1,9-2, #2, p. 9-3,9-4, Section 12: Operations, #4, p. 12-4, Section 14: Soils & Surface Waters, #2, p. 14-2 – 14-6, #3, p. 14-6 – 14-9, #4, p. 14-9 – 14-13, #5, p. 14-13 –14-15.

The following discussion, photos and excerpts are included below to illustrate conflicting data, information, and adequate project descriptions regarding facility system components that are deemed critical for the operational and maintenance requirements of the renewable portion of the facility.

To begin, at the 11-03-11 Informational Hearing(26), a Mr. Warren asks the Applicant about water usage as it related to mirror cleaning.

> *"I want to ask the applicants about the amount of water that's currently projected at 140acre feet. So as your project continues and if you discover that you need substantially more water for cleaning, if it's more dirty of an area or more wind, more caking of mud and stuff that gets on the mirrors during bad weather, is there a provision to – you know, basically I'm asking what happens if you need a lot more water than you've got, is the question?"*

With respect to Mr. Warren question about potential increases in water requirements for mirror cleaning activities, it has yet to answered and as far as I know, no one has required an answer. Now, as I have repeatedly stated throughout these proceedings, the Applicant has disclosed to investors that:

> "*Our largely unproven mirror cleaning equipment may perform below our expectations. The primary maintenance activity for solar thermal projects using our systems will be the routine and continuous washing of reflective mirror surfaces. We anticipate each mirror may need to be cleaned every two weeks* ***to prevent a buildup of dust which would significantly degrade the system performance****. Mirrors will be washed at night by a dedicated crew using specialized mobile equipment. A truck is being designed that will bring purified water simultaneously to a number of mirrors. We are still designing and testing the specialized equipment to be used in this process.* ***If the mirror washing equipment and process are not effective, actual operating costs may be substantially higher than forecasted or total electrical production may fall short of estimates****.*" [emphasis added].

As a result, it is reasonable to assume that the mirror cleaning equipment is largely unproven, the maintenance activities on a utility scale have never been tried, the equipment was still being designed approximately six months *after* the HHSEGS AFC was filed (that we still know nothing about over a year and a half later), and if the equipment and process are not effective, costs will be substantially higher and/or electrical production may fall short – how much shorter also remains a mystery.

Despite the completely unproven, experimental and "still designing" nature of the equipment and processes, the AFC provides water requirements for mirror cleaning as illustrated in the following quote.

> *"Heliostat washing will require up to 52,834 gallons of water per day. Heliostat wash water will not be collected for disposal—it is expected that the wash water will evaporate at or near the ground surface."*(27)

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(26) Exhibit 700, p. 171/172
(27) HHSEGS, AFC, Section 5.15, Water Resource Management, p. 15.

What is the basis for the Applicant's water requirement estimates if both mirror washing equipment and processes are largely unproven and still experimental at the time the AFC was filed? Where is this substantiated in the AFC or subsequent documents, how was it determined, and how was it determined to be reasonably accurate by Staff? And, as Mr. Warren so appropriately queried, what happens if it is discovered the project needs substantially more water for cleaning, if it's dirty, has more wind, more caking of mud and stuff that gets on the mirror during bad weather (i.e., water spotting from sprinkling rain)?

The following photos evidence the need to adequately address and resolve this matter as it is at the heart of the "renewable" portion of the proposed HHSEGS's ability to operate. Photo 1 and Photo 2 are before and after photos of the same mirror placed on an area that was subject to any close activities from the surrounding area during the time frame it was "collecting dust", which was 35 days.

Photo 1

Freshly cleaned mirror placed outside to element exposure. 8/29/12

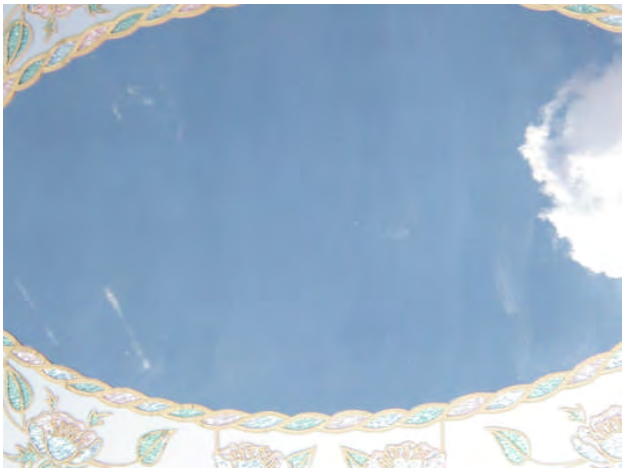

Photo 2

Same mirror after 35 days. 10/3/12

Note the water spotting on the mirror? This was caused from a light sprinkling of rain, which often occurs in the late summer months. I believe this will have a significant effect on the HHSEGS's output, efficiency and performance if maintenance activities are incapable of addressing these mirror distortions.

Photo 3 was taken of a windshield at a residence in Charleston View. The windshield had been cleaned exactly 14 days from the time this photo was taken. The area around the vehicle was surrounded by gravel and has been compacted for a very long time.

Photo 3

Photo of vehicle windshield located in Charleston View. This dust is exactly 14 days old from when the windshield was last cleaned.

Besides impacts to the renewable portion of the facility's performance, mirror degradation, unproven processes and equipment as well as unsubstantiated claims in the AFC (such as water requirements), there are also environmental considerations that may impact the heliostat/mirror assemblies.

A. Mirror Washing Machines

To continue the trend of the Applicant's haphazard approach in the AFC to descriptions of the renewable portions of the proposed HHSEGS project, including its equipment, processes, performance standards, output, efficiency, etc. the following excerpts clearly illustrate how "anything goes" when it comes to describing the proposed project.

In the AFC Project Description, Applicant describes the number of necessary Mirror Washing Machine Operators as;

> *"HHSEGS is expected to employ up to 120 full-time employees: 36 at Solar Plant 1 (including mirror washing machine operators), 36 at Solar Plant 2 (including mirror washing machine operators), and 48 at the administration complex. The facility will operate 7 days a week."*(28)

(28) AFC, Project Description, 2.2.12 Generating Facility Operation, p. 2.18.

In November, just three months later, the Applicant again describes the number of Mirror Washing Operators as now being 42 as illustrated in Figure 4 below.(29)

Figure 4

TABLE DR24-1
HHSEGS Plant Operation Workforce

Department	Personnel	Shift
Operations	42 MWM operators 24 Technicians 6 Support staff	All night shift, 21 per plant 2 shifts, 6 technicians each shift, per plant. 3 per plant, day or night shift?
Warehouse & Maintenance	13 personnel	12-hour night shift for maintenance?
Administration	31 Administration staff 4 Support staff	Day shift
Total	120	

MWM = mirror washing machine

In April, Applicant appears to drop the number of MWM operators significantly by citing that the plant will now only utilize 16 MWM's total (one operator p/machine?).(30)

In October, new figures are provided by the Applicant that are even more obscure, but seem to indicate MWM operators may now total 24 as illustrated in Figure 5.(31)

Figure 5

TABLE 5.10-21R1
Operational Workforce

Staff	Solar Plant 1	Solar Plant 2	Common Area	Total
Solar fields and Power Block Workers	12	12	—	24
Technicians	8	8	—	16
Operators (Administration Building: shower and sewage calculations)	—	—	15	15
Warehouse & Maintenance Personnel	—	—	13	13
Admin Personal – day shift only	—	—	12	12
TOTAL (actual)	**20**	**20**	**40**	**80**
Misc. Support	10	10	—	20
TOTAL (max)	**30**	**30**	**40**	**100**

(29) Exhibit 728, Applicant's Data Response Set 1A, 11/17/11, p. 18.
(30) Exhibit 703, Section 1, Baseline Data, #3, p. 2.
(31) Updated Workforce Analaysis, TN-67434, 10/01/12, p. 3-6.

Meanwhile, as illustrated in Figure 6, the HHSEGS FSA describes the number of Mirror Washing Operators as 15 – even though the Applicant has described 16 Mirror Washing Machines will be required for the HHSEGS!(32)

Figure 6.

SOCIOECONOMICS Table 6
HHSEGS Plant Operation Workforce

Operations Workforce	
Solar fields and Power Block Workers	24
Technicians	16
MWM Operators	15
Warehouse & Maintenance Staff	13
Administration & Support Staff	32
TOTAL	100

Note: Total workforce includes only the crafts specifically needed for the HHSEGS. See **SOCIOECONOMICS Table 5** for a list of crafts included in the total workforce figures. MWM = mirror washing machine. Source: CH2 2012jj

SUMMARY CONCLUSIONS

The AFC and data responses fail to adequately describe, report, analyze or provide adequate evidence or data regarding the most significant components and equipment associated with the renewable portion of the proposed HHSEGS project to determine its reliability and efficiency as a renewable power plant. Similarly, CEC Staff is deferring the majority of critical data collection, reporting and analysis until after project approval. With respect to describing "what" the HHSEGS project actually is, insufficient attention, data and analysis has been given to the renewable and operational portion of the HHSEGS while the majority of focus has been on the construction and natural gas use of the facility.

If the proposed HHSEGS systems are incapable of producing power from renewable sources for a significant portion of the year, then land use efficiency is an invalid stand alone parameter to measure system efficiency by as the inability of that same land to yield energy production a significant portion of the time greatly reduces that same land use efficiency.

Loss of solarity reduces renewable power plant efficiency. Loss of heliostat availability due to wind speeds causing the heliostats to be "offline" results in reduced land use efficiency. If mirror washing equipment or schedules are insufficient to maintain clean mirror surfaces, then out put and efficiency may be substantially reduced.

Due to the emerging nature of these new technologies, the need to evaluate the systems capabilities and parameters has never been more critical. Based on the available data, the HHSEGS efficient use of both land and renewable power sources is highly questionable. As such, the current parameters that are being applied to measure the efficiency of proposed HHSEGS are inadequate to ensure informed decision making prior to approval.

(32) HHSEGS FSA, Socioeconomics, p. 4.8-14.

4. POWER PLANT EFFICIENCY

TESTIMONY OF C.R. MACDONALD, INTERVENOR

I. INTRODUCTION

A. Qualifications: Committee Order Granting Petition To Intervene

B. Prior Filings: In addition to the statements herein, this testimony includes by reference the following documents submitted in this proceeding:

Exhibit's 700, 702, 703, 708, 709, 711, 712

C. Additional Filings:

Exhibit's 718, 726, 729, 730, 731, 732, 739, 741, 742, 747

D. Documents Prepared By Others:

Exhibit's 714, 726, 727, 728, 733, 734.

It is my intent to invoke the requirement that the Applicant bear the burden of proof regarding the information provided in the HHSEGS AFC and subsequent documents throughout this proceeding. This will include requesting where the Applicant has addressed the issues previously raised and to provide evidence that supports the statements and conclusions presented in the AFC and throughout these proceedings.

It is also my intent to invoke Staff's requirements under CEQA and Title 20 to provide evidence of where they have addressed issues previously raised and to provide evidence that supports the statements and conclusions presented in the PSA and/or FSA.

Therefore, I will be focusing on many of the issues raised throughout these proceedings during the Evidentiary Hearings and consider much of my previous submissions as the foundation of my testimony.

To the best of my knowledge, all of the facts contained in this testimony are true and correct or were true and correct at the time they were previously filed. With respect to documents prepared by others, I have endeavored to find the most credible source of facts to incorporate by reference in these proceedings but can make no sworn testimony as to their truth or accuracy on the preparer's behalf. To the extent this testimony contains opinions, such opinions are my own. I make these statements, and render these opinions freely and under oath for the purpose of constituting sworn testimony in this proceeding.

II. PROPOSED FINDING OF FACTS

- The proposed HHSEGS 500 MW utility scale project is a highly experimental, unproven design. As it stands, its viable renewable operations and projected performance are highly speculative.

- There is no basis, data or facts in the AFC that support the proposed design system is capable of generating 270 MWs per plant solely from 85,000 heliostats. To the contrary, the Applicant has provided MW production figures for its design that indicate the proposed HHSEGS project will be incapable of producing the advertised 500 MW's by a large margin therefore reducing land use efficiency calculations.

- There is no basis, data or facts that support the Applicant's claim that its new solar power tower design can generate more megawatts per acre, that the design is more efficient overall, that more heliostats can be placed per acre or that the new design "substantially reduces mirror shading".

- There is no basis, data or facts to support the proposed projects renewable power production capabilities. Analysis has thus far proved inadequate to determine the plant's overall availability for power generation regarding the renewable portion of the facility; specifically, when the sun is shining and what impacts wind speeds will have during operations. However, based on available data and reasonable assumptions, the renewable portion of the proposed HHSEGS will be unavailable for energy production approximately 186 days annually, over 50% of the time.

- There is no evidence the proposed site is suitable for the reasonable and reliable operation of the *renewable portion* of the proposed HHSEGS facilities. Specifically, the performance of the heliostat/mirror assemblies, the "heart" of facility's renewable energy generating capabilities, have been inadequately reported on or analyzed as a stand-alone subject nor in a site-specific context.

- There is contradictory data and statements regarding the HHSEGS hours of operation. Therefore, estimates as to when the reliable generation of power can be expected have failed to be sufficiently or adequately addressed in the FSA.

- The Mirror Washing Machines (MWM), dedicated equipment that has been deemed critical for maintenance activities necessary to ensure maximum output and efficiency of the renewable portion of the facilities, i.e., the mirrors, have been inadequately reported on or analyzed as a stand-alone subject nor in context of the facilities operational parameters.

- If the proposed HHSEGS systems are incapable of producing power from renewable sources for a significant portion of the year, then land use efficiency is an invalid stand alone parameter to measure system efficiency by as the inability of that same land to yield energy production a significant portion of the time greatly reduces that same land use efficiency.

- Loss of solarity reduces renewable power plant efficiency. Loss of heliostat availability due to wind speeds causing the heliostats to be "offline" results in reduced land use efficiency. If mirror washing equipment or schedules are insufficient to maintain clean mirror surfaces, then out put and efficiency may be substantially reduced.

- If the renewable portion of the facility only produces approximately 66% of the power generated from the facility per day, will only generate electricity from renewable sources on average of 33% per day and the number of days reasonably expected to be available for renewable power production based on environmental conditions is only about 50% annually, what is the real land use efficiency rating of the HHSEGS?

- Due to the emerging nature of these new technologies, the need to evaluate the systems capabilities and parameters has never been more critical. Based on the available data, the HHSEGS efficient use of both land and renewable power sources is highly questionable. As such, the current parameters that are being applied to measure the efficiency of proposed HHSEGS are inadequate to ensure informed decision making prior to approval.

III. SUMMARY OF TESTIMONY

1. Unsupported MW Production Via Heliostats

There is no basis, data or facts in the AFC that support the proposed design system is capable of generating 270 MWs per plant solely from 85,000 heliostats. To the contrary, the Applicant has provided MW production figures for its design indicating the proposed HHSEGS project will be incapable of producing the advertised 500 MW's by a large margin.

Specifically, in the March 21, 2012, SEC filing by Bright Source Energy, the Applicant reported that:

> *"In the current system design, a 130 MW plant will utilize up to 60,000 heliostats, depending on land area and shape, and site-specific economic optimization."* (1)

BSE made this statement to investors approximately seven months after filing the HHSEGS AFC, which should reasonably indicate the "current system design" being referred to by the Applicant is applicable to the proposed HHSEGS.

However, the AFC claims the proposed HHSEGS will generate 270 MWs using only 85,000 heliostats. If the SEC reported MW/heliostat formula is used to determine the actual HHSEGS's MW/heliostat power production potential, then only 184 MWs can expect to be generated by 85,000 heliostats(2), not 270 MWs (gross) as is currently being claimed.

Therefore, the maximum MW output of the proposed HHSEGS project is 368 MWs under the most optimal conditions. If 40 MWs is subtracted from this total as has been done in the AFC projections, the maximum MW production available for export produced solely from the heliostats is 328 MW at any time while the sun is shining.

2. No Basis For Design Claims

There is no basis, data or facts that support the Applicant's claim that its new solar power tower design can generate more megawatts per acre, that the design is more efficient overall, that more heliostats can be placed per acre or that the new design "substantially reduces mirror shading".

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(1) Exhibit 726, BSE/SEC Excerpts, Heliostats, p. 31

(2) The MW production formula reported in BSE's SEC filing was 60,000 heliostats to produce 130 MWs. The proposed HHSEGS will utilize 85,000 heliostat/mirror assemblies, 25,000 more than the SEC/Heliostat MW formula. As such, 20,000 heliostats were used as the basis for the calculations and resulting conclusions. Specifically, 60,000 divided by 20,000 heliostats equals three. 130 MWs divided by three equals 43.3 MWs per each 20,000 heliostat block. This was further refined by dividing 5,000 heliostats into 20,000 heliostats, which goes four times. 43.3 MWs was then divided by four to determine each 5,000 heliostat block would produce 10.82 MWs. The totals of 43.3 MWs (20,000 additional heliostats) and 10.82 MWs (5,000 additional heliostats) were combined with the 60,000 heliostat 130 MW production to equal 184.12 MWs).

At several places in the HHSEGS AFC, the Applicant reports that:

> *"One principle advantage of the HHSEGS solar power tower design is that it results in more efficient land use and greater power generation. The new, higher, 750-foot solar power tower allows the heliostat rows to be placed closer together, with the mirrors at a steeper angle. This substantially reduces mirror shading and allows more heliostats to be placed per acre. More megawatts can be generated per acre and the design is more efficient overall".*(3)

However, no further evidence, data, discussions, analysis or diagrams are included in the AFC or subsequent data responses that explain, justify, or prove Applicant's claims. There is also contrary positions offered in the above quote, specifically, how is mirror shading substantially reduced *overall* if steeper angles allow more mirrors to be placed per acre and heliostat rows will be placed closer together?

The following questions were submitted to the CEC on March 9, 2012, regarding questions surrounding the "new" design, which to date have remained unanswered. (*See* Exhibit 700, Section Heliostat/Mirrors, #5, p. 77/78)

7. What is the source and where is the data proving the credibility of applicant's assertion that the "design incorporates an important technology advancement"? Where was this technology advancement developed, tested and verified?

8. By what degree does this technological advancement increase power production versus the "old design"?

9. How does the height of the 750-foot power tower correlate to the heliostat row placement and how does it compare to lower power towers?

10. What will be the placement distance between each heliostat with the new system? How does it compare to the old system?

11. If each mirror is placed at a different angle that reduces shading but more mirrors are placed as a result, how is mirror shading "reduced" if mirror density is increased?

12. What is the comparison value between the new "steeper angle" heliostats versus the "old angles" of heliostat placement in terms of:

    a) power generation, b) shading, c) sunlight capture efficiency, d) megawatts generated per acre, e) impacts to vegetative resources, f) impacts to soil stability

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(3) AFC, Executive Summary, p. 1-2.

7. What is the efficiency rate "overall" between the new technology versus the old in terms of percentages? What is the efficiency increase percentage rate specific to each component of the new technology?

8. Is there any decrease in power tower height possible that still yields the same advertised efficiency rate? By what percentage rate does efficiency decrease as tower height decreases?

The Applicant has also made public declarations regarding a number of assumptions regarding their systems that may result in materially different performance for their systems as illustrated in the quote below.

> "*Because of the limited operating history of our solar thermal systems, we have been required to make assumptions and apply judgments regarding a number of factors, including our anticipated rate of warranty claims, the durability and reliability of our systems and the performance of our equipment, including heliostats in the field. Our assumptions could prove to be materially different from the actual long-term performance of our systems, resulting in significant operational problems for us including increased maintenance costs and inability to meet energy delivery requirements or defaults under project or financing documents.*"(4) [emphasis added]

Since there is no viable information yet available about this component of the systems operating parameters, no recommendation or possible mitigation measures can be addressed. Failure to disclose, analyze, define, discuss or address these critical operational and performance issues should yield a lack of data adequacy decision from the CEC.

3. Sunlight Efficiency In Power Production

Additionally, the statement that this design will result in "greater power generation" is highly questionable as, from my current understanding, the SRGS's require 600 kW/m2 to operate. Directing additional heliostats at the SRGS will not "increase its power" as all that is required is for the SRGS to reach sufficient temperatures to operate the steam turbine engine. In fact, the Applicant advertises that one advantage of their system is the ability to control and *reduce* heliostat directions to the SRGS to maintain stable temperatures.

Furthermore, during a joint workshop for the Rio Mesa/Hidden Hills SEGS on solar flux, while describing the impact of solar flux to avian species, two comments were made specifically regarding how the efficiency of solar flux to heat something.

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(4) Exhibit 726, BSE/SEC Excerpts, p. 12/13

As a result, I submitted questions during a November 14, 2012 workshop for the Rio Mesa SEGS in attempts to get answers regarding critical questions surrounding the efficiency of the Applicant's designs, which asked;

> 14. Around 1:10 in the 8/28/12 workshop, the following statement is made: "*As I understand it, solar flux, the efficiency of the energy, isn't very efficient for heating water molecules.*" Around 43:30 into the 8/28/12 workshop, the following statement is made: "*What this tells me is this is not a very efficient way to heat something"*.
>
> Please explain how this relates to the use of flux to heat the receiver and power the solar plant if it is not a very efficient way to heat something.(5)

So far, no answers have been forthcoming and as such, known and potential efficiency issues associated with the proposed HHSEGS system and designs must be addressed to meet the substantive requirements of CEQA and Title 20.

4. Plant Efficiency Based On Environmental Conditions

There is no basis, data or facts to support the proposed projects renewable power production capabilities. There is no available data in the AFC files or subsequent documents that incorporates or analyzes environmental data such as available solarity, wind speeds, or summer storms at the proposed site that would support the Applicant's advertised "peak demand" capabilities of the facility.

Analysis has thus far proved inadequate to determine the plant's overall annual availability for power generation regarding the renewable portion of the facility; specifically, when the sun is shining and what impacts wind speeds will have during operations. There is also contradictory data and statements regarding its hours of operation.

Therefore, the degree to which these factors will affect power production, availability or reliability during "peak" demand times currently remains unknown. Therefore, the proposed projects feasibility, output, performance, efficiency, availability and reliability cannot be adequately or reasonably evaluated.

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(5) Exhibit 739, p. Rio Mesa Workshop: November 14, 2012, Biological Resources, Alternatives & Technical Questions, C.R. MacDonald, p. 2, available online at:
http://www.energy.ca.gov/sitingcases/riomesa/documents/others/2012-11-14_Questions_from_Cindy_MacDonald_for_November_14_2012_Workshop_TN-68546.pdf

A. Project Site Available Solarity

The AFC files describe the area as one of "high solarity". However, no data or analysis is provided regarding the annual or seasonal average of sunny days at the proposed site in either the AFC and subsequent documents or the FSA.

With respect to plant availability, the HHSEGS FSA states, "*The plant would be available 92-98% of the time when the source of energy (the sunlight) is available, which is when the plant is expected to be available to come online.*"(6)

While the HHSEGS AFC states, "*HHSEGS is expected to have an annual plant availability of 92 to 98 percent. It will be possible for plant availability to exceed 98 percent for a given 12-month period.*"(7)

According to the Pahrump Chamber of Commerce, the average annual number of sunny days in the Pahrump Valley is 216. Cloudy and rainy days average 65 days per year and partly cloudy days average 84 days per year.(8) Based on these statistics, it can be reasonably assumed the average annual loss of available solarity for operations of the "renewable" portion of the proposed HHSEGS facility totals 149 days (approximately 40%).

The Applicant is well aware of the need to evaluate site solarity in relation to system performance and output as illustrated from the declaration quoted below, which was disclosed to investors but not in the AFC proceedings.

> *"The production of solar energy depends heavily on suitable meteorological conditions. If solar conditions are unfavorable, our electricity production, and therefore revenue from projects using our systems, may be substantially below our expectations. The electricity produced and revenues generated by a solar energy project will be highly dependent on suitable solar conditions and associated weather conditions, which are beyond our control. Furthermore, components of our system, such as the heliostats, could be damaged by severe weather, such as hailstorms or tornadoes. Unfavorable weather and atmospheric conditions could impair the effectiveness or require shutdown of key equipment, impeding operation of our projects, which would result in reduced energy production and decreased revenues and, if these problems persist, potential payments, deductions or defaults under key project documents, including our projects' PPAs or other financing arrangements."* (*See* Exhibit 726, BSE/SEC Excerpts, p. 13)

If the proposed HHSEGS systems are incapable of producing power from renewable sources for a significant portion of the year, then land use efficiency is an invalid stand alone parameter to measure system efficiency by as the inability of that same land to yield energy production a significant portion of the time greatly reduces that same land use efficiency.

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(6) HHSEGS, Power Plant Reliability, p. 5.4-1
(7) Project Description, 2.2.12 Generating Facility Operation, p. 2-18.
(8) http://www.pahrumpchamber.com/weather.php

B. Wind Speed Thresholds & Heliostat Wind Loads

During times of high wind speeds, heliostat/mirrors will rotate to the "safe" horizontal position to prevent equipment damage. However, no data is provided in the AFC or subsequent documents that describes or determines what wind speeds will trigger maximum thresholds that require heliostat "safe position" rotation, the annual average projected loss of heliostat function due to wind disturbance or seasonal analysis to determine if wind speed thresholds will occur during months of estimated peak power production.

Below, the Applicant describes the operational parameters of the heliostats with respect to how they will be protected from large wind loads.

> *"The wind protection and default position (called the "safe" position or orientation) is the 90- degree elevation - the mirrors being in horizontal position facing the sky. This position minimizes the risk of damage from large wind loads and is also the default orientation of the heliostats in case of loss of communication with the plant's control system or dysfunction of the plant's control system. With the solar field in "safe" position, at the ground level, the flux concentration will be low, similar to the sun's reflection on a lake."*(9) (Emphasis added.)

The Applicant has acknowledged heliostat/mirror assemblies will be rotated into the "safe" position to prevent equipment damage from threshold wind speeds. However, no data or analysis was made available by the Applicant that establishes what the threshold wind speeds will be or the estimated percentage of time heliostat/mirror functions will be offline and incapable of solar power production on either an annual or seasonal basis.

Between 1980 and 2010, Pahrump's average wind speed was 21.63 mph, 5 mph higher than the national average of 16.93 mph. Pahrump's three highest annual wind speed *averages* by month are: February (45.6 mph), June (29.6 mph) and August (31.5 mph).(10) Pahrump also ranked #7 out of 154 locations in Nevada with respect to average wind speeds.(11)

Regarding potential impacts of wind speeds in relation to heliostat protection and plant availability, reliability, or efficiency the following relevant questions were submitted to the CEC on March 9, 2012.(12) Unfortunately, they have still yet to be answered by anyone.

> 2. What will be the "trigger level" of sustained wind speeds that will result in heliostat positioning to safe mode during operational hours?

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(9) Exhibit 728, 2011-11-17 Data Response Set, 1A, p. 24.
(10) Available online at: http://www.usa.com/pahrump-nv-weather.htm
(11)http://www.usa.com/rank/nevada-state--average-wind-speed—city rank.htm?hl=Pahrump&hlst=NV
(12) Exhibit 700, #14. Heliostat Damage: Large Wind Loads, p. 89-94, Also see Attachment I, p. 104-105, Attachment II, p. 106-111)

3. What wind gust or sustained wind speed is projected to be the maximum speed a heliostat/mirror assembly could absorb without damage in both safe position and operating position?

4. Is there any projected wind event that could result in catastrophic damage to heliostats, production and the surrounding environment? Specifically, how fast would wind have to blow and/or gust to produce a catastrophic event?

5. How does the applicant's larger mirror design (12' x 8.5' = 204.7 sq.ft) compare to parabolic trough mirrors in terms of projected damage and/or breakage?

11. Can high winds result in any unusual or nuisance sounds on the heliostats or mirror surfaces?

13. What are the estimated impacts of wind erosion to mirror surface degradation and system performance on an annual basis and over the life of the project?

14. What is the projected amount of time per month that heliostats will be in safe positions to protect them from wind damage? For example, on average three days in June, two days in July, six days in February, etc.

Just days after I submitted these questions to the CEC, Bright Source Energy made the following disclosure to investors in their filing with the SEC on March 21, 2012.

> *"Our assumptions could prove to be materially different from the actual long-term performance of our systems, resulting in significant operational problems for us including increased maintenance costs and inability to meet energy delivery requirements or defaults under project or financing documents. For example, a severe wind storm in late November 2011 at the Coalinga Solar-to-Steam for EOR project resulted in movement in some of the pylons on which the heliostats are mounted. As a result, we are deploying redesigned pylons in much of the Ivanpah project. Any similar widespread system or component failures may damage our market reputation and cause our revenue to decline."*(13) [emphasis added]

Since Applicant and Staff have remained unresponsive to this issue since I first began questioning impacts of wind on the project design, operations, output, reliability, availability, efficiecy, etc., as well as failing to provide a single forum during workshops or other avenues to address this issue, in desperation I began combing the CEC website on Ivanpah and going through the Monthly Compliance Reports (MCR) trying to determine if any information could be found regarding changes to heliostat designs or reports to the CPM due to the BSE statement that they were redesigning the pylons at Ivanpah.

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(13) Exhibit 726, BSE/SEC Excerpts, p. 13

As a result, I found four reports that may have relevance and immediately put a Public Records Act request into the CEC on November 2, 2012. Two of these reports were titled, "Heliostat Earthquake LAOD Analysis (Project 30003-LH2.2 Rev A), Document # 25542-000-V1A-MXHS-00087" and, "Heliostat Wind Load Analysis (Project 3003-LH2.2 Rev A) Document # 25542-000-V1A-MXHS-00088".(14)

On December 17, 2012, I received an email in response to my PRA request, which in summary stated, these documents contained exclusive proprietary information that would have to be redacted and as such, to provide a redacted document would have "no meaning" and therefore, they would not be supplied.

In summary response, I argued that I didn't care if the Applicant redacted the "proprietary" portions of the documents, that I was looking for the conclusions of the earthquake and windload analysis with respect to the heliostats and that there was nothing proprietary about telling a competitor (or the public) that, for example sake, "Our heliostats can withstand winds up to 150 mph."(15)

As of January 15, 2013, the last report I have received regarding the status of this PRA is; the CEC is "*working on two fronts regarding my request for seismic and wind tolerance conclusions*". The first is trying to determine if Staff is capable of supplying this information. The second is still waiting on BSE because they are "*looking into it*".(16)

Since the Applicant has failed to provide data regarding maximum wind speed thresholds, no factual analysis of annual averages or seasonal wind speed thresholds in relation to power plant availability or reliability can be performed. However, assuming a factor of 10% annual loss of heliostat/mirror function due to wind speed thresholds (or 3.04 days per month), an additional 36.5 days per year can be projected to impact the power plant's output due to lack of availability of heliostat/mirror functions.

With a loss of heliostat function for an average of 36.5 days per year due to threshold wind speeds and combining it with the annual average loss of solar availability of 149 days, it is reasonable to assume the proposed HHSEGS will be unavailable for power production approximately 50% of the time or on average, 186 days per year. This figure may be higher or lower depending on the maximum wind speed thresholds that trigger heliostat/mirror rotation into the "safe" or horizontal positions.

If the proposed HHSEGS systems are incapable of producing power from renewable sources for a significant portion of the year, then land use efficiency is an invalid stand alone parameter to measure system efficiency by as the inability of that same land to yield energy production a significant portion of the time greatly reduces that same land use efficiency.

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(14) Exhibit 729
(15) Exhibit 730
(16) Exhibit 731

5. Hours of Operation

There are wide discrepancies in the Applicant and Staff reported hours of operation for the HHSEGS facilities once they become online. Reported hours of operations have been included in a variety of sections in the AFC, subsequent documents and the FSA though the majority of hourly and annual operations analysis have relegated to the Air Quality sections of both the AFC and FSA.

Based on the available data, the Applicant and the FSA has failed to sufficiently provide evidence, data or analysis that supports:

a) The estimated number of hours the proposed HHSEGS facility will generate electricity on a daily, quarterly or annual basis.

b) The projected number of hours the proposed HHSEGS will generate electricity solely from the "renewable" portion of the facility, i.e., the sun, on a daily, quarterly or annual basis.

c) Adequate description and verification of the function, necessity and contribution of natural gas fired boilers towards electrical generation on a daily, quarterly or annual basis.

The descriptions contained within this section come from varying sections of the AFC, the Boiler Optimization Plan, the FSA and the joint Rio Mesa/Hidden Hills workshop held on August 28, 2012. Included references of hourly and annual operation levels taken from the air quality and emissions sections are NOT intended to be evaluated for emissions factors. They are included solely to demonstrate the conflicting data regarding hours of operations that have been scattered through various documents and how these conflicting reports fail to adequately describe when and for how long the proposed HHSEGS will actually be operational on a daily, quarterly and annual basis.

"*HHSEGS would generate electricity up to 16 hours a day*".(17)

"The HHSEGS project would operate during the daylight hours (when the sun is shining)."(18)

"The project, as proposed in the AFC, would be able to operate when the sun is shining." (19)

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(17) HHSEGS FSA, Cover, Executive Summary, Introduction, Description, p. 1.1-3
(18) HHSEGS FSA, Noise & Vibration, p. 4.6-10
(19) HHSEGS FSA, Reliability, p. 5.4-4

A. Unknown Solar Radiation Levels Available For Daily Hours of Operations

In the August 28, 2012, joint Rio Mesa/Hidden Hills SEGS workshop, Applicant stated that,

> *"<u>The receiver needs about 600 kW/m2 to generate steam</u>. Therefore, it doesn't matter the size of the solar field because the same amount of flux will be needed by the receiver."* (20)

S. "*How will operational flux vary throughout the course of a day? What happens to flux at the start and end of operations, i.e., dawn and dusk when birds are known to be most active?*"

C. "*The flux levels during the day stay more or less the same. At the beginning of day and the end of the day the flux levels are significantly lower. We took at the upper boundary, 1,000 kW/m2, a normal day, a good day would be 900 kW/M2, dusk would be around 200 to 250. The intensity will be very, very low.*"(21)

Based on the statements above, the "renewable" portion of the proposed HHSEGS power generation abilities is dependent on when the flux levels from the mirrors are capable of reaching 600 kW/m2 at the receiver and that, this level necessary is not achievable during dusk or dawn (200-250 kW/m2).

However, what we still don't know is at what time the required level of solar radiation (per kW/m2) will be achievable at the start of the day (8:00 a.m., 10:00 a.m.?) or when the required solar radiation level will drop below the necessary levels to generate steam (5:00 p.m., 7:00 p.m.?).

Furthermore, based on the information above, it is impossible for the proposed HHSEGS to generate electricity up to 16 hours per day via sunlight. The only way generating electricity up to 16 hours per day is even remotely possible is through a heavy reliance on the boilers and natural gas. If this is the case, then the proposed HHSEGS cannot qualify as a "renewable" power plant.

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(20) Joint Rio Mesa/Hidden Hills SEGS Workshop, 8/28/12, at 2:14 minutes.
(21) Joint Rio Mesa/Hidden Hills SEGS Workshop, 8/28/12, at 2:40 minutes.

B. Determining Hours of Operation Via Reported Annual MWh Production

Another potential method for trying to determine the daily hours of operation for the proposed HHSEGS is to use the reported annual generation of 1,400,000 MWh.(22)

The following explanation of what a 500MW power plant is defined as and the formula for converting MWs production potential to megawatt hours (MWh) was provided courtesy of a CEC Staff member.(23)

> *"The value represents the maximum that the facility can generate instantaneously. A 500 MW (megawatt) power plant is one that can potentially generate 500 MW at any point in time. If it were to do so for an hour, it would produce 500 MWh (megawatt hours). If it were to do so for 2 hours it would produce 1000 (= 2x500) MWh. For an entire day, 12,000 MWh. For 15, minutes, 125 MWh."*

Since the proposed HHSEGS is a 500 MW facility, then dividing 500 MWh's into 1,400,000 MWh's should provide the number of hours the proposed facility is estimated to generate electricity on an annual basis, which equals 2,800 hours. If this is further refined by dividing 2,800 hours by 345 days (subtracting 20 days for down time during December), it equates to 8.1 hours per day.

C. Conflicting Hours of Operations Via Emissions Reporting

Since there is no reported data or analysis regarding the daily availability of solar input to generate steam, there is equally no way to verify the accuracy or validity of the boilers reported hours of operation or their contributions towards electrical generation on a daily, quarterly or annual basis. However, given the general number of reported full load hours the boiler's are expected to be operating, combined with the MWh results equating to 8.1 hours of daily operations, evidence suggests the HHSEGS will be largely fueled by natural gas.

D. Reported Annual Full Load Hours And Capacity Factor

Based on the Applicant's description of the annualized capacity factor, the proposed HHSEGS is expected to operate at approximately the equivalent hours identified in converting the MWhs (2,800 hours annually or 8.1 hours per day) as explained below.

> *"However, as a solar power plant, the project is not designed or intended for base load generation. The EPS applies only to procurements that entail an annualized capacity factor in excess of 60 percent. With <u>an expected operating capacity that is the equivalent of approximately 3,000 full-load hours per year,</u> the project's annualized capacity factor will be less than 50 percent. Therefore, the SB 1368 limitation does not apply to this facility*." *(24)* [Emphasis added]

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(22) Applicants Testimony, Executive Summary, p. 3
(23) Exhibit 732, Email comm.. re: MW/MWhs
(24) 2012-04-09 Supplemental Data Response, Set 2, TN-64558, pdf. pp. 133

E. Operational Hours Via Emissions Data

There are a significant amount of discrepancies regarding boiler hours of operations in many different areas of the AFC, the Boiler Optimization Plan and the Permit To Construct. However, the following examples have been chosen to best represent the issues surrounding hours of operations as well as, out of these hours, how many hours of electricity are being generated from the "renewable" portion of the facility (the sun) and how many hours of electrical generation is a result of natural gas fired boilers.

Figure 1.

Source: Boiler Optimization, Supplemental Data Response, Set 2, TN64558, Appendix 5.1B, Revised April 2012, Emissions and Operating Parameters p. 5.1B-8

Table 5.1B-8R
Typical Annual Operating Schedule, Each Plant
Hidden Hills Solar Electric Generating System
Revised April 2012

Auxiliary boiler operation[1]	Summer	Winter	
operation , hours/day[2] (average)	5	5	
Equivalent full-load hours/yr[2]			1,100
Expected startup hours/yr			865

Nighttime boiler operation	Summer	Winter	
operation , hours/day[2] (average)	12	16	
Equivalent full-load hours/yr[2]			4,780
Expected startup hours/yr			345

Notes:
1. These 249 MMBtu/hr boilers were called "startup boilers" in the original project design.
2. Hours shown are equivalent full load hours; boilers may operate more hours on some days and/or at lower loads. See text.

As seen in Figure 1., the estimated typical number of full load hours for an auxiliary boiler is five hours per day and 1,100 hours annually, more than one third of the 3,000 annual operating hours described during the capacity factor discussion.

However, 1,100 annual hours divided by five hours only equates to 220 days per year. If five hours is a "typical day" and is multiplied by 345 days (subtracting 20 days of down time in December), then the auxiliary boiler would be operational for 1,725 hours annually at full load or well over half the annual reported hours of operations (57.5%).

From a daily calculation, if the plant is estimated to only produce power for 8 hours per day on average, then on a typical day, the auxiliary boilers will be used during 5 of these 8 hours.

Now the question is, will the auxiliary boilers be generating power as a stand alone generational source for five hours a day (perhaps during peak demand times?) <u>or</u> are they required to supplement the solar radiation from the heliostats because it is insufficient to generate steam for more than three hours per day. As it stands, the Applicant has failed to sufficiently or adequately explain the "renewable" portion of the facility's power generation.

What these figures also tell us is, this renewable power plant will "typically" require natural gas to operate for 21 hours p/day while only generating electricity 8 hours p/day – and yet, it is still qualifying as a "renewable facility".

Trying to determine the daily average "typical" hours of operations is further muddied by the fact that Staff and the GBUAPCD is unconcerned by annual daily average plant operations, deferring instead to allow the HHSEGS flexibility to utilize natural gas any time it wants, as long as it wants, to meet demand.

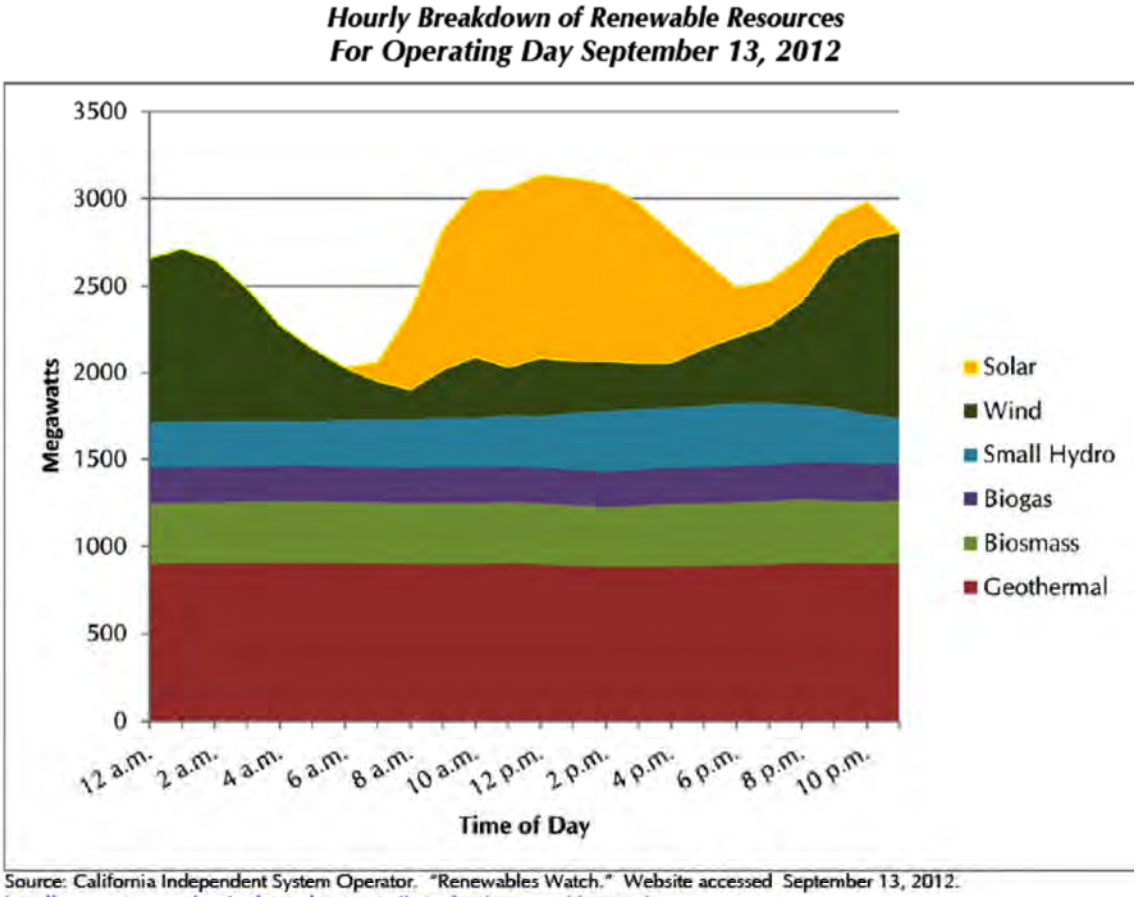
The focus of Staff and the GBUAPCD's analysis of daily/hourly operations is maintained exclusively through the lens of limitations on natural gas use incorporated in the COC and PTO. The idea being, incorporated natural gas use limitations in the COC's and PTO's will act as the enforcement mechanism to ensure the facility is not, in essence, using natural gas as the main source of fuel on an annual basis.

However, these limitations have a variety of caveats, including rolling annual averages and the option to submit modifications to the facility and Permit To Operate (PTO) within as little as five days (AQ-SC8). Additionally, though the Applicant is required to report violations of exceeding natural gas use to regulators, there are no enforcement provisions contained in the COC's and no shut down requirements if natural gas use is exceeded.

As such, what is to stop the proposed HHSEGS from relying on natural gas for the majority of its' power production, especially during "peak hours" (through 10 p.m. at night) when the plant can command its highest rates and simply just pay any associated fines for reported violations, sometimes known as "the price of doing business"?

To illustrate this point further, Figure 2 shows the hourly breakdown of megawatt generation from renewable resources. Note that the maximum megawatt production for the majority of solar power occurs between 10:00 a.m. and 5:00 p.m. However, megawatt production via "solar" energy is shown as extending to 11:00 p.m. at night. How much of this "qualified" solar energy is being driven by natural gas instead?

Figure 2.
Source: Rewiring California: Integrating Agendas For Energy Reform.
p. 34, Little Hoover Commission, December 2012.



Source: California Independent System Operator. "Renewables Watch." Website accessed September 13, 2012.
http://www.caiso.com/market/Pages/ReportsBulletins/DailyRenewablesWatch.aspx

Unfortunately, there does not seem to be any reasonably established criteria yet developed to adequately measure these issues and make determinations on solar versus natural gas for these types of facilities. The only means staff had to estimate the project's operations via availability was to substitute natural gas statistics for the BSE design as outlined below. Either that or it is a predominately natural gas-fired facility and that is why Staff found it reasonable to use natural gas statistics.

> "*Because natural gas is the primary type of fossil fuel used in California, staff finds it reasonable to compare the project's availability factor to the average availability factor of natural gas-fired fossil fuel units. Also, because the project's total net power output would be 500 MW, staff uses the NERC statistics for 400–599 MW units. The NERC reported an availability factor of 85.15% as the generating unit average for the years 2005 through 2009 for natural gas units of 400–599 MW (NERC 2010)".*(25)

(25) HHSEGS FSA, Reliability, p. 5.4-6

In my Supplemental Comments submitted regarding the PSA, questions where submitted regarding annual power production that were not addressed. Specifically, in my Air Quality section, #7. Annual Power Production, Q-1. and Q-2., p. 3-7. In the FSA, Air Quality, Appendix 1- PSA Response To Public Comments, p. 4, Staff's response indicated answers to these questions would be addressed in the Power Plant Efficiency and Facility Design sections of the FSA. However, there is no mention of them in either section and therefore, they still remain unanswered. Also see Exhibit 700, Section: Operations, p. 128-130, Exhibit 702, Section 12, Operations, #1, #2, p. 12-1, 12-2

As a result of all these variables, inconsistencies, lack of established means to generally separate power production between solar sources and natural gas sources as is so clearly evident in the proposed HHSEGS, the Committee should determine standards that allow for clear distinction, measurements, standards and reporting requirements that ensure facility's such as these are capable of producing energy predominately from solar sources. Enforcement provisions should also be incorporated in the COC's mandating shut down requirements if natural gas use exceeds these renewable standards.

6. Heliostats: The "Renewable" Equipment

There is no evidence the proposed site is suitable for the reasonable and reliable operation of the *renewable portion* of the proposed HHSEGS facilities. Specifically, the performance of the heliostat/mirror assemblies, the "heart" of facility's renewable energy generating capabilities, have been inadequately reported on or analyzed as a stand-alone subject nor in a site-specific context.

I have submitted a significant amount of discussion on this issue as well as raising a large amount of questions since March 2012, most of which have continued to go unanswered. (*See* Exhibit 703, Exhibit 706, Exhibit 711: Section III, IV (plus Exhibits III-VI), Exhibit 712, and, Exhibit 700: Heliostats/Mirrors: All, p. 73-111, Soils: All, 155-162 Exhibit 702: Section 3: Air Quality #8, p. 3-9, #10, p. 3-10, Section 7: Facility Design p. 7-1, 7-2, Section 9: Heliostats #1, p. 9-1,9-2, #2, p. 9-3,9-4, Section 12: Operations, #4, p. 12-4, Section 14: Soils & Surface Waters, #2, p. 14-2 – 14-6, #3, p. 14-6 – 14-9, #4, p. 14-9 – 14-13, #5, p. 14-13 –14-15.

The following discussion, photos and excerpts are included below to illustrate conflicting data, information, and adequate project descriptions regarding facility system components that are deemed critical for the operational and maintenance requirements of the renewable portion of the facility.

To begin, at the 11-03-11 Informational Hearing(26), a Mr. Warren asks the Applicant about water usage as it related to mirror cleaning.

> *"I want to ask the applicants about the amount of water that's currently projected at 140acre feet. So as your project continues and if you discover that you need substantially more water for cleaning, if it's more dirty of an area or more wind, more caking of mud and stuff that gets on the mirrors during bad weather, is there a provision to – you know, basically I'm asking what happens if you need a lot more water than you've got, is the question?"*

With respect to Mr. Warren question about potential increases in water requirements for mirror cleaning activities, it has yet to answered and as far as I know, no one has required an answer. Now, as I have repeatedly stated throughout these proceedings, the Applicant has disclosed to investors that:

> "*Our largely unproven mirror cleaning equipment may perform below our expectations. The primary maintenance activity for solar thermal projects using our systems will be the routine and continuous washing of reflective mirror surfaces. We anticipate each mirror may need to be cleaned every two weeks* ***to prevent a buildup of dust which would significantly degrade the system performance****. Mirrors will be washed at night by a dedicated crew using specialized mobile equipment. A truck is being designed that will bring purified water simultaneously to a number of mirrors. We are still designing and testing the specialized equipment to be used in this process.* ***If the mirror washing equipment and process are not effective, actual operating costs may be substantially higher than forecasted or total electrical production may fall short of estimates****.*" [emphasis added].

As a result, it is reasonable to assume that the mirror cleaning equipment is largely unproven, the maintenance activities on a utility scale have never been tried, the equipment was still being designed approximately six months *after* the HHSEGS AFC was filed (that we still know nothing about over a year and a half later), and if the equipment and process are not effective, costs will be substantially higher and/or electrical production may fall short – how much shorter also remains a mystery.

Despite the completely unproven, experimental and "still designing" nature of the equipment and processes, the AFC provides water requirements for mirror cleaning as illustrated in the following quote.

> *"Heliostat washing will require up to 52,834 gallons of water per day. Heliostat wash water will not be collected for disposal—it is expected that the wash water will evaporate at or near the ground surface."*(27)

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(26) Exhibit 700, p. 171/172
(27) HHSEGS, AFC, Section 5.15, Water Resource Management, p. 15.

What is the basis for the Applicant's water requirement estimates if both mirror washing equipment and processes are largely unproven and still experimental at the time the AFC was filed? Where is this substantiated in the AFC or subsequent documents, how was it determined, and how was it determined to be reasonably accurate by Staff? And, as Mr. Warren so appropriately queried, what happens if it is discovered the project needs substantially more water for cleaning, if it's dirty, has more wind, more caking of mud and stuff that gets on the mirror during bad weather (i.e., water spotting from sprinkling rain)?

The following photos evidence the need to adequately address and resolve this matter as it is at the heart of the "renewable" portion of the proposed HHSEGS's ability to operate. Photo 1 and Photo 2 are before and after photos of the same mirror placed on an area that was subject to any close activities from the surrounding area during the time frame it was "collecting dust", which was 35 days.

Photo 1
Freshly cleaned mirror placed outside to element exposure. 8/29/12

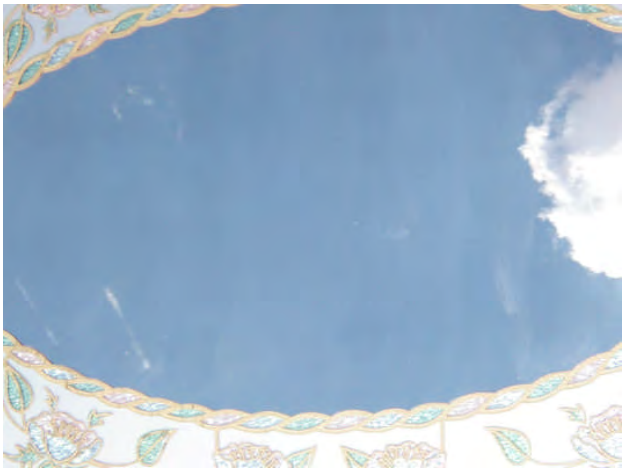

Photo 2
Same mirror after 35 days. 10/3/12

Note the water spotting on the mirror? This was caused from a light sprinkling of rain, which often occurs in the late summer months. I believe this will have a significant effect on the HHSEGS's output, efficiency and performance if maintenance activities are incapable of addressing these mirror distortions.

Photo 3 was taken of a windshield at a residence in Charleston View. The windshield had been cleaned exactly 14 days from the time this photo was taken. The area around the vehicle was surrounded by gravel and has been compacted for a very long time.

Photo 3

Photo of vehicle windshield located in Charleston View. This dust is exactly 14 days old from when the windshield was last cleaned.

Besides impacts to the renewable portion of the facility's performance, mirror degradation, unproven processes and equipment as well as unsubstantiated claims in the AFC (such as water requirements), there are also environmental considerations that may impact the heliostat/mirror assemblies.

A. Mirror Washing Machines

To continue the trend of the Applicant's haphazard approach in the AFC to descriptions of the renewable portions of the proposed HHSEGS project, including its equipment, processes, performance standards, output, efficiency, etc. the following excerpts clearly illustrate how "anything goes" when it comes to describing the proposed project.

In the AFC Project Description, Applicant describes the number of necessary Mirror Washing Machine Operators as;

> *"HHSEGS is expected to employ up to 120 full-time employees: 36 at Solar Plant 1 (including mirror washing machine operators), 36 at Solar Plant 2 (including mirror washing machine operators), and 48 at the administration complex. The facility will operate 7 days a week."*(28)

(28) AFC, Project Description, 2.2.12 Generating Facility Operation, p. 2.18.

In November, just three months later, the Applicant again describes the number of Mirror Washing Operators as now being 42 as illustrated in Figure 4 below.(29)

Figure 4

TABLE DR24-1
HHSEGS Plant Operation Workforce

Department	Personnel	Shift
Operations	42 MWM operators 24 Technicians 6 Support staff	All night shift, 21 per plant 2 shifts, 6 technicians each shift, per plant. 3 per plant, day or night shift?
Warehouse & Maintenance	13 personnel	12-hour night shift for maintenance?
Administration	31 Administration staff 4 Support staff	Day shift
Total	120	

MWM = mirror washing machine

In April, Applicant appears to drop the number of MWM operators significantly by citing that the plant will now only utilize 16 MWM's total (one operator p/machine?).(30)

In October, new figures are provided by the Applicant that are even more obscure, but seem to indicate MWM operators may now total 24 as illustrated in Figure 5.(31)

Figure 5

TABLE 5.10-21R1
Operational Workforce

Staff	Solar Plant 1	Solar Plant 2	Common Area	Total
Solar fields and Power Block Workers	12	12	—	24
Technicians	8	8	—	16
Operators (Administration Building: shower and sewage calculations)	—	—	15	15
Warehouse & Maintenance Personnel	—	—	13	13
Admin Personal – day shift only	—	—	12	12
TOTAL (actual)	**20**	**20**	**40**	**80**
Misc. Support	10	10	—	20
TOTAL (max)	**30**	**30**	**40**	**100**

(29) Exhibit 728, Applicant's Data Response Set 1A, 11/17/11, p. 18.
(30) Exhibit 703, Section 1, Baseline Data, #3, p. 2.
(31) Updated Workforce Analaysis, TN-67434, 10/01/12, p. 3-6.

Meanwhile, as illustrated in Figure 6, the HHSEGS FSA describes the number of Mirror Washing Operators as 15 – even though the Applicant has described 16 Mirror Washing Machines will be required for the HHSEGS!(32)

Figure 6.

SOCIOECONOMICS Table 6
HHSEGS Plant Operation Workforce

Operations Workforce	
Solar fields and Power Block Workers	24
Technicians	16
MWM Operators	15
Warehouse & Maintenance Staff	13
Administration & Support Staff	32
TOTAL	100

Note: Total workforce includes only the crafts specifically needed for the HHSEGS. See **SOCIOECONOMICS Table 5** for a list of crafts included in the total workforce figures. MWM = mirror washing machine. Source: CH2 2012jj

SUMMARY CONCLUSIONS

The AFC and data responses fail to adequately describe, report, analyze or provide adequate evidence or data regarding the most significant components and equipment associated with the renewable portion of the proposed HHSEGS project to determine its reliability and efficiency as a renewable power plant. Similarly, CEC Staff is deferring the majority of critical data collection, reporting and analysis until after project approval. With respect to describing "what" the HHSEGS project actually is, insufficient attention, data and analysis has been given to the renewable and operational portion of the HHSEGS while the majority of focus has been on the construction and natural gas use of the facility.

If the proposed HHSEGS systems are incapable of producing power from renewable sources for a significant portion of the year, then land use efficiency is an invalid stand alone parameter to measure system efficiency by as the inability of that same land to yield energy production a significant portion of the time greatly reduces that same land use efficiency.

Loss of solarity reduces renewable power plant efficiency. Loss of heliostat availability due to wind speeds causing the heliostats to be "offline" results in reduced land use efficiency. If mirror washing equipment or schedules are insufficient to maintain clean mirror surfaces, then out put and efficiency may be substantially reduced.

Due to the emerging nature of these new technologies, the need to evaluate the systems capabilities and parameters has never been more critical. Based on the available data, the HHSEGS efficient use of both land and renewable power sources is highly questionable. As such, the current parameters that are being applied to measure the efficiency of proposed HHSEGS are inadequate to ensure informed decision making prior to approval.

(32) HHSEGS FSA, Socioeconomics, p. 4.8-14.

5. POWER PLANT RELIABILITY

TESTIMONY OF C.R. MACDONALD, INTERVENOR

I. INTRODUCTION

A. Qualifications: Committee Order Granting Petition To Intervene

B. Prior Filings: In addition to the statements herein, this testimony includes by reference the following documents submitted in this proceeding:

Exhibit's 700, 702, 703, 708, 709, 711, 712

C. Additional Filings:
Exhibit 718, 726, 729, 730, 731, 732, 747

D. Documents Prepared By Others:
Exhibits 726, 727, 728, 733, 734

It is my intent to invoke the requirement that the Applicant bear the burden of proof regarding the information provided in the HHSEGS AFC and subsequent documents throughout this proceeding. This will include requesting where the Applicant has addressed the issues previously raised and to provide evidence that supports the statements and conclusions presented in the AFC and throughout these proceedings.

It is also my intent to invoke Staff's requirements under CEQA and Title 20 to provide evidence of where they have addressed issues previously raised and to provide evidence that supports the statements and conclusions presented in the PSA and/or FSA.

Therefore, I will be focusing on many of the issues raised throughout these proceedings during the Evidentiary Hearings and consider much of my previous submissions as the foundation of my testimony.

To the best of my knowledge, all of the facts contained in this testimony are true and correct or were true and correct at the time they were previously filed. With respect to documents prepared by others, I have endeavored to find the most credible source of facts to incorporate by reference in these proceedings but can make no sworn testimony as to their truth or accuracy on the preparer's behalf. To the extent this testimony contains opinions, such opinions are my own. I make these statements, and render these opinions freely and under oath for the purpose of constituting sworn testimony in this proceeding.

II. PROPOSED FINDING OF FACTS

- The proposed HHSEGS 500 MW utility scale project is a highly experimental, unproven design. As it stands, its viable renewable operations and projected performance are highly speculative.

- There is no basis, data or facts in the AFC that support the proposed design system is capable of generating 270 MWs per plant solely from 85,000 heliostats. To the contrary, the Applicant has provided MW production figures for its design that indicate the proposed HHSEGS project will be incapable of producing the advertised 500 MW's by a large margin.

- There is no basis, data or facts that support the Applicant's claim that its new solar power tower design can generate more megawatts per acre, that the design is more efficient overall, that more heliostats can be placed per acre or that the new design "substantially reduces mirror shading".

- There is no basis, data or facts to support the proposed projects renewable power production capabilities. Analysis has thus far proved inadequate to determine the plant's overall availability for power generation regarding the renewable portion of the facility; specifically, when the sun is shining and what impacts wind speeds will have during operations. However, based on available data and reasonable assumptions, the renewable portion of the proposed HHSEGS will be unavailable for energy production approximately 186 days annually, over 50% of the time.

- There is no evidence the proposed site is suitable for the reasonable and reliable operation of the *renewable portion* of the proposed HHSEGS facilities. Specifically, the performance of the heliostat/mirror assemblies, the "heart" of facility's renewable energy generating capabilities, have been inadequately reported on or analyzed as a stand-alone subject nor in a site-specific context.

- There is contradictory data and statements regarding the HHSEGS hours of operation. Therefore, estimates as to when the reliable generation of power can be expected have failed to be sufficiently or adequately addressed in the FSA.

- The Mirror Washing Machines (MWM), dedicated equipment that has been deemed critical for maintenance activities necessary to ensure maximum output of the renewable portion of the facilities, have been inadequately reported on or analyzed as a stand-alone subject nor in context of the facilities operational parameters.

- The source of the proposed HHSEGS's water supply cannot be stated with any degree of confidence. While the Pahrump Valley Basin aquifer is cited as the source, data is inadequate to sufficiently address unanswered question regarding source, recharge sources and rates, depths to water levels, and a potential impermeable barrier or semi-permeable barrier at the California/Nevada State line.

- Water demands of the proposed project cannot be mitigated to "less than significant" in the existing environment. If COC's place restrictions on water levels associated with project pumping to protect the environment and local residents, the proposed project cannot be considered feasible as a reliable power supply. If COC's do not place restrictions on project pumping, significant impacts to water dependent resources in the area will be left highly vulnerable and inadequately protected and thereby, impacts will be left unmitigated. As such, it is clear the project site is not suitable for the proposed HHSEGS as there are no measures that can protect both the environment and its public trust resources that can *also* be capable of ensuring reliable power production over the project's lifetime.

- The AFC and data responses fail to adequately describe, report, analyze or provide adequate evidence or data regarding the most significant components and equipment associated with the renewable portion of the proposed HHSEGS project. Similarly, CEC Staff is deferring the majority of critical data collection, reporting and analysis until after project approval. With respect to describing "what" the HHSEGS project actually is, insufficient attention, data and analysis has been given to the renewable and operational portion of the HHSEGS while the majority of focus has been on the construction and natural gas use of the facility.

III. SUMMARY OF TESTIMONY

1. Unsupported MW Production Via Heliostats

There is no basis, data or facts in the AFC that support the proposed design system is capable of generating 270 MWs per plant solely from 85,000 heliostats. To the contrary, the Applicant has provided MW production figures for its design indicating the proposed HHSEGS project will be incapable of producing the advertised 500 MW's by a large margin.

Specifically, in the March 21, 2012, SEC filing by Bright Source Energy, the Applicant reported that:

> *"In the current system design, a 130 MW plant will utilize up to 60,000 heliostats, depending on land area and shape, and site-specific economic optimization."*(1)

BSE made this statement to investors approximately seven months after filing the HHSEGS AFC, which should reasonably indicate the "current system design" being referred to by the Applicant is applicable to the proposed HHSEGS.

However, the AFC claims the proposed HHSEGS will generate 270 MWs using only 85,000 heliostats. If the SEC reported MW/heliostat formula is used to determine the actual HHSEGS's MW/heliostat power production potential, then only 184 MWs can expect to be generated by 85,000 heliostats(2), not 270 MWs (gross) as is currently being claimed.

Therefore, the maximum MW output of the proposed HHSEGS project is 368 MWs under the most optimal conditions. If 40 MWs is subtracted from this total as has been done in the AFC projections, the maximum MW production available for export produced solely from the heliostats is 328 MW at any time while the sun is shining.

2. No Basis For Design Claims

There is no basis, data or facts that support the Applicant's claim that its new solar power tower design can generate more megawatts per acre, that the design is more efficient overall, that more heliostats can be placed per acre or that the new design "substantially reduces mirror shading".

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(1) Exhibit 726, BSE/SEC Excerpts, Heliostats, p. 31

(2) The MW production formula reported in BSE's SEC filing was 60,000 heliostats to produce 130 MWs. The proposed HHSEGS will utilize 85,000 heliostat/mirror assemblies, 25,000 more than the SEC/Heliostat MW formula. As such, 20,000 heliostats were used as the basis for the calculations and resulting conclusions. Specifically, 60,000 divided by 20,000 heliostats equals three. 130 MWs divided by three equals 43.3 MWs per each 20,000 heliostat block. This was further refined by dividing 5,000 heliostats into 20,000 heliostats, which goes four times. 43.3 MWs was then divided by four to determine each 5,000 heliostat block would produce 10.82 MWs. The totals of 43.3 MWs (20,000 additional heliostats) and 10.82 MWs (5,000 additional heliostats) were combined with the 60,000 heliostat 130 MW production to equal 184.12 MWs).

At several places in the HHSEGS AFC, the Applicant reports that:

> *"One principle advantage of the HHSEGS solar power tower design is that it results in more efficient land use and greater power generation. The new, higher, 750-foot solar power tower allows the heliostat rows to be placed closer together, with the mirrors at a steeper angle. This substantially reduces mirror shading and allows more heliostats to be placed per acre. More megawatts can be generated per acre and the design is more efficient overall".*(3)

However, no further evidence, data, discussions, analysis or diagrams are included in the AFC or subsequent data responses that explain, justify, or prove Applicant's claims. There is also contrary positions offered in the above quote, specifically, how is mirror shading substantially reduced *overall* if steeper angles allow more mirrors to be placed per acre and heliostat rows will be placed closer together?

Additionally, the statement that this design will result in "greater power generation" is highly questionable as, from my current understanding, the SRGS's require 600 kW/m2 to operate. Directing additional heliostats at the SRGS will not "increase its power" as all that is required is for the SRGS to reach sufficient temperatures to operate the steam turbine engine. In fact, the Applicant advertises that one advantage of their system is the ability to control and *reduce* heliostat directions to the SRGS to maintain stable temperatures.

3. Plant Availability Based On Environmental Conditions

There is no basis, data or facts to support the proposed projects renewable power production capabilities. There is no available data in the AFC files or subsequent documents that incorporates or analyzes environmental data such as available solarity, wind speeds, or summer storms at the proposed site that would support the Applicant's advertised "peak demand" capabilities of the facility.

Analysis has thus far proved inadequate to determine the plant's overall annual availability for power generation regarding the renewable portion of the facility; specifically, when the sun is shining and what impacts wind speeds will have during operations. There is also contradictory data and statements regarding its hours of operation.

Therefore, the degree to which these factors will affect power production, availability or reliability during "peak" demand times currently remains unknown. Therefore, the proposed projects feasibility, output, performance, availability and reliability cannot be adequately or reasonably evaluated.

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(3) AFC, Executive Summary, p. 1-2.

A. Project Site Available Solarity

The AFC files describe the area as one of "high solarity". However, no data or analysis is provided regarding the annual or seasonal average of sunny days at the proposed site in either the AFC and subsequent documents or the FSA.

With respect to plant availability, the HHSEGS FSA states, "*The plant would be available 92-98% of the time when the source of energy (the sunlight) is available, which is when the plant is expected to be available to come online.*"(4)

While the HHSEGS AFC states, "*HHSEGS is expected to have an annual plant availability of 92 to 98 percent. It will be possible for plant availability to exceed 98 percent for a given 12-month period.*"(5)

According to the Pahrump Chamber of Commerce, the average annual number of sunny days in the Pahrump Valley is 216. Cloudy and rainy days average 65 days per year and partly cloudy days average 84 days per year.(6) Based on these statistics, it can be reasonably assumed the average annual loss of available solarity for operations of the "renewable" portion of the proposed HHSEGS facility totals 149 days (approximately 40%).

B. Wind Speed Thresholds & Heliostat Wind Loads

During times of high wind speeds, heliostat/mirrors will rotate to the "safe" horizontal position to prevent equipment damage. However, no data is provided in the AFC or subsequent documents that describes or determines what wind speeds will trigger maximum thresholds that require heliostat "safe position" rotation, the annual average projected loss of heliostat function due to wind disturbance or seasonal analysis to determine if wind speed thresholds will occur during months of estimated peak power production.

Below, the Applicant describes the operational parameters of the heliostats with respect to how they will be protected from large wind loads.

> *"The wind protection and default position (called the "safe" position or orientation) is the 90- degree elevation - the mirrors being in horizontal position facing the sky. This position minimizes the risk of damage from large wind loads and is also the default orientation of the heliostats in case of loss of communication with the plant's control system or dysfunction of the plant's control system. With the solar field in "safe" position, at the ground level, the flux concentration will be low, similar to the sun's reflection on a lake."*(7) (Emphasis added.)

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(4) HHSEGS, Power Plant Reliability, p. 5.4-1
(5) Project Description, 2.2.12 Generating Facility Operation, p. 2-18.
(6) http://www.pahrumpchamber.com/weather.php
(7) Exhibit 728, 2011-11-17 Data Response Set, 1A, p. 24.

The Applicant has acknowledged heliostat/mirror assemblies will be rotated into the "safe" position to prevent equipment damage from threshold wind speeds. However, no data or analysis was made available by the Applicant that establishes what the threshold wind speeds will be or the estimated percentage of time heliostat/mirror functions will be offline and incapable of solar power production on either an annual or seasonal basis.

Between 1980 and 2010, Pahrump's average wind speed was 21.63 mph, 5 mph higher than the national average of 16.93 mph. Pahrump's three highest annual wind speed *averages* by month are: February (45.6 mph), June (29.6 mph) and August (31.5 mph).(8) Pahrump also ranked #7 out of 154 locations in Nevada with respect to average wind speeds.(9)

Regarding potential impacts of wind speeds in relation to heliostat protection and plant availability and/or reliability, the following relevant questions were submitted to the CEC on March 9, 2012. (10) Unfortunately, they have still yet to be answered by anyone.

> 2. What will be the "trigger level" of sustained wind speeds that will result in heliostat positioning to safe mode during operational hours?
>
> 3. What wind gust or sustained wind speed is projected to be the maximum speed a heliostat/mirror assembly could absorb without damage in both safe position and operating position?
>
> 4. Is there any projected wind event that could result in catastrophic damage to heliostats, production and the surrounding environment? Specifically, how fast would wind have to blow and/or gust to produce a catastrophic event?
>
> 5. How does the applicant's larger mirror design (12' x 8.5' = 204.7 sq.ft) compare to parabolic trough mirrors in terms of projected damage and/or breakage?
>
> 11. Can high winds result in any unusual or nuisance sounds on the heliostats or mirror surfaces?
>
> 13. What are the estimated impacts of wind erosion to mirror surface degradation and system performance on an annual basis and over the life of the project?
>
> 14. What is the projected amount of time per month that heliostats will be in safe positions to protect them from wind damage? For example, on average three days in June, two days in July, six days in February, etc.

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(8) Available online at: http://www.usa.com/pahrump-nv-weather.htm
(9)http://www.usa.com/rank/nevada-state--average-wind-speed—city rank.htm?hl=Pahrump&hlst=NV
(10) Exhibit 700, #14. Heliostat Damage: Large Wind Loads, p. 89-94, Also see Attachment I, p. 104-105, Attachment II, p. 106-111)

Just days after I submitted these questions to the CEC, Bright Source Energy made the following disclosure to investors in their filing with the SEC on March 21, 2012.

> "*Our assumptions could prove to be materially different from the actual long-term performance of our systems, resulting in significant operational problems for us including increased maintenance costs and inability to meet energy delivery requirements or defaults under project or financing documents. For example, a severe wind storm in late November 2011 at the Coalinga Solar-to-Steam for EOR project resulted in movement in some of the pylons on which the heliostats are mounted. As a result, we are deploying redesigned pylons in much of the Ivanpah project. Any similar widespread system or component failures may damage our market reputation and cause our revenue to decline."*(11)

Since Applicant and Staff have remained unresponsive to this issue since I first began questioning impacts of wind on the project design, operations, output, reliability, availability, etc., as well as failing to provide a single forum during workshops or other avenues to address this issue, in desperation I began combing the CEC website on Ivanpah and going through the Monthly Compliance Reports (MCR) trying to determine if any information could be found regarding changes to heliostat designs or reports to the CPM due to the BSE statement that they were redesigning the pylons at Ivanpah.

As a result, I found four reports that may have relevance and immediately put a Public Records Act request into the CEC on November 2, 2012. Two of these reports were titled, "Heliostat Earthquake LAOD Analysis (Project 30003-LH2.2 Rev A), Document # 25542-000-V1A-MXHS-00087" and, "Heliostat Wind Load Analysis (Project 3003-LH2.2 Rev A) Document # 25542-000-V1A-MXHS-00088".(12)

On December 17, 2012, I received an email in response to my PRA request, which in summary stated, these documents contained exclusive proprietary information that would have to be redacted and as such, to provide a redacted document would have "no meaning" and therefore, they would not be supplied.

In summary response, I argued that I didn't care if the Applicant redacted the "proprietary" portions of the documents, that I was looking for the conclusions of the earthquake and windload analysis with respect to the heliostats and that there was nothing proprietary about telling a competitor (or the public) that, for example sake, "Our heliostats can withstand winds up to 150 mph."(13)

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(11) Exhibit 726, BSE/SEC Excerpts, p. 13
(12) Exhibit 729
(13) Exhibit 730

As of January 15, 2013, the last report I have received regarding the status of this PRA is; the CEC is "*working on two fronts regarding my request for seismic and wind tolerance conclusions*". The first is trying to determine if Staff is capable of supplying this information. The second is still waiting on BSE because they are "*looking into it*".(14)

Since the Applicant has failed to provide data regarding maximum wind speed thresholds, no factual analysis of annual averages or seasonal wind speed thresholds in relation to power plant availability or reliability can be performed. However, assuming a factor of 10% annual loss of heliostat/mirror function due to wind speed thresholds (or 3.04 days per month), an additional 36.5 days per year can be projected to impact the power plant's output due to lack of availability of heliostat/mirror functions.

With a loss of heliostat function for an average of 36.5 days per year due to threshold wind speeds and combining it with the annual average loss of solar availability of 149 days, it is reasonable to assume the proposed HHSEGS will be unavailable for power production approximately 50% of the time or on average, 186 days per year. This figure may be higher or lower depending on the maximum wind speed thresholds that trigger heliostat/mirror rotation into the "safe" or horizontal positions.

4. Hours of Operation

There are wide discrepancies in the Applicant and Staff reported hours of operation for the HHSEGS facilities once they become online. Reported hours of operations have been included in a variety of sections in the AFC, subsequent documents and the FSA though the majority of hourly and annual operations analysis have relegated to the Air Quality sections of both the AFC and FSA.

Based on the available data, the Applicant and the FSA has failed to sufficiently provide evidence, data or analysis that supports:

a) The estimated number of hours the proposed HHSEGS facility will generate electricity on a daily, quarterly or annual basis.

b) The projected number of hours the proposed HHSEGS will generate electricity solely from the "renewable" portion of the facility, i.e., the sun, on a daily, quarterly or annual basis.

c) Adequate description and verification of the function, necessity and contribution of natural gas fired boilers towards electrical generation on a daily, quarterly or annual basis.

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(14) Exhibit 731

The descriptions contained within this section come from varying sections of the AFC, the Boiler Optimization Plan, the FSA and the joint Rio Mesa/Hidden Hills workshop held on August 28, 2012. Included references of hourly and annual operation levels taken from the air quality and emissions sections are NOT intended to be evaluated for emissions factors. They are included solely to demonstrate the conflicting data regarding hours of operations that have been scattered through various documents and how these conflicting reports fail to adequately describe when and for how long the proposed HHSEGS will actually be operational on a daily, quarterly and annual basis.

> "*HHSEGS would generate electricity up to 16 hours a day*".(15)
>
> *"The HHSEGS project would operate during the daylight hours (when the sun is shining)."*(16)

"The project, as proposed in the AFC, would be able to operate when the sun is shining." (17)

A. Unknown Solar Radiation Levels Available For Daily Hours of Operations

In the August 28, 2012, joint Rio Mesa/Hidden Hills SEGS workshop, Applicant stated that,

> *"<u>The receiver needs about 600 kW/m2 to generate steam</u>. Therefore, it doesn't matter the size of the solar field because the same amount of flux will be needed by the receiver."* (18)

T. "*How will operational flux vary throughout the course of a day? What happens to flux at the start and end of operations, i.e., dawn and dusk when birds are known to be most active?"*

E. "*The flux levels during the day stay more or less the same. At the beginning of day and the end of the day the flux levels are significantly lower. We took at the upper boundary, 1,000 kW/m2, a normal day, a good day would be 900 kW/M2, dusk would be around 200 to 250. The intensity will be very, very low."*(19)

Based on the statements above, the "renewable" portion of the proposed HHSEGS power generation abilities is dependent on when the flux levels from the mirrors are capable of reaching 600 kW/m2 at the receiver and that, this level necessary is not achievable during dusk or dawn (200-250 kW/m2).

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(15) HHSEGS FSA, Cover, Executive Summary, Introduction, Description, p. 1.1-3
(16) HHSEGS FSA, Noise & Vibration, p. 4.6-10
(17) HHSEGS FSA, Reliability, p. 5.4-4
(18) Joint Rio Mesa/Hidden Hills SEGS Workshop, 8/28/12, at 2:14 minutes.
(19) Joint Rio Mesa/Hidden Hills SEGS Workshop, 8/28/12, at 2:40 minutes.

However, what we still don't know is at what time the required level of solar radiation (per kW/m2) will be achievable at the start of the day (8:00 a.m., 10:00 a.m.?) or when the required solar radiation level will drop below the necessary levels to generate steam (5:00 p.m., 7:00 p.m.?).

Furthermore, based on the information above, it is impossible for the proposed HHSEGS to generate electricity up to 16 hours per day via sunlight. The only way generating electricity up to 16 hours per day is even remotely possible is through a heavy reliance on the boilers and natural gas. If this is the case, then the proposed HHSEGS cannot qualify as a "renewable" power plant.

B. Determining Hours of Operation Via Reported Annual MWh Production

Another potential method for trying to determine the daily hours of operation for the proposed HHSEGS is to use the reported annual generation of 1,400,000 MWh.(20)

The following explanation of what a 500MW power plant is defined as and the formula for converting MWs production potential to megawatt hours (MWh) was provided courtesy of a CEC Staff member.(21)

> *"The value represents the maximum that the facility can generate instantaneously. A 500 MW (megawatt) power plant is one that can potentially generate 500 MW at any point in time. If it were to do so for an hour, it would produce 500 MWh (megawatt hours). If it were to do so for 2 hours it would produce 1000 (= 2x500) MWh. For an entire day, 12,000 MWh. For 15, minutes, 125 MWh."*

Since the proposed HHSEGS is a 500 MW facility, then dividing 500 MWh's into 1,400,000 MWh's should provide the number of hours the proposed facility is estimated to generate electricity on an annual basis, which equals 2,800 hours. If this is further refined by dividing 2,800 hours by 345 days (subtracting 20 days for down time during December), it equates to 8.1 hours per day.

C. Conflicting Hours of Operations Via Emissions Reporting

Since there is no reported data or analysis regarding the daily availability of solar input to generate steam, there is equally no way to verify the accuracy or validity of the boilers reported hours of operation or their contributions towards electrical generation on a daily, quarterly or annual basis. However, given the general number of reported full load hours the boiler's are expected to be operating, combined with the MWh results equating to 8.1 hours of daily operations, evidence suggests the HHSEGS will be largely fueled by natural gas.

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(20) Applicants Testimony, Executive Summary, p. 3
(21) Exhibit 732, Email comm.. re: MW/MWhs

D. Reported Annual Full Load Hours And Capacity Factor

Based on the Applicant's description of the annualized capacity factor, the proposed HHSEGS is expected to operate at approximately the equivalent hours identified in converting the MWhs (2,800 hours annually or 8.1 hours per day) as explained below.

> *"However, as a solar power plant, the project is not designed or intended for base load generation. The EPS applies only to procurements that entail an annualized capacity factor in excess of 60 percent. With <u>an expected operating capacity that is the equivalent of approximately 3,000 full-load hours per year,</u> the project's annualized capacity factor will be less than 50 percent. Therefore, the SB 1368 limitation does not apply to this facility*."(22) [Emphasis added]

E. Operational Hours Via Emissions Data

There are a significant amount of discrepancies regarding boiler hours of operations in many different areas of the AFC, the Boiler Optimization Plan and the Permit To Construct. However, the following examples have been chosen to best represent the issues surrounding hours of operations as well as, out of these hours, how many hours of electricity are being generated from the "renewable" portion of the facility (the sun) and how many hours of electrical generation is a result of natural gas fired boilers.

Figure 1.

Source: Boiler Optimization, Supplemental Data Response, Set 2, TN64558, Appendix 5.1B, Revised April 2012, Emissions and Operating Parameters p. 5.1B-8

Table 5.1B-8R
Typical Annual Operating Schedule, Each Plant
Hidden Hills Solar Electric Generating System
Revised April 2012

Auxiliary boiler operation[1]	Summer	Winter	
operation , hours/day[2] (average)	5	5	
Equivalent full-load hours/yr[2]			1,100
Expected startup hours/yr			865

Nighttime boiler operation	Summer	Winter	
operation , hours/day[2] (average)	12	16	
Equivalent full-load hours/yr[2]			4,780
Expected startup hours/yr			345

Notes:
1. These 249 MMBtu/hr boilers were called "startup boilers" in the original project design.
2. Hours shown are equivalent full load hours; boilers may operate more hours on some days and/or at lower loads. See text.

(22) 2012-04-09 Supplemental Data Response, Set 2, TN-64558, pdf. pp. 133

As seen in Figure 1., the estimated typical number of full load hours for an auxiliary boiler is five hours per day and 1,100 hours annually, more than one third of the 3,000 annual operating hours described during the capacity factor discussion.

However, 1,100 annual hours divided by five hours only equates to 220 days per year. If five hours is a "typical day" and is multiplied by 345 days (subtracting 20 days of down time in December), then the auxiliary boiler would be operational for 1,725 hours annually at full load or well over half the annual reported hours of operations (57.5%).

From a daily calculation, if the plant is estimated to only produce power for 8 hours per day on average, then on a typical day, the auxiliary boilers will be used during 5 of these 8 hours.

Now the question is, will the auxiliary boilers be generating power as a stand alone generational source for five hours a day (perhaps during peak demand times?) <u>or</u> are they required to supplement the solar radiation from the heliostats because it is insufficient to generate steam for more than three hours per day. As it stands, the Applicant has failed to sufficiently or adequately explain the "renewable" portion of the facility's power generation.

What these figures also tell us is, this renewable power plant will "typically" require natural gas to operate for 21 hours p/day while only generating electricity 8 hours p/day – and yet, it is still qualifying as a "renewable facility".

Trying to determine the daily average "typical" hours of operations is further muddied by the fact that Staff and the GBUAPCD is unconcerned by annual daily average plant operations, deferring instead to allow the HHSEGS flexibility to utilize natural gas any time it wants, as long as it wants, to meet demand.

The focus of Staff and the GBUAPCD's analysis of daily/hourly operations is maintained exclusively through the lens of limitations on natural gas use incorporated in the COC and PTO. The idea being, incorporated natural gas use limitations in the COC's and PTO's will act as the enforcement mechanism to ensure the facility is not, in essence, using natural gas as the main source of fuel on an annual basis.

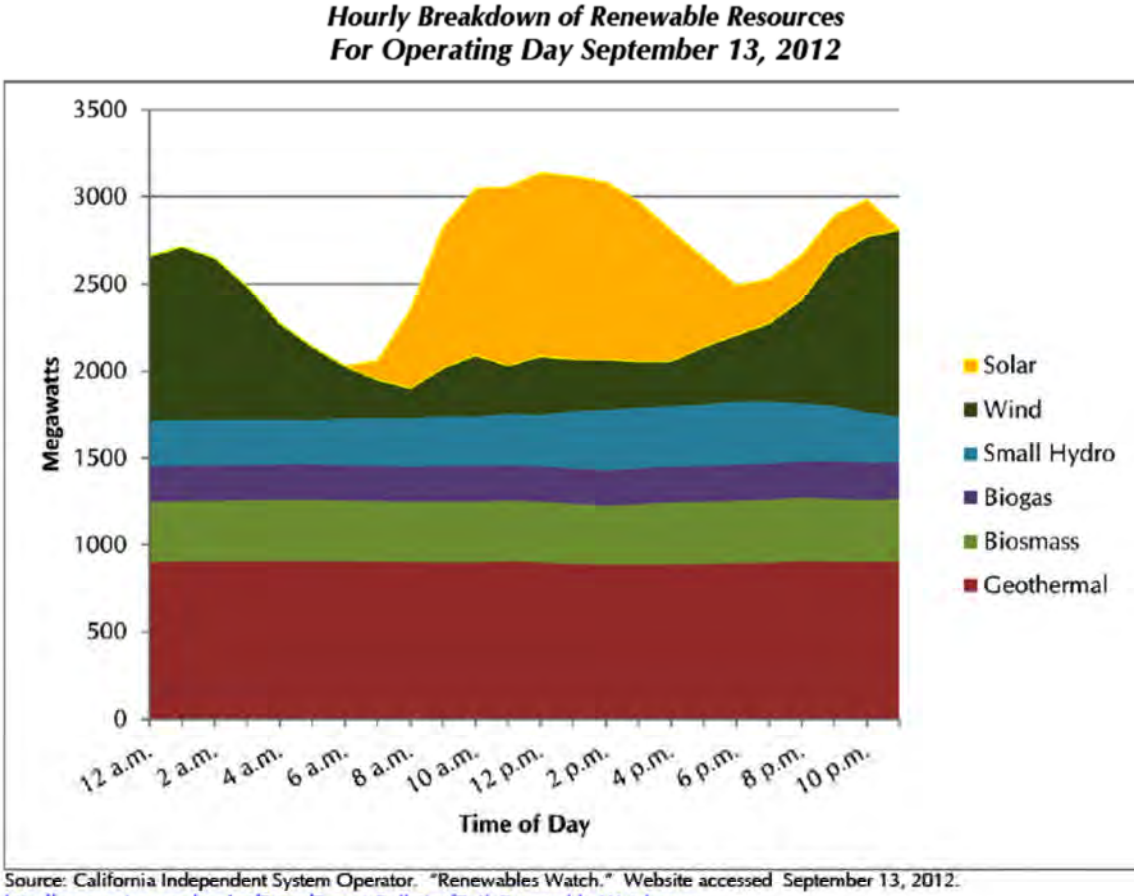
However, these limitations have a variety of caveats, including rolling annual averages and the option to submit modifications to the facility and Permit To Operate (PTO) within as little as five days (AQ-SC8). Additionally, though the Applicant is required to report violations of exceeding natural gas use to regulators, there are no enforcement provisions contained in the COC's and no shut down requirements if natural gas use is exceeded.

As such, what is to stop the proposed HHSEGS from relying on natural gas for the majority of its' power production, especially during "peak hours" (through 10 p.m. at night) when the plant can command its highest rates and simply just pay any associated fines for reported violations, sometimes known as "the price of doing business"?

To illustrate this point further, Figure 2 shows the hourly breakdown of megawatt generation from renewable resources. Note that the maximum megawatt production for the majority of solar power occurs between 10:00 a.m. and 5:00 p.m. However, megawatt production via "solar" energy is shown as extending to 11:00 p.m. at night. How much of this "qualified" solar energy is being driven by natural gas instead?

Figure 2.

Source: Rewiring California: Integrating Agendas For Energy Reform.
p. 34, Little Hoover Commission, December 2012.



Source: California Independent System Operator. "Renewables Watch." Website accessed September 13, 2012.
http://www.caiso.com/market/Pages/ReportsBulletins/DailyRenewablesWatch.aspx

Unfortunately, there does not seem to be any reasonably established criteria yet developed to adequately measure these issues and make determinations on solar versus natural gas for these types of facilities. The only means staff had to estimate the project's operations via availability was to substitute natural gas statistics for the BSE design as outlined below. Either that or it is a predominately natural gas-fired facility and that is why Staff found it reasonable to use natural gas statistics.

> "*Because natural gas is the primary type of fossil fuel used in California, staff finds it reasonable to compare the project's availability factor to the average availability factor of natural gas-fired fossil fuel units. Also, because the project's total net power output would be 500 MW, staff uses the NERC statistics for 400–599 MW units. The NERC reported an availability factor of 85.15% as the generating unit average for the years 2005 through 2009 for natural gas units of 400–599 MW (NERC 2010)".*(23)

In my Supplemental Comments submitted regarding the PSA, questions where submitted regarding annual power production that were not addressed. Specifically, in my Air Quality section, #7. Annual Power Production, Q-1. and Q-2., p. 3-7. In the FSA, Air Quality, Appendix 1- PSA Response To Public Comments, p. 4, Staff's response indicated answers to these questions would be addressed in the Power Plant Efficiency and Facility Design sections of the FSA. However, there is no mention of them in either section and therefore, they still remain unanswered. Also see Exhibit 700, Section: Operations, p. 128-130, Exhibit 702, Section 12, Operations, #1, #2, p. 12-1, 12-2

As a result of all these variables, inconsistencies, lack of established means to generally separate power production between solar sources and natural gas sources as is so clearly evident in the proposed HHSEGS, the Committee should determine standards that allow for clear distinction, measurements, standards and reporting requirements that ensure facility's such as these are capable of producing energy predominately from solar sources. Enforcement provisions should also be incorporated in the COC's mandating shut down requirements if natural gas use exceeds these renewable standards.

5. Heliostats: The "Renewable" Equipment

There is no evidence the proposed site is suitable for the reasonable and reliable operation of the <u>*renewable portion*</u> of the proposed HHSEGS facilities. Specifically, the performance of the heliostat/mirror assemblies, the "heart" of facility's renewable energy generating capabilities, have been inadequately reported on or analyzed as a stand-alone subject nor in a site-specific context.

I have submitted a significant amount of discussion on this issue as well as raising a large amount of questions since March 2012, most of which have continued to go unanswered. (*See* Exhibit 703, Exhibit 706, Exhibit 711: Section III, IV (plus Exhibits III-VI), Exhibit 712, and, Exhibit 700: Heliostats/Mirrors: All, p. 73-111, Soils: All, 155-162 Exhibit 702: Section 3: Air Quality #8, p. 3-9, #10, p. 3-10, Section 7: Facility Design p. 7-1, 7-2, Section 9: Heliostats #1, p. 9-1,9-2, #2, p. 9-3,9-4, Section 12: Operations, #4, p. 12-4, Section 14: Soils & Surface Waters, #2, p. 14-2 – 14-6, #3, p. 14-6 – 14-9, #4, p. 14-9 – 14-13, #5, p. 14-13 –14-15.

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(23) HHSEGS FSA, Reliability, p. 5.4-6

The following discussion, photos and excerpts are included below to illustrate conflicting data, information, and adequate project descriptions regarding facility system components that are deemed critical for the operational and maintenance requirements of the renewable portion of the facility.

To begin, at the 11-03-11 Informational Hearing(24), a Mr. Warren asks the Applicant about water usage as it related to mirror cleaning.

> *"I want to ask the applicants about the amount of water that's currently projected at 140acre feet. So as your project continues and if you discover that you need substantially more water for cleaning, if it's more dirty of an area or more wind, more caking of mud and stuff that gets on the mirrors during bad weather, is there a provision to – you know, basically I'm asking what happens if you need a lot more water than you've got, is the question?"*

With respect to Mr. Warren question about potential increases in water requirements for mirror cleaning activities, it has yet to answered and as far as I know, no one has required an answer. Now, as I have repeatedly stated throughout these proceedings, the Applicant has disclosed to investors that:

> "*Our largely unproven mirror cleaning equipment may perform below our expectations. The primary maintenance activity for solar thermal projects using our systems will be the routine and continuous washing of reflective mirror surfaces. We anticipate each mirror may need to be cleaned every two weeks* ***to prevent a buildup of dust which would significantly degrade the system performance****. Mirrors will be washed at night by a dedicated crew using specialized mobile equipment. A truck is being designed that will bring purified water simultaneously to a number of mirrors. We are still designing and testing the specialized equipment to be used in this process.* ***If the mirror washing equipment and process are not effective, actual operating costs may be substantially higher than forecasted or total electrical production may fall short of estimates****.*" [emphasis added].

As a result, it is reasonable to assume that the mirror cleaning equipment is largely unproven, the maintenance activities on a utility scale have never been tried, the equipment was still being designed approximately six months *after* the HHSEGS AFC was filed (that we still know nothing about over a year and a half later), and if the equipment and process are not effective, costs will be substantially higher and/or electrical production may fall short – how much shorter also remains a mystery.

Despite the completely unproven, experimental and "still designing" nature of the equipment and processes, the AFC provides water requirements for mirror cleaning as illustrated in the following quote.

---

(24) Exhibit 700, p. 171/172

> *"Heliostat washing will require up to 52,834 gallons of water per day. Heliostat wash water will not be collected for disposal—it is expected that the wash water will evaporate at or near the ground surface."*(25)

What is the basis for the Applicant's water requirement estimates if both mirror washing equipment and processes are largely unproven and still experimental at the time the AFC was filed? Where is this substantiated in the AFC or subsequent documents, how was it determined, and how was it determined to be reasonably accurate by Staff? And, as Mr. Warren so appropriately queried, what happens if it is discovered the project needs substantially more water for cleaning, if it's dirty, has more wind, more caking of mud and stuff that gets on the mirror during bad weather (i.e., water spotting from sprinkling rain)?

The following photos evidence the need to adequately address and resolve this matter as it is at the heart of the "renewable" portion of the proposed HHSEGS's ability to operate. Photo 1 and Photo 2 are before and after photos of the same mirror placed on an area that was subject to any close activities from the surrounding area during the time frame it was "collecting dust", which was 35 days.

Photo 1
Freshly cleaned mirror placed outside to element exposure. 8/29/12

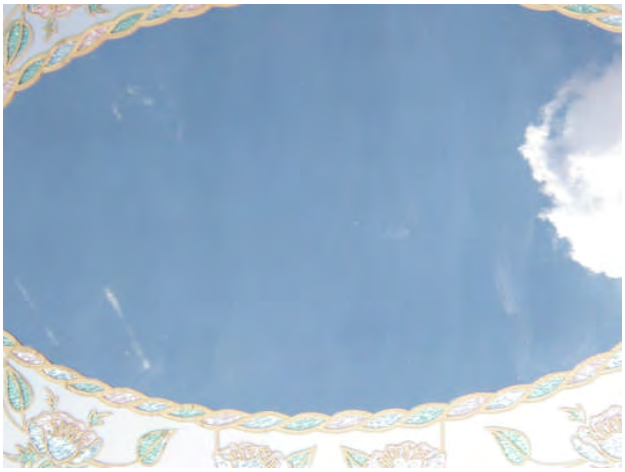

Photo 2
Same mirror after 35 days. 10/3/12

Note the water spotting on the mirror? This was caused from a light sprinkling of rain, which often occurs in the late summer months. I believe this will have a significant effect on the HHSEGS's output and performance if maintenance activities are incapable of addressing these mirror distortions.

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(25) HHSEGS, AFC, Section 5.15, Water Resource Management, p. 15.

Photo 3 was taken of a windshield at a residence in Charleston View. The windshield had been cleaned exactly 14 days from the time this photo was taken. The area around the vehicle was surrounded by gravel and has been compacted for a very long time.

Photo 3

Photo of vehicle windshield located in Charleston View. This dust is exactly 14 days old from when the windshield was last cleaned.

Besides impacts to the renewable portion of the facility's performance, mirror degradation, unproven processes and equipment as well as unsubstantiated claims in the AFC (such as water requirements), there are also environmental considerations that may impact the heliostat/mirror assemblies.

As previously discussed, there are potentially significant wind impacts as well as potential impacts from flooding, expansive soils, soil collapse, shifting of the heliostat assemblies and corrosive soil types recorded in the area.

For example, Staff dismisses pylon impacts due to expansive soils by stating that the amount of heliostat material (pylons) is much smaller than larger structures. They also cite pylons will be driven into the ground at least 10 feet and that the design of the heliostat foundation will not allow flow or infiltration of runoff beneath the pylon.(26)

(26) HHSEGS FSA, Soil and Surface Water, Response To Agency & Public Comments, Response to Comment 10.7/10.8, p. 4.9-50, 4.9-51.

With respect to the pylons and the attached heliostat/mirror assemblies (how much do they weigh?), even relatively "small" vehicles have sunk in the expansive desert soils when saturated. (*See* Exhibit 718, Section II: Soils, Photos 1-5)

Staff states that the heliostat foundations will not allow flow or infiltration of runoff beneath the pylon. I'm not sure what foundations Staff is referring too as my understanding of the pylon/heliostat design from the AFC is the pylons will be placed directly into the soil per the Low Impact Design (LID). What is Staff's source for the pylon/heliostat foundation descriptions in the AFC, data responses or FSA?

Significant issues were also raised by BLM regarding pylon/heliostat assembly stability and site suitability during the Ivanpah AFC process, most of which have NOT been covered in the HHSEGS AFC proceedings. At that time, stormwater flow calculations suggested modifying pylon insertion depths from four feet to five feet.(27) Now Staff states pylons will be inserted 10 feet or more. What is the source of this data and where was it analyzed in the AFC, data responses or FSA?

Also, BLM mentioned a high degree of variability at the Ivanpah site for water/soil infiltration rates. The Preliminary Geotechnical Report suggests similar variances in soil types are present at the proposed HHSEGS site. Staff has incorporated a requirement to test pylon stabilization with saturated soil and standing water under SOILS-5, which I highly support.

However, my question is, if Staff will request extensive surveys to be performed and data required for biological resources, cultural resources, visual resources, water supply, etc. during the AFC proceedings and prior to project approval, why on earth wouldn't something as fundamental as testing pylon stability at various locations throughout the HHSEGS site also be required prior to project approval? How much could it cost or time would it take to install a number of heliostats across the project site, saturate the soil, let the pylons stand in water for a day or two and see what happens?

When the heliostat installation began at Ivanpah, it must have been approved by the CBO and CPM and were found to be in "compliance" with structural and building LORS. And yet, the deficiencies found in these same designs discovered by the Applicant due to the wind event at the Coalinga facility had received CBO and CPM approval for Ivanpah, that then had to be redesigned and changed out. This illustrates how new this technology is and how current LORS may be inadequate for these components of the facility.

An additional consideration is the potential impacts of earth shaking on the heliostats due to seismic activity. While there will most likely be sufficient scrutiny of design requirements for large structures, what about the almost 5 square miles of heliostats?

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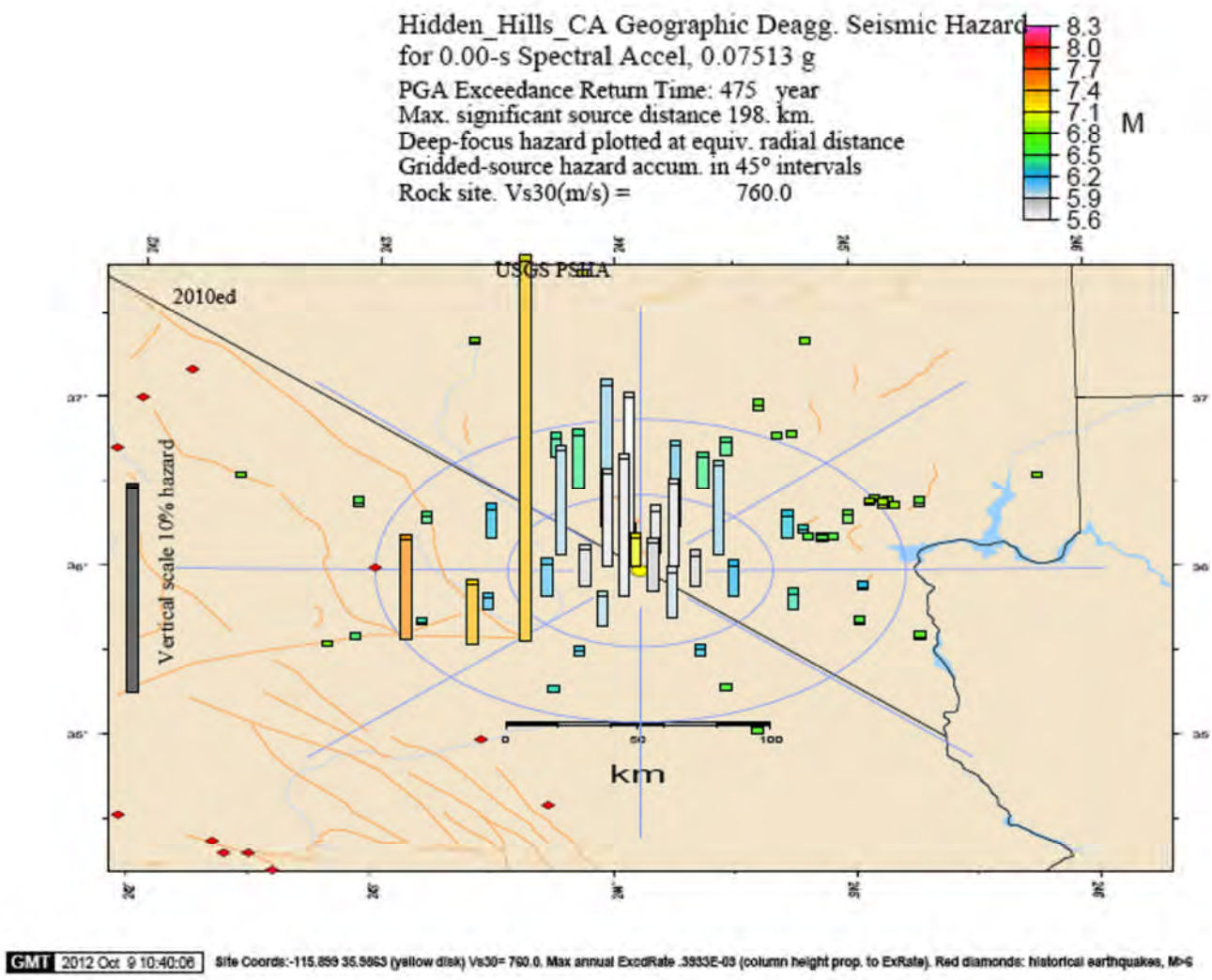
(27) Exhibit 733, p. 4.

Figure 3, below, was a computer generated model of earthquake potentials at the proposed project site using latitude and longitude degrees provided in the AFC at 10% for 50 years.(28) The model was run using the USGS Earthquake Hazards Program, Interpolated Probabilistic Ground Motion for the Conterminous 48 states.(29) This helps visually illustrate potential earthquake impacts throughout the heliostat fields and area as well as why I have been attempting to pursue heliostat earthquake tolerances via the CEC Public Record Acts requests.

Figure 3

Peak ground accelerations for the proposed HHSEGS site modeled by USGS using a 10% 50-year parameter.



A. Mirror Washing Machines

To continue the trend of the Applicant's haphazard approach in the AFC to descriptions of the renewable portions of the proposed HHSEGS project, including its equipment, processes, performance standards, output, etc. the following excerpts clearly illustrate how "anything goes" when it comes to describing the proposed project.

In the AFC Project Description, Applicant describes the number of necessary Mirror Washing Machine Operators as;

> *"HHSEGS is expected to employ up to 120 full-time employees: 36 at Solar Plant 1 (including mirror washing machine operators), 36 at Solar Plant 2 (including mirror washing machine operators), and 48 at the administration complex. The facility will operate 7 days a week."*(28)

In November, just three months later, the Applicant again describes the number of Mirror Washing Operators as now being 42 as illustrated in Figure 4 below.(29)

Figure 4

TABLE DR24-1
HHSEGS Plant Operation Workforce

Department	Personnel	Shift
Operations	42 MWM operators 24 Technicians 6 Support staff	All night shift, 21 per plant 2 shifts, 6 technicians each shift, per plant. 3 per plant, day or night shift?
Warehouse & Maintenance	13 personnel	12-hour night shift for maintenance?
Administration	31 Administration staff 4 Support staff	Day shift
Total	120	

MWM = mirror washing machine

In April, Applicant appears to drop the number of MWM operators significantly by citing that the plant will now only utilize 16 MWM's total (one operator p/machine?).(30)

In October, new figures are provided by the Applicant that are even more obscure, but seem to indicate MWM operators may now total 24 as illustrated in Figure 5.(31)

(28) AFC, Project Description, 2.2.12 Generating Facility Operation, p. 2.18.
(29) Exhibit 728, Applicant's Data Response Set 1A, 11/17/11, p. 18.
(30) Exhibit 703, Section 1, Baseline Data, #3, p. 2.
(31) Updated Workforce Analaysis, TN-67434, 10/01/12, p. 3-6.

Figure 5

TABLE 5.10-21R1
Operational Workforce

Staff	Solar Plant 1	Solar Plant 2	Common Area	Total
Solar fields and Power Block Workers	12	12	—	24
Technicians	8	8	—	16
Operators (Administration Building: shower and sewage calculations)	—	—	15	15
Warehouse & Maintenance Personnel	—	—	13	13
Admin Personal – day shift only	—	—	12	12
TOTAL (actual)	**20**	**20**	**40**	**80**
Misc. Support	10	10	—	20
TOTAL (max)	**30**	**30**	**40**	**100**

Meanwhile, as illustrated in Figure 6, the HHSEGS FSA describes the number of Mirror Washing Operators as 15 – even though the Applicant has described 16 Mirror Washing Machines will be required for the HHSEGS!(32)

Figure 6.

SOCIOECONOMICS Table 6
HHSEGS Plant Operation Workforce

Operations Workforce	
Solar fields and Power Block Workers	24
Technicians	16
MWM Operators	15
Warehouse & Maintenance Staff	13
Administration & Support Staff	32
TOTAL	100

Note: Total workforce includes only the crafts specifically needed for the HHSEGS. See **SOCIOECONOMICS Table 5** for a list of crafts included in the total workforce figures. MWM = mirror washing machine. Source: CH2 2012jj

SUMMARY CONCLUSIONS

The AFC and data responses fail to adequately describe, report, analyze or provide adequate evidence or data regarding the most significant components and equipment associated with the renewable portion of the proposed HHSEGS project to determine its reliability as a renewable power plant. Similarly, CEC Staff is deferring the majority of critical data collection, reporting and analysis until after project approval. With respect to describing "what" the HHSEGS project actually is, insufficient attention, data and analysis has been given to the renewable and operational portion of the HHSEGS while the majority of focus has been on the construction and natural gas use of the facility.

(32) HHSEGS FSA, Socioeconomics, p. 4.8-14.

7. TRANSMISSION LINE SAFETY/NUISANCE

TESTIMONY OF C.R. MACDONALD, INTERVENOR

I. INTRODUCTION

A. Qualifications: Committee Order Granting Petition To Intervene

B. Prior Filings: In addition to the statements herein, this testimony includes by reference the following documents submitted in this proceeding:

Exhibit's 700, 704, 709

C. Additional Filings:

Exhibit's 719, 720, 747

D. Documents Prepared By Others:

Exhibit's 714, 724, 744, 746

It is my intent to invoke the requirement that the Applicant bear the burden of proof regarding the information provided in the HHSEGS AFC and subsequent documents throughout this proceeding. This will include requesting where the Applicant has addressed the issues previously raised and to provide evidence that supports the statements and conclusions presented in the AFC and throughout these proceedings.

It is also my intent to invoke Staff's requirements under CEQA and Title 20 to provide evidence of where they have addressed issues previously raised and to provide evidence that supports the statements and conclusions presented in the PSA and/or FSA.

Therefore, I will be focusing on many of the issues raised throughout these proceedings during the Evidentiary Hearings and consider much of my previous submissions as the foundation of my testimony.

To the best of my knowledge, all of the facts contained in this testimony are true and correct or were true and correct at the time they were previously filed. With respect to documents prepared by others, I have endeavored to find the most credible source of facts to incorporate by reference in these proceedings but can make no sworn testimony as to their truth or accuracy on the preparer's behalf. To the extent this testimony contains opinions, such opinions are my own. I make these statements, and render these opinions freely and under oath for the purpose of constituting sworn testimony in this proceeding.

8. AIR QUALITY

TESTIMONY OF C.R. MACDONALD, INTERVENOR

I. INTRODUCTION

A. Qualifications: Committee Order Granting Petition To Intervene

B. Prior Filings: In addition to the statements herein, this testimony includes by reference the following documents submitted in this proceeding:

Exhibits 700, 702, 703, 704, 705, 706, 708, 709, 710, 711, 712

C. Additional Filings:

Exhibits 718, 719, 720, 721, 747

D. Documents Prepared By Others:

Exhibits 714, 722, 726, 727, 728, 732, 733, 734, 735, 736, 740, 742, 743, 744, 746

It is my intent to invoke the requirement that the Applicant bear the burden of proof regarding the information provided in the HHSEGS AFC and subsequent documents throughout this proceeding. This will include requesting where the Applicant has addressed the issues previously raised and to provide evidence that supports the statements and conclusions presented in the AFC and throughout these proceedings.

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II. PROPOSED FINDING OF FACTS

- The air quality modeling data used to determine project impacts failed to utilize data that "best represented" air quality found within the proposed sites six-mile buffer zone. Instead, data substitutions of less representative areas were used to analyze the projects impacts to the existing environment and local air quality, specifically PM_{10} emissions. Therefore, determinations of significance are not based on adequate analysis of air quality conditions in the vicinity of the project site but instead, have calculated the proposed projects impacts "somewhere else". Therefore, conclusions regarding project impacts to local air quality have significantly reduced confidence.

- The "power plant" emissions criteria have so far been evaluated solely from the natural gas portion of the facilities. Specifically, the MWMs and their activities are being excluded from emissions reporting requirements, even though they will be responsible for 33% of the facilities green house gas emissions and potentially significant particulate matter emissions (dust) over the projects lifetime. If utility scale renewable power plants are going to be constructed and operated on a mass scale, regulators must recognize, respond and incorporate new emissions standards to meet the challenge.

- There is no basis, data or facts to support the annual reported emissions for the Mirror Washing Machines (MWM) via vehicle miles traveled. The Applicant has the burden of proof of demonstrating the basis of how these conclusions were derived.

- There has been inadequate analysis of cumulative impacts to air quality resulting from the recent wide spread deployment of land intensive renewable energy projects throughout California and the Southwest. Specifically, large-scale soil disturbance may cause significant increases in airborne and/or suspended particulate matter. This in turn has the ability to deflect sunshine and can potentially change local and regional weather patterns via temperature changes, wind speeds/directions and reductions and/or increases in moisture content related to rain events.

- Wind, rain and general weather patterns are heavily influenced by temperature changes. The insertion of two or more "power towers" that radiate extremely high heat in the local atmosphere may result in changes to local weather patterns in the Pahrump Valley. Potential affects may include causing current wind and moisture patterns to change, which may include more or less rain, higher or lower wind speeds or "trapping" local air for longer periods of time that has not been considered or analyzed.

III. SUMMARY OF TESTIMONY

1. PM_{10} Data Used To Determine HHSEGS Impacts To Local Air Quality

The Applicant chose Jean, NV, versus Pahrump to better represent air quality at the project site for PM_{10} and $PM_{2.5}$ values. The reason cited was:

> "*Although the PM_{10} monitoring site at Pahrump, Nevada, is closer to the project site than the Jean station, <u>the Pahrump data are strongly affected by local windblown dust, and therefore are not representative of regional background concentrations</u>. As noted by the Nevada Bureau of Air Quality Planning (NVBAQP, 2010):"* (Emphasis added).
>
> *"Fast population growth in the '90s through mid-2006 created intensive development. Large parcels of land were cleared of vegetation, subdivided and prepared for housing construction. Dirt and gravel roads were constructed. Many of the planned housing developments never materialized and the lots are now disturbed, vacant areas."*
>
> *"As a result of the disturbed, vacant land and the number of dirt and gravel roads, fugitive dust (particulate matter less than 10 microns, or PM) became a problem. The Pahrump valley is subject to high winds and these winds often create dust storms."*
>
> *"However, the project site is not downwind of the Pahrump area under most meteorological conditions[2] and therefore would not be expected to be affected by the dust storms that create high localized PM_{10} concentrations in Pahrump. Consequently, PM_{10} concentrations monitored at Jean better represent conditions <u>in</u> the project area."* (*See* HHSEGS, 5.1 Air Quality, p. 28) (emphasis added)

First, the Applicant states that *<u>regional</u>* background concentrations are more representative of the project site and surrounding environment than actual local ambient air quality data collected from Pahrump, specifically PM10 data.

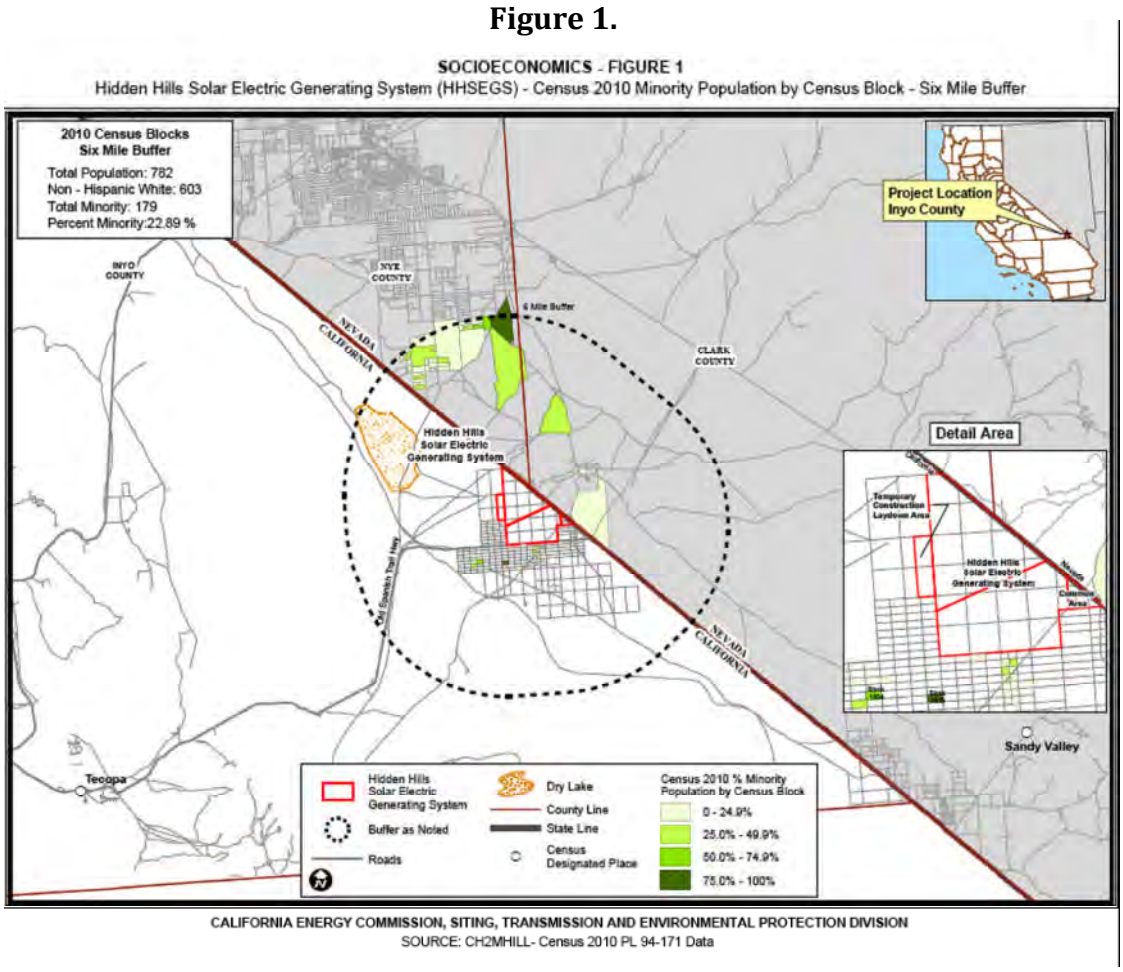
Second, Applicant admits the Pahrump Valley as a whole is subject to high winds and these winds often create dust storms. Applicant admits the Pahrump PM10 data is strongly affected by local windblown dust but implies that this same dust is localized and produced only in Pahrump. The reason offered to support this suggestion is because "intense development" from the 1990's through mid-2006 is still strongly affecting local ambient air quality PM10 emissions, despite a minimum of five years having passed since 2006 and when the AFC was submitted.

If this is true, it is a clear indication that desert soil, once disturbed, does not form crusts or "settle" quickly and is subject to long-term impacts to local air quality during high winds, such as those noted in the Pahrump Valley even after being treated during construction phases.

Third, Applicant's suggestion that air quality data for PM10 windblown dust is exclusively a result of Pahrump while ignoring a significant contributor to PM10 emissions in the Pahrump Valley that is *also* "strongly affected" by windstorms, which is the Pahrump Dry Lake located slightly northwest of the proposed HHSEGS site and slightly southwest of the southern end of Pahrump.

Fourth, Applicant substitutes local air quality PM10 data from Pahrump in their air quality modeling for an area less representative of the Pahrump Valley, which Staff and the GBUAPCD agree with, despite the fact that Pahrump is represented in the FSA as being within a six-mile buffer zone of the proposed HHSEGS as illustrated in Figure 1.

Figure 1.



CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION
SOURCE: CH2MHILL- Census 2010 PL 94-171 Data

Fifth, after substituting local PM_{10} data with a less representative site, additional PM_{10} values and data of unknown numbers are removed again from the air quality impact analysis as described below in Figure 2. (*See* HHSEGS FSA, Air Quality Table 4, p. 4.1-7)

Here the FSA describes under a., how "*exceptional PM concentration events, such as those caused by windstorms are* <u>*excluded*</u> *in the data presented*". It is not known how much windstorm data was removed to achieve these concentration levels. The conclusions presented are also based on a further caveat found in b., which goes on to state that PM_{10} annual averages used in this analysis are from "*federal data and may not exactly represent California annual average*."

Figure 2.

Air Quality Table 4
Criteria Pollutant Summary Maximum Ambient Concentrations (ppm or μg/m^3)

Pollutant	Monitoring Station Location	Averaging Period	Units	2006	2007	2008	2009	2010	2011	Limiting AAQS
Ozone	Jean, NV	1 hour	ppm	0.092	0.092	0.087	0.082	0.082	.085	0.09
Ozone	Jean, NV	8 hours	ppm	0.083	0.088	0.078	0.079	0.076	.078	0.07
PM10 [a]	Jean, NV	24 hours	μg/m	62	60	96	81.3	49	79	50
PM10 [a, b]	Jean, NV	Annual	μg/m	12.1	12.7	14	12.4	8.5	*	20
PM2.5[c]	Jean, NV	24 hours	μg/m	9	9	13	11	10	12.6	35
PM2.5	Jean, NV	Annual	μg/m	3.52	4.0	4.9	4.0	3.5	*	12
CO	Barstow,	1 hour	ppm	3.5	1.4	1.4	1.2	1.3	4.4	20
CO	Barstow,	8 hours	ppm	1.19	0.7	1.23	0.089	0.089	1.35	9.0
NO_2	Trona, CA	1 hour	ppm	0.050	0.055	0.062	0.049	0.052	0.049	0.18
NO_2	Trona, CA	1 hour (98th	ppm	.042	.046	.043	.039	.043	0.043	.100
NO_2	Trona, CA	Annual	ppm	0.005	0.004	0.004	0.004	0.005	*	0.03
SO_2	Trona, CA	1 hour	ppm	0.033	0.014	0.036	0.011	*	0.001	0.25
SO_2	Trona, CA	24 hours	ppm	0.004	0.005	0.005	0.003	0.003	0.006	0.04
SO_2	Trona, CA	Annual	ppm	0.000	0.000	0.000	0.001	0.001	0.001	0.03

Source: ARB 2012, U.S. EPA 2012 Notes: * insufficient data available to determine the value.
a. Exceptional PM concentration events, such as those caused by windstorms are excluded in the data presented.
b. Annual average data is federal data and may not exactly represent California annual average.
c. The U.S. EPA database used for retrieval of the PM2.5 data did not allow direct determination of the calculated 98th percentile, which is the basis of the standard, so the closest proxy (third highest values) are presented.

Therefore, the air quality modeling impacts of the HHSEGS to the surrounding area reached their conclusions by removing layers of PM_{10} data from the analysis, citing the local data was "strongly affected by windblown dust" and additional PM_{10} data was removed again due to "windstorms" and as such, ambient air quality and impacts from the HHSEGS to the surrounding environment (a.k.a, Pahrump Valley) have not been adequately represented thus far.

This fact is vaguely alluded to in the FSA at the end of a rather confusing description of air quality modeling parameters and criteria described as;

> *"Ambient air quality monitoring data for ozone, PM10, PM2.5, CO, NO2, and SO2, compared to most restrictive applicable standards for the years between 2006 through 2011 (the last year that the complete annual data is currently available) at the most representative monitoring stations for each pollutant are shown in* ***Air Quality Table 4.*** *All ozone, PM10, and PM2.5 (up through 2011) data shown are from the Jean, Nevada, monitoring station located approximately 34 miles southeast of the project site. All CO data are from the Barstow, CA monitoring station located approximately 97 miles southwest of the project site. All SOx and NOx data are from the Trona, CA monitoring station located approximately 82 miles west southwest of the project site. Besides the Jean monitoring station, which provides reasonably near ozone and particulate monitoring data, available monitoring stations for CO, NOx or SOx either are located just under a hundred miles away from the site, or in the case of Las Vegas, are otherwise not representative due to their urban location. Therefore, staff chose the GBVAB monitoring locations located in Barstow and Trona because they best represent the air quality conditions at the site. Staff expects that the background ambient concentrations for both of these pollutants to be relatively low at the project site due to its remote location. <u>However, due to the relatively large distances from the proposed site, there is a reduced overall confidence in the representativeness of data from these monitoring stations."</u>* [emphasis added] (*See* HHSEGS FSA, Air Quality, p. 4.1-6, 4.1-7)

With respect to confidence levels of PM_{10} concentrations and construction impacts at the proposed HHSEGS site, the Preliminary Staff Assessment (PSA) made the following statement regarding the Applicant's construction emissions calculations but was subsequently removed in the FSA.

> *"These emission estimates appear reasonable in terms of the onsite equipment and offsite vehicle use and the offsite vehicle fugitive dust emissions. <u>However, the onsite fugitive dust emissions estimate may be underestimated given the amount of activity on the site</u> and appropriate level of control for the applicant's proposed mitigation measures (specifically watering unpaved roads). Staff recommends additional mitigation measures, specifically the use of soil binders on unpaved roads and other inactive disturbed surfaces during construction, so that the applicant's fugitive dust emissions estimate and associated impact analysis will be reasonable for this project."* [emphasis added] (*See* HHSEGS PSA, Air Quality Table 7, HHSEGS Construction Emissions, p. 4.1-16)

Based on these facts and my experience in the area, it is my opinion that the air quality modeling data used to determine project impacts failed to utilize data that "best represented" air quality found within the proposed sites six-mile buffer zone of Pahrump. Instead, data substitutions of less representative areas were used to analyze the projects impacts to local air quality, specifically PM_{10} emissions.

Therefore, determinations of significance are not based on adequate analysis of air quality conditions in the surrounding environment of the proposed HHSEGS site and in the Pahrump Valley but instead, have presented PM_{10} conclusions for the proposed projects impacts to "somewhere else". Therefore, conclusions regarding project impacts to local air quality have been rendered meaningless due to the lack of adequate site-specific representation.

However, Staff has attempted to resolve this issue by mandating fugitive dust mitigation that will include watering the site down (requiring an estimated 20 AFY of water), the liberal and consistent use of chemical dust suppressants throughout the site over the life of the project and slow vehicle speeds but I significant reservations regarding the wisdom of this mitigation as it seems to cut ones nose off to spite one's face.

A. Dust Suppressants: Limitations, Costs and Lack of Long Term Data

If approved, the HHSEGS project site will require extensive use of chemical dust suppressants to reduce both fugitive dust and soil erosion throughout the life of the project. Estimates on what kind of product, depth of product and frequency of product application will remain undisclosed to the public.

Staff is recommending dust suppressants that have been pre-certified by CARB or the EPA. Currently, the only dust suppressant approved by CARB that could be considered suitable for the site is Soil-Sement™.

Soil-Sement™ precertification was only evaluated for the effectiveness in suppressing fugitive dust emissions from unpaved roads consisting of a silty, sandy loam soil. CARB will not vouch for its integrity in any other kind of soil. Soil-Sement™ was not recommended for aggregates that have low abrasion resistance such as much of the soil at the proposed site (i.e., those that will crush and form new dust under the weight of vehicles.) Also, based on the literature provided, in very arid environments, a variety of products may also be required to precondition the soils to accept Soil-Sement™.

What will the price of all this site modification be? No one knows and nobody's asking but to provide one small example, according to one federal contract I found with the company that makes Soil-Sement™, Midwest Industrial Supply, Inc., it costs $25,420.00 to cover 410,000 square feet using one of their products (however, the product was not Soil-Sement™ but Road Pro™).(1)

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(1) Exhibit 735, Midwest Industrial Supply, Inc., FY09, Award #4.

Using the square footage provided by FSA Soils and Surface section(2), the square footage of dirt roads estimated to require chemical dust suppressant to reduce soil loss (via fugitive dust and/or erosion) equals 8,241,552 sq. ft. Based on the pricing of the federal contract, total site application of Soil-Sement™ or a similar product is estimated to be over a half a million dollars per application. If the product is applied twice per year, it could be over $1,000,000 dollars in operating costs annually just for the dust suppressants. Given the soil conditions at the site, there will probably be "preconditioning" products required as well.

Generally, there also seems to be a lack of data regarding potential long-term effects. Most of the products I reviewed had been tested once or twice, submitted to regulator agencies for approval and were never analyzed or studied again.

2. Solar Solutions & Cumulative Impacts

Many of the BMPs utilized today are a result of "lessons learned" from poor agriculture practices in the Midwest that helped contribute to the era known as the Dust Bowl. Mistakes made included plowing large areas without planting crops that left vast areas of soils exposed as well as failing to have adequate barriers strategically placed in order to control high levels of erosion, soil loss and airborne particulate matter.

> *"During the five years before the Dust Bowl began, more than 5 million acres (2 million hectares) of new farmland had been plowed, although not all of it had been used [source: CSA]. Rampant overproduction of wheat crops, coupled with over plowing of the fields, led to unforeseen consequences when massive droughts began to set in during the early 1930s. As the winds began to blow against the parched landscape, uncovered patches of farmland simply blew away entirely. This was the beginning of the Dust Bowl, which actually comprised four separate drought periods that happened in quick succession [source: Univ. of Nebraska Lincoln]."* (3)

Today, modern techniques boast that one of the deterrents used in modern agriculture to prevent recreating another dust bowl is through avoiding the creation of large patches of barren, heavily disturbed soil.

As of December 2010, the BLM reported there were "*147 solar applications pending. Of those, 104, comprising 1 million acres, were "first-in-line" applications*".(4) This is the most recent statistics offered by BLM on potential cumulative impacts to acreage that may be affected by utility scale solar project.

.(2) HHSEGS FSA, Soils & Surface Waters, Response To Public Comments, Cindy MacDonald, Air Resources 10.29, p. 4.9-68.

(3) "What Caused The Dust Bowl?", available online at: http://curiosity.discovery.com/question/what-caused-the-dust-bowl

(4) BLM Solar Fact Sheet, available online at: http://www.blm.gov/pgdata/etc/medialib/blm/wo/MINERALS__REALTY__AND_RESOURCE_PROTECTION_/energy/solar_and_wind.Par.56734.File.dat/10factsheet_Solar_120810.pdf

According to a document recently released by Solar Energy Industries Association®, as of December 13, 2012, there are 30,265 Utility-Scale Solar Projects operating, under construction or under development in the United States. Of these, California is home to almost 20,000 or 66% of the national total. Unfortunately, the affected acreage of these projects is not provided. (*See* Exhibit 742)

As utility-scale solar plants are approved and begin to cover the desert floors with vast expanses of barren, exposed and/or heavily disturbed soils, each project's potential impact to soil loss is deemed "mitigated" by wide-spread reliance on chemical dust suppressant and/or through the use of our most precious resource – water.

If these measures fail over the life of these projects, cumulative impacts may be greater than just creating significant air quality deterioration. A recent study on atmospheric contributions of particulate matter indicate airborne dust of significant magnitude as occurred during the Dust Bowl resulted in temporarily altering the regions weather patterns, significantly exasperated drought conditions and prolonged the disaster.

> *"Human-induced land degradation is likely to have not only contributed to the dust storms of the 1930s but also amplified the drought, and these together turned a modest SST forced drought into one of the worst environmental disasters the U.S. has experienced."* (5)

Given my current understanding of the nature of the AFC proceedings, the information presented here will be summarily dismissed due to site-specific analysis – despite the substantive requirements of CEQA.

There will most likely never be an AFC filed where the Commission will reject the application simply because the project would represent an unknown "tipping point" in cumulative impacts to soil degradation and disturbance in the Southwest. But if deployment of utility scale, land intensive solar projects continues at the current rate, there *will be* a project is the tipping point, even if it is never realized at the time of its approval.

The hinge pin to preventing it all rests solely on the use of chemical dust suppressants and the energy it takes to manufacture them, apply them, reapply them and so on. This approach seems counter productive towards the whole "renewable and sustainable" goals being propagated by industrialized renewable energy enthusiasts.

However, if the Applicant is right and the dust from Pahrump's development efforts, beginning in the 1990's through mid-2006, is still strongly affecting the air quality data to date, then we better hope there's no break in the supply of dust suppressant for a very, very long time.

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(5) "Amplification of the North American "Dust Bowl" drought through human-induced land degradation", Cook et al.

9. GREENHOUSE GASES

TESTIMONY OF C.R. MACDONALD, INTERVENOR

I. INTRODUCTION

A. Qualifications: Committee Order Granting Petition To Intervene

B. Prior Filings: In addition to the statements herein, this testimony includes by reference the following documents submitted in this proceeding:

Exhibits 700, 702, 703, 706, 711, 712

C. Additional Filings:

Exhibits 721, 747

D. Documents Prepared By Others:

Exhibits 714, 726, 727, 735, 736, 740, 742

It is my intent to invoke the requirement that the Applicant bear the burden of proof regarding the information provided in the HHSEGS AFC and subsequent documents throughout this proceeding. This will include requesting where the Applicant has addressed the issues previously raised and to provide evidence that supports the statements and conclusions presented in the AFC and throughout these proceedings.

It is also my intent to invoke Staff's requirements under CEQA and Title 20 to provide evidence of where they have addressed issues previously raised and to provide evidence that supports the statements and conclusions presented in the PSA and/or FSA.

Therefore, I will be focusing on many of the issues raised throughout these proceedings during the Evidentiary Hearings and consider much of my previous submissions as the foundation of my testimony.

To the best of my knowledge, all of the facts contained in this testimony are true and correct or were true and correct at the time they were previously filed. With respect to documents prepared by others, I have endeavored to find the most credible source of facts to incorporate by reference in these proceedings but can make no sworn testimony as to their truth or accuracy on the preparer's behalf. To the extent this testimony contains opinions, such opinions are my own. I make these statements, and render these opinions freely and under oath for the purpose of constituting sworn testimony in this proceeding.

II. PROPOSED FINDING OF FACTS

- In the GBUAPCD FDOC, the "power plant" has been solely defined from the natural gas portion of the facilities. Specifically, the MWMs and their activities are being excluded from emissions reporting requirements and limitations in the PTO, even though they will be responsible for 33% of the facilities green house gas emissions and potentially significant particulate matter emissions (dust) over the projects lifetime. If utility scale renewable power plants are going to be constructed and operated on a mass scale, regulators must recognize, respond and incorporate new emissions standards to meet the challenge.

- Failure to recognize the emissions and GHG contributions of the MWMs at the proposed HHSEGS is not in conformance with California's renewable or GHG reduction goals.

- The CEC Staff did an excellent job in both recognizing and requiring data regarding the emissions and GHG contributions of the MWMs, equipment deemed critical for maintaining the renewable portion of the facility. The CEC should continue this trend by also recognizing the emissions and GHG contributions of the MWMs through requiring as a COC of the proposed HHSEGS and future facilities and that this dedicated equipment inextricably tied to the renewable portion of the facility's operations be incorporated by;

    a) Defining renewable power plants emissions based on all dedicated components and/or equipment required to operate and maintain the power plant, including the renewable portions of the facility, and

    b) Require emissions from dedicated components and/or equipment necessary for the production of renewable energy – including mobile sources, to be incorporated in the emissions reporting and limitations requirements in the Permit To Operate.

- Incorporating GHG emissions produced by dedicated equipment such as the MWMs deemed critical for renewable power production at facilities such as the proposed HHSEGS allows for the honest accounting and reporting of GHG emissions. This would be consistent with California's GHG reduction goals and efforts to reduce global warming impacts resulting from GHG's. It may also encourage alternative fuel use such as bio-diesel and bio-gas.

III. SUMMARY OF TESTIMONY

1. MWMs Will Be Responsible For 33% of the HHSEGS GHG Emissions

The FSA states that;

> *8. The maximum annual CO_2 emissions from HHSEGS operation would be 61,628 [24] MTCO2, which constitutes an emissions performance factor of 0.043 [25] MTCO2 / MWh.*
>
> *[24] Includes mirror washing – otherwise the maximum emission is 40,481 MTCO2E*
> *[25] Includes mirror washing – otherwise around 0.028 MTCO2.MWh without including mirror washing emission estimates*

As such, MWM emissions will be responsible for approximately 33% of the HHSEGS GHG emissions. These emissions should not be allowed exclusion from the reporting requirements and limitations in the Permit To Operate.

2. Cumulative Impacts of Solar Development

Most solar projects will require some form of mobile equipment to clean the panels, mirrors, troughs, etc.

According to a document recently released by Solar Energy Industries Association®, as of December 13, 2012, there are 30,265 Utility-Scale Solar Projects operating, under construction or under development in the United States. Of these, California is home to almost 20,000 or 66% of the national total. Unfortunately, the affected acreage of these projects is not provided. (*See* Exhibit 742)

Cumulative emissions from equipment required to maintain these solar projects should be acknowledged, analyzed, and incorporated in permitting requirements.

10. PUBLIC HEALTH

TESTIMONY OF C.R. MACDONALD, INTERVENOR

I. INTRODUCTION

A. Qualifications: Committee Order Granting Petition To Intervene

B. Prior Filings: In addition to the statements herein, this testimony includes by reference the following documents submitted in this proceeding:

Exhibits 700, 702, 703, 704, 706, 709, 711, 712, 713

C. Additional Filings:

Exhibits 715, 718, 719, 720, 721, 747

D. Documents Prepared By Others:

Exhibits 714, 724, 726, 727, 736, 740, 741, 742, 743, 744, 746

It is my intent to invoke the requirement that the Applicant bear the burden of proof regarding the information provided in the HHSEGS AFC and subsequent documents throughout this proceeding. This will include requesting where the Applicant has addressed the issues previously raised and to provide evidence that supports the statements and conclusions presented in the AFC and throughout these proceedings.

It is also my intent to invoke Staff's requirements under CEQA and Title 20 to provide evidence of where they have addressed issues previously raised and to provide evidence that supports the statements and conclusions presented in the PSA and/or FSA.

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II. PROPOSED FINDING OF FACTS

- Expecting the residents, visitors, recreationalists and commercial enterprises in the vicinity of the proposed HHSEGS to both know about the potential risk of Valley Fever as well as burdening them with having to locate, purchase and stock special masks to protect themselves from getting sick in order to accommodate the proposed HHSEGS and California's RPS goals is not mitigation.

- Noise pollution can cause health problems.

- Senior citizens in the area should be allowed to receive free eye protection via safety glasses from the owners.

11. WORKER SAFETY/FIRE PROTECTION

TESTIMONY OF C.R. MACDONALD, INTERVENOR

I. INTRODUCTION

A. Qualifications: Committee Order Granting Petition To Intervene

B. Prior Filings: In addition to the statements herein, this testimony includes by reference the following documents submitted in this proceeding:

Exhibit's 700, 702

C. Additional Filings:

Exhibit's 719, 747

D. Documents Prepared By Others:

Exhibit's 714, 726, 744, 745, 746

It is my intent to invoke the requirement that the Applicant bear the burden of proof regarding the information provided in the HHSEGS AFC and subsequent documents throughout this proceeding. This will include requesting where the Applicant has addressed the issues previously raised and to provide evidence that supports the statements and conclusions presented in the AFC and throughout these proceedings.

It is also my intent to invoke Staff's requirements under CEQA and Title 20 to provide evidence of where they have addressed issues previously raised and to provide evidence that supports the statements and conclusions presented in the PSA and/or FSA.

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II. PROPOSED FINDING OF FACTS

- Establishing an industrial scale power plant with almost 5 square miles of mirrors, a receiver that reaches temperatures of 1300F, natural gas pipelines, high voltage transmission lines and a variety of hazardous materials without providing adequate fire and emergency services for residents in the area is public endangerment.

- I have seen no fire protection plan that covers the entirety of the HHSEGS site. For example, what if dried vegetation catches fire within the solar fields, how is it going to be stopped so it can't get to our homes?

- The fire protection services in Charleston View are supported by voluntaries only with limited residences and adequate labor pool. It will likely be very difficult find capable and willing individuals who live already live in the area and over the project's lifetime.

Photo 1

Banner advertises for SIFPD volunteers at Orchard Well. 1/02/13

12. HAZARDOUS MATERIALS MANAGEMENT

TESTIMONY OF C.R. MACDONALD, INTERVENOR

I. INTRODUCTION

A. Qualifications: Committee Order Granting Petition To Intervene

B. Prior Filings: In addition to the statements herein, this testimony includes by reference the following documents submitted in this proceeding:

Exhibits 700, 702, 703, 708, 709, 711, 712, 713,

C. Additional Filings:

Exhibits 718, 719, 720, 729, 730, 731, 747

D. Documents Prepared By Others:

Exhibits 724, 733, 734, 740, 744, 746

It is my intent to invoke the requirement that the Applicant bear the burden of proof regarding the information provided in the HHSEGS AFC and subsequent documents throughout this proceeding. This will include requesting where the Applicant has addressed the issues previously raised and to provide evidence that supports the statements and conclusions presented in the AFC and throughout these proceedings.

It is also my intent to invoke Staff's requirements under CEQA and Title 20 to provide evidence of where they have addressed issues previously raised and to provide evidence that supports the statements and conclusions presented in the PSA and/or FSA.

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13. WASTE MANAGEMENT

TESTIMONY OF C.R. MACDONALD, INTERVENOR

I. INTRODUCTION

A. Qualifications: Committee Order Granting Petition To Intervene

B. Prior Filings: In addition to the statements herein, this testimony includes by reference the following documents submitted in this proceeding:

Exhibits 700, 702,

C. Additional Filings:

Exhibits 718, 719, 720, 747

D. Documents Prepared By Others:

Exhibits 714

It is my intent to invoke the requirement that the Applicant bear the burden of proof regarding the information provided in the HHSEGS AFC and subsequent documents throughout this proceeding. This will include requesting where the Applicant has addressed the issues previously raised and to provide evidence that supports the statements and conclusions presented in the AFC and throughout these proceedings.

It is also my intent to invoke Staff's requirements under CEQA and Title 20 to provide evidence of where they have addressed issues previously raised and to provide evidence that supports the statements and conclusions presented in the PSA and/or FSA.

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14. BIOLOGICAL RESOURCES

TESTIMONY OF C.R. MACDONALD, INTERVENOR

I. INTRODUCTION

A. Qualifications: Committee Order Granting Petition To Intervene

B. Prior Filings: In addition to the statements herein, this testimony includes by reference the following documents submitted in this proceeding:

Exhibits 700, 702, 709, 710, 711, 712, 738, 739

C. Additional Filings:

Exhibits 715, 718, 719, 720, 721, 747

D. Documents Prepared By Others:

Exhibits 714, 724, 733, 734, 741, 742, 743

It is my intent to invoke the requirement that the Applicant bear the burden of proof regarding the information provided in the HHSEGS AFC and subsequent documents throughout this proceeding. This will include requesting where the Applicant has addressed the issues previously raised and to provide evidence that supports the statements and conclusions presented in the AFC and throughout these proceedings.

It is also my intent to invoke Staff's requirements under CEQA and Title 20 to provide evidence of where they have addressed issues previously raised and to provide evidence that supports the statements and conclusions presented in the PSA and/or FSA.

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II. PROPOSED FINDING OF FACTS

- Screening the proposed HHSEGS perimeter with trees to block the views and add a layer of protection to passing motorists increase risks to avian species as "trees" are the preferred habitat of most birds. When trees are combined with the reported "lake like reflection" of the heliostat fields, it may also serve to increase migratory bird injuries or fatalities. Trees will also increase the water demands of the proposed project, though to what extent has remained undisclosed. As such, other methods of screening the proposed projects boundaries visual degradation must be incorporated in the COC's instead.

- Compliance with California Fish & Game Code 4600 has not yet been addressed or mitigated.

- Species occurrence, impacts, significance determinations and/or potential mitigation measures for *Aphonopelma Mojave* have not been addressed.

- Cumulative loss of desert tortoise habitat in California and throughout the Southwest has not been described, reported on or issued a determination of significant.

- Gila monsters have been sighted on our property, approximately 1 mile away from the proposed HHSEGS's boundaries.

- The Charleston View area has been a stopover for migratory birds for decades.

- The Charleston View area and Pahrump Valley is home to a great deal of raptors that have been routinely seen for decades.

- There are concerns that project construction will result in wide spread displacement of snake populations, the most deadly of which is the Mojave Green, causing increased risks to domestic animals and residents in the Charleston View area.

15. SOIL AND WATER RESOURCES

TESTIMONY OF C.R. MACDONALD, INTERVENOR

I. INTRODUCTION

A. Qualifications: Committee Order Granting Petition To Intervene

B. Prior Filings: In addition to the statements herein, this testimony includes by reference the following documents submitted in this proceeding:

Exhibits 700, 702, 703, 706, 710, 711, 712

C. Additional Filings:

Exhibits 718, 719, 721, 729, 730, 731, 747

D. Documents Prepared By Others:

Exhibits 726, 728, 733, 734, 735, 736, 744, 746

It is my intent to invoke the requirement that the Applicant bear the burden of proof regarding the information provided in the HHSEGS AFC and subsequent documents throughout this proceeding. This will include requesting where the Applicant has addressed the issues previously raised and to provide evidence that supports the statements and conclusions presented in the AFC and throughout these proceedings.

It is also my intent to invoke Staff's requirements under CEQA and Title 20 to provide evidence of where they have addressed issues previously raised and to provide evidence that supports the statements and conclusions presented in the PSA and/or FSA.

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II. PROPOSED FINDING OF FACTS

- The source of the proposed HHSEGS's water supply cannot be stated with any degree of confidence. While the Pahrump Valley Basin aquifer is cited as the source, data is inadequate to sufficiently address unanswered question regarding source, recharge sources and rates, depths to water levels, and a potential impermeable barrier or semi-permeable barrier at the California/Nevada State line.

- Cumulative impact to local wells as a result of the construction and operational phase of the proposed HHSEGS over its 25-year lifespan will be approximately a 95 ft. drop in our water levels, which would effectively dry up most of the domestic wells within the area and cause heavy impacts to well water depths by the completion of the construction phase.

- The only effective mitigation that protects public trust resources is to require a COC that will mandate project pumping must cease if it begins to impact water levels at the site. Based on the historical water level declines in the area, it will take less than a year of pumping to trigger critical water level thresholds and required water pumping activities to cease.

- If a COC is imposed mandating cessation of project operations due to triggering critical water level thresholds, such an imposed condition would make the proposed HHSEGS wholly infeasible because it cannot be considered a reliable source of power over its lifetime.

- Water demands of the proposed project cannot be mitigated to "less than significant" in the existing environment. If COC's place restrictions on water levels associated with project pumping to protect the environment and local residents, the proposed project cannot be considered feasible as a reliable power supply. If COC's do not place restrictions on project pumping, significant impacts to water dependent resources in the area will be left highly vulnerable and inadequately protected and thereby, impacts will be left unmitigated. As such, it is clear the project site is not suitable for the proposed HHSEGS as there are no measures that can protect both the environment and its public trust resources that can *also* be capable of ensuring reliable power production over the project's lifetime.

- The project area is prone to extensive flooding. To potentially offset flooding impacts, the FSA has recommended the use of dry or injection wells throughout the project site that will accelerate the transfer of project site pollutants to the local water supply. Statistics regarding LORS effectiveness in protecting California's water are abysmal. Historical and recent reports of statewide decline in water quality indicate current regulators mitigation and enforcement efforts are inadequate.

- The soils in the proposed siting location are ill suited for the proposed project and will require extensive modifications throughout the site to make it even marginally suitable or feasible for operations. The area is prone to expansive and collapsing soils, super thick mud when wet and super fine power when dry and disturbed. Required modifications will include extensive use of fill, chemical dust suppressant and wide-spread, extensive changes to the existing topography throughout the site that will ultimately be very expensive to construct and maintain. Ultimately, these costs will be borne by the ratepayer.

- Currently, the only dust suppressant approved by CARB that could be considered suitable for the site is Soil-Sement™, which was only evaluated for the effectiveness of Soil-Sement™ in suppressing fugitive dust emissions from unpaved roads consisting of a silty, sandy loam soil. CARB will not vouch for its integrity in other kind of soil. Soil-Sement™ was not recommended on aggregates that have low abrasion resistance such as much of the soil at the proposed site (i.e., those that will crush and form new dust under the weight of vehicles.) Also, based on the literature provided, in very arid environments, a variety of products may also be required to precondition the soils to accept Soil-Sement™.

- The cost of utilizing chemical dust suppressants to reduce soils loss via fugitive dust and soil erosion are conservatively estimated to cost between $500,000 to $1,000,000 dollars annually.

III. SUMMARY OF TESTIMONY

SECTION I: WATER RESOURCES

1. WATER SUPPLY

A. Predicted Water Level Declines To Local Well Owners In Charleston View

The source of the proposed HHSEGS's water supply cannot be stated with any degree of confidence. While the Pahrump Valley Basin aquifer is cited as the source, data is inadequate to sufficiently address unanswered question regarding source, recharge sources and rates, depths to water levels, and a potential impermeable barrier or semi-permeable barrier at the California/Nevada State line.

The Pahrump Valley aquifer on the Nevada "side" of the basin has long been documented as being in a state of overdraft, decline, and over committed. Much less is known about the California side, where our wells are located - if it is a separate water table, connected water table or both.

Currently, there is much heated debate between the Applicant and Staff regarding the state, source and potential impacts of the proposed project's water use on both local water supply and other water dependent resources such as mesquite communities, biological resources, local residents and the nearby Area of Critical Environmental Concern (ACEC), Stump Springs.

However, based on the evidence and historical trends of well water data collected at the proposed project site, what can be stated with a reasonable degree of confidence is the proposed HHSEGS will most likely heavily impact local residents water supply on the California side of the basin and most likely dry up the majority of the domestic wells without intervention. This statement is based on the following facts.

The Orchard well has been in a steady state of decline since 1959 with water levels dropping on average at 0.37 feet per year.(1) The Hidden Hills irrigation well experienced a significant decline in water levels in the 1980's, levels that have never recovered and since the 1970's, has experienced a steady state of decline on average of 0.25 feet per year.(2)

The FSA estimated average annual water use in the area is predominately from residents of Charleston View, estimated at about 17 AFY.(3) The majority of these wells are located within a half a mile from Orchard Well.

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(1) HHSEGS FSA, Water Supply, p. 4.14-12.
(2) HHSEGS FSA, Water Supply, p. 4.14-12.
(3) HHSEGS FSA, Water Supply, p. 4.14-7, 4.14-8.

Based on the known facts, simple arithmetic can reasonably calculate the results of the proposed HHSEGS's impact to local well owners water supply during the construction and operational phase of the project, regardless of whether there is an impermeable or semi-permeable barrier at the State line.

The proposed HHSEGS estimated water use during the construction portion of the project is 288 AFY; the operational phase is 140 AFY. The current use is estimated at 17 AFY for Charleston View residents, the majority of which are located within a half a mile of Orchard Well.

Construction Phase

288 AFY divided by the current use of 17 AFY = 16.9
16.9 multiplied by 0.37 ft of annual decline at Orchard Well = 6.26 ft
6.26 multiplied by 3 years = 18.78 ft

Therefore, during the construction phase of the proposed project, it is reasonable to assume water levels will decline in the first year of construction by 6.26 ft and 19 ft. by completion of the construction phase of the project.

Operational Phase

140 AFY divided by the current use of 17 AFY = 8.2
8.2 multiplied by 0.37 ft of annual decline at Orchard Well = 3 ft
3 ft. multiplied by 25 years = 75.85 ft.

Therefore, during the operational phase of the proposed project, it is reasonable to assume water levels will decline in the area by 3 ft. per year during operations and 76 ft. during the life of the project.

Cumulative impact to local wells as a result of the construction and operational phase of the proposed HHSEGS over its 25-year lifespan will be approximately a 95 ft. drop in our water levels, which would effectively dry up most of the domestic wells within the area and cause heavy impacts to well water depths by the completion of the construction phase.

As a result, the water supply is insufficient to support the proposed HHSEGS without causing significant damage to local area water resources. Offsetting these impacts will not be mitigated by requiring water rights to be retired on the Nevada side of the border as steady declines are already noted from insignificant use by local well owners residing within a half a mile of Orchard Well.

Dropping the water levels and/or drying up our wells will severely disrupt and/or end our ability to live in the area unless significantly deeper wells are drilled, which may include larger pumps for water draw and increased electrical consumption.

Local residents should not be so severely burdened simply because someone wants to build something that is ill suited for the area. In order to accommodate the Applicant's needs, we will have to enlist in an extensive and exhaustive monitoring program to save our water supply as well as being forced to become dependent on the Applicant over the life of the project.

What other business license forces surrounding businesses and residents to become so subordinated to a singular businesses needs? Or, what happens if we should ever choose to sell our property? Do we tell the perspective buyers, "Oh, by the way, the well is about to run dry thanks to the solar project down the street and over its lifetime, it will drop the water levels about a 100 ft., so you're probably going to have to drill new wells if you want water since you weren't here to 'sign up' for the monitoring program."

The only effective mitigation that shifts the burdens from our shoulders to the Applicant's is requiring a COC that will mandate project pumping must cease if it begins to impact water levels at the site. This is also the only mitigation capable of protecting other water dependent resources such as local mesquites, wildlife and Stump Springs.

However, based on the historical water level declines in the area, it will take less than a year of pumping to trigger critical water level thresholds.

If the Applicant wants to dispute these facts, has a high degree of confidence that the local water supply is more than sufficient to support the project, then that confidence should be reflected in agreeing to COC's that protect local water levels and water dependent resources. Yet, such an imposed condition makes the proposed HHSEGS wholly infeasible because it cannot be considered a reliable source of power since it can be shut down at any time over its lifetime due to impacted and declining water levels.

Therefore, the water demands of the proposed project cannot be mitigated to "less than significant". If COC's place restrictions on water levels associated with project pumping to protect the environment and local residents, the proposed project cannot be considered feasible as a reliable power supply. If COC's do not place restrictions on project pumping, significant impacts to water dependent resources in the area will be left highly vulnerable and inadequately protected from the proposed HHSEGS.

As such, it is clear that the project site is not suitable for the proposed HHSEGS as there are no measures that can protect both the environment and the public that also are *also* capable of ensuring reliable power production over the project's lifetime.

B. Water Supply Contamination Via Dry Or Injection Wells

The Charleston View area and the proposed HHSEGS project site is prone to heavy flooding. As mitigation for potential flood impacts, Staff has proposed the use of dry water or injection wells to capture onsite floodwaters in SOILS & SURFACE WATERS-6.

In the FSA section on Worker Safety and Fire Management, Staff discusses protecting workers from herbicide use and herbicide storage at the project site maintaining that, with appropriate training on herbicide application and storage methods, the chances will be reduced that site herbicide use will contaminate either surface water or groundwater. (4)

Based on my research, dry wells or injection wells will be placed *above* the local water table. As such, these wells will inject surface waters from the proposed project - and all of the contaminants and hazardous materials associated with it- above our water table thereby allowing it to "leach" back into the water supply.

While its great that the Water Supply section recommends vigorous water quality testing as part of the COC's, reporting that the water is now contaminated doesn't do much for ensuring the water doesn't get contaminated in the first place.

The HHSEGS will be responsible for transporting and introducing huge quantities of chemicals, pollutants and hazardous substances to the project site and surrounding environment. Though the quantities of these materials are often measured in "tons", the applicant consistently maintains these introductions will be "less than significant" to local resources such as air, soil, vegetation and water.

In addition to the currently listed chemicals, pollutants and hazardous substances required for the construction and operations of the HHSEGS, it is also quite reasonable to predict the introduction of additional unlisted substances of unknown qualities and quantities. These will include chemical soil stabilizers, chemical dust suppressants, chemical soil binders and fills, as well as the large scale use of herbicides and pesticides that will become necessary as a direct result of the increased moisture made available to soil and vegetative resources due to continuous mirror washing activities.

While the proposed HHSEGS site promotes its environmental impacts as less than significant, statistics related to the affect of industrialization on human health and the environment state otherwise, especially so in California.

With respect to the California Environmental Protection Agency's ability to prevent environmental contamination and regulate hazardous substances, it has what can only be described as an abysmal track record.

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(4) HHSEGS FSA, Worker Safety and Fire Protection, p. 4.15-9.

Just within the narrow band of researching the EPA's Superfund Sites, California was by far and away the leader in environmental contamination for its region. Of the 153 Superfund sites listed on the EPA's website for Region 9(5), which include Arizona, California, Nevada, Hawaii, the Pacific Islands and Tribal Nations, California was responsible for 110 of them or 72% - almost three times the amount of all the other areas combined. (See Attachment I)

Some of California's Superfund sites are so vast, the size of the areas contamination could not even be quantified. In some of the areas where the size of the contamination *could be* quantified, it would have such titles as "San Fernando and San Gabriel Valley – All Areas" or "Modesto Groundwater Contamination" for the entire the city of Modesto, the "Newmark Groundwater Contamination" in San Bernardino or groundwater contamination in Santa Clara that may affect 1.4 million people

In almost all instances regarding California's Superfund sites, groundwater contamination was cited as being a primary concern and it's only getting worse. In the NRDC article "California's Contaminated Groundwater: Is The State Minding The Store?"(6) published almost ten years ago, more than one third of the aerial extent of groundwater assessed in California was so polluted that it could not fully support at least one of its intended uses, and at least 40 percent was either impaired by pollution or threatened with impairment.

A decade later, a recently released report(7) from the EPA in October 2011, found toxicity levels in California waters increased by 170 percent from 2006 to 2010.

Unlike surface water pollution, underground water contamination may be harder to detect.

An ounce of prevention is worth a pound of cure.

(5) EPA, Region 9, Superfund Sites,http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/vwsoalphabetic?openview
(6) California's Contaminated Groundwater: Is the State Minding The Store?" Natural Resources Defense Council, http://www.nrdc.org/water/pollution/ccg/execsum.asp
(7) "California Water Pollution Not Getting Any Better, Study Finds" at: http://www.ibtimes.com/articles/229743/20111012/california-water-pollution.htm

California's Environmental Protection Agency's less than stellar performance incites little confidence in their ability to prevent environmental contamination, regulate hazardous wastes or protect local residents from industrial poisoning and groundwater contamination that may result from the construction and operation of the HHSEGS.

Along side of the CEPA's involvement with regulating hazardous substances, there is also the California Department of Toxic Substances Control (DTCS). In 1999, a survey(8) was compiled by Public Employees For Environmental Responsibility (PEER) of the DTSC in order help gauge employees views on its effectiveness.

Of the responses, 60% disagreed or strongly disagreed that the DTSC had adequate funding to fulfill its mission of environmental protection, 45% did not believe it was effective, 71% felt their resources were not effectively utilized, 61% felt executives placed self-protection over environmental protection, 50% did not believe that the best scientific and technical data was used in permitting, enforcement, technology certification and site mitigation decisions, 68% reported managers overruled scientific/technical recommendations for political reasons, 48% did not feel management was committed to strong enforcement of environmental laws and regulations in the field overall, 52% lacked confidence in DTSC leadership, 63% reported being directed to ignore an environmental rule or regulation by their supervisors, up to 63% feared job-retaliation for reporting problems or discrepancies, and between 36-40% of the employees knew of instances were a staffer has been re-assigned for doing their job "too well" on a controversial project.

I suspect a California DTSC employee survey today would have even higher percentages of overall dissatisfaction on all counts.

As for the EPA itself, since its inception it has always been subjected to political and economic pressures from industry, which has resulted in weakening its effectiveness. However, over the last decade there has been accelerated disparity between the wealthy industrial giants (sometimes known as "job creators") ability to excessively influence and/or corrupt the political and decision-making processes and environmental justice.

In today's current political and economic climate, the EPA has become a high level target for total elimination by some members of Congress who cite excessive environmental regulations and reviews are costing America jobs. While the EPA is now being openly attacked in efforts to dismantle it, it has already been subjected to relentless pressure internally as well.

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(8) 1999 Survey of the California Department of Toxic Substances Control, available at: http://www.peer.org/pubs/surveys/1999_ca_toxic.pdf

In 2010, PEER completed a survey(9) of the EPA Criminal Investigation Division's agents, who reported even higher levels of discouragement regarding their ability to effectively enforce or prosecute critical environmental concerns.

Of the responses, 79% did not believe they had adequate resources to perform their mission, 77% did not believe the EPA's criminal enforcement program is well managed, 64% did not believe management decisions were motivated primarily to improve environmental enforcement, 58% felt the EPA criminal program was weaker today than during the Bush Administration, 63% believed the CID failed to foster management practices necessary for successful criminal investigations, 68% believed hiring and promotions were not based on merit, 77% reported employee moral was not good, 71% feared job retaliation for reporting concerns to upper management, 75% felt senior management failed to listen to field agents, 62% reported they had personally been directed to not pursue important criminal cases for political reasons, and 52% believed catching environmental criminals is no longer a focus for of the CID.

During the same year this survey of the EPA Criminal Investigation Division agents was completed, PEER reported shortly afterwards that a high number of special agents had transferred out of the CID in 2010.

With these supporting facts, it would appear the process goes something like this;
California puts a bunch of laws on the books that give the illusion they are highly protective of the environment. This allows a great deal of fees and other monies to flow to regulatory bodies and oversight agencies. Then, these agencies don't really enforce the laws much and anyone who takes their job too seriously with respect to protecting our shared environment and public trust resources gets "squeezed out" of the agency and/or their positions.

Since statistics clearly show that California water contamination is both on the rise and wide spread, then using dry wells or injection wells to accelerate the introduction of chemicals associated with the proposed HHSEGS will continue California's abysmal and statistical trend.

As such, attempting to mitigate the lack of site suitability for the proposed HHSEGS due to flood waters will in turn, increase risks to water quality and potential contamination to the local water supply and Charleston View residents. This is not acceptable mitigation as trying to fix one problem just increases potential problems in another area. Proposals that further significantly endanger the quality of the environment and its natural resources cannot be considered either "renewable" or sustainable".

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(9) 2010 Survey of EPA Criminal Investigation Division Agents, PEER, available at:
http://www.peer.org/pubs/surveys/10_21_10_CID_Survey_Results.pdf

2. SURFACE WATERS

The proposed project site is prone to heavy flooding. It will sit at the base of a large alluvial fan system and elevated ridge directly above much of the site en route to the Pahrump Valley dry lake. The Old Spanish Trail Highway/Tecopa Road, which sits adjacent to the proposed HHSEGS boundaries, has been subject to extensive flooding since its inception.

High risk flooding impacts across the project site may significantly impact operations over the projects lifetime as well as cause increases in sheet flow speeds and unforeseen changes in floodwater patterns caused from such factors, but not limited to, a minimum of 26% increase in impervious surfaces across the site that will only increase once chemical dust suppressants are deployed across the site, grading and vegetative loss.

As each technical discipline proposes mitigation measures in an attempt to lessen the harm the construction and operation of the proposed project will induce, the compartmental nature of the each analysis is prohibiting appropriate integration and review of the project on a holistic scale.

For example, it is being emphatically stated that potential fugitive dust from the construction and operations of the proposed project will be mitigated to less than significant through the use of chemical dust suppressants. In turn, this will increase the amount of impervious surfaces across the project site but impervious surface analysis is being deferred until after project approval. Everyone knows the project will need to utilize broad scale use of chemical dust suppressant for even marginal dust and erosion control, so why is data and analysis being deferred until after project approval?

The bottom line is, in order to make the proposed site even marginally suitable, a broad suite of extensive mitigation measures must be employed, some of which have yet to even be analyzed at all or whose impacts have not been adequately described. Even then, many areas have already determined project impacts are unmitigatable with the only solution being laws established to protect public trust resources must be run roughshod over, also known as “override”.

A mitigation measure is not actually a mitigation measure if it has yet to be developed. Proposing to initiate a wide range of studies, modeling and mitigation measures after project approval is not in conformance with the substantive requirements of CEQA.

I believe that if all the appropriate mitigation and alterations required to make the proposed HHSEGS site “suitable” for long-term operations were analyzed in an integrated and objective manner, it would be deemed so cost prohibitive and environmental destructive, it would result in the automatic rejection of the AFC based on siting location alone.

3. SOILS

The soils in the proposed siting location are ill suited for the proposed project and will require extensive modifications throughout the site to make it even marginally suitable or feasible for operations. The area is prone to expansive and collapsing soils, super thick mud when wet and super fine power when dry and disturbed. Required modifications will include extensive use of fill, chemical dust suppressant and wide-spread, extensive changes to the existing topography throughout the site that will ultimately be very expensive to construct and maintain. Ultimately, these costs will be borne by the ratepayer because everyone knows, business just pass along their costs.

For example, the area will require extensive use of chemical dust suppressants to reduce both fugitive dust and soil erosion throughout the life of the project. Estimates on what kind of product, depth of product and frequency of product application remain undisclosed.

However, Staff is recommending dust suppressants that have been pre-certified by CARB or the EPA. Currently, the only dust suppressant approved by CARB that could be considered suitable for the site is Soil-Sement™.

Soil-Sement™ precertification was only evaluated for the effectiveness of Soil-Sement™ in suppressing fugitive dust emissions from unpaved roads consisting of a silty, sandy loam soil. CARB will not vouch for its integrity in other kind of soil. Soil-Sement™ was not recommended on aggregates that have low abrasion resistance such as much of the soil at the proposed site (i.e., those that will crush and form new dust under the weight of vehicles.) Also, based on the literature provided, in very arid environments, a variety of products may also be required to precondition the soils to accept Soil-Sement™.

What will the price of all this site modification be? No one knows and nobody's asking but to provide one small example, according to one federal contract I found with the company that makes Soil-Sement™, Midwest Industrial Supply, Inc., it costs $25,420.00 to cover 410,000 square feet using one of their products (however, the product was not Soil-Sement™ but Road Pro™).(10)

Using the square footage provided by FSA Soils and Surface section(11) , the square footage of dirt roads estimated to require chemical dust suppressant to reduce soil loss (via fugitive dust and/or erosion) equals 8,241,552 sq. ft. Based on the pricing of the federal contract, total site application of Soil-Sement™ or a similar product is estimated to be over a half a million dollars per application. If the product is applied twice per year, we are looking at over $1,000,000 dollars in operating costs just for the dust suppressants averaging over $83,000 p/month. Given the soil conditions at the site, there will probably be "preconditioning" products required as well.

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(10) Exhibit 735, Midwest Industrial Supply, Inc., FY09, Award #4.

(11) HHSEGS FSA, Soils & Surface Waters, Response To Public Comments, Cindy MacDonald, Air Resources 10.29, p. 4.9-68.

ATTACHMENT I

EPA Superfund Sites: Region 9

Arizona, California, Hawaii, Nevada, Pacific Islands and Tribal Nations

EPA Superfund Sites: Region 9

Currently, the EPA lists 153 such known sites in CA, AZ, NV, HW, Pacific Islands and Tribal Nations. Of these, California is responsible for 110 equating to 72% of the superfund sites for Region 9.

EPA Superfund Sites: California

1. Advanced Micro Devices, Sunnyvale, CA 6 acres
2. Aerojet General Corp., Sacramento, CA 5,900 acres
3. Alameda Naval Air Station, City of Alameda, CA 2,634 acres
4. Alark Hard Chrome, Riverside, CA
5. AMCO Chemical, Oakland, CA 0.9 acres
6. Applied Materials, Santa Clara, CA (Groundwater contamination that may affect 1.4 million)
7. Barstow Marine Corps Logistics Base, Barstow, CA 5,687 acres

Consequently, the majority of wastes historically generated by the base have been vehicle-related and war surplus. Vehicle-related wastes include waste oils, grease, hydraulic fluids, fuels, battery acids, bilge waters, and antifreeze. Industrial wastes are generated by the Repair Division while maintaining, rebuilding or preserving the vehicles. These include painting, degreasing, metal parts cleaning, and preservation wastes. Some hazardous or suspected hazardous wastes were contained in war surplus materials received at the base including ammunition, various sources of low-level radiation (luminescent dials, watches, and scopes) and chemicals such as pesticides, herbicides and raw materials. Investigations by the Marine Corps have found 38 areas of contamination on the base. Approximately 29,000 people live in the City of Barstow. About 1,300 people use on-site groundwater as a drinking water source. Groundwater is the only source for domestic, commercial and industrial water supply, as well as crop irrigation.

8. Beckman Instruments (Porterville Plant), Porterville, CA 500 acres
9. Blue Ledge Mine, Rogue River Nf, CA,
10. Brown & Bryant, Inc, (Arvin Plant), Arvin, CA 5 acres
11. BF Goodrich, Rialto, CA 160 acres
12. Camp Pendleton Marine Corps Base, San Diego, CA 125,000 acres
13. Casmalia Resources, Casmalia, CA 252 acres
14. Castle Air Force Base, Atwater, CA 2,777 acres
15. Celtor Chemical Works, Hoopa, CA 3.2 acres
16. Coalinga Asbestos Mine, Outside Coalinga, CA 120 acres
17. Coast Wood Preserving, Outside Ukiah, CA 8 acres
18. Concord Naval Weapons Station, Concord, CA 12,800 acres
19. Cooper Drum Co, South Gate, CA 3.8 acres
20. Crazy Horse Sanitary Landfill, Salinas, CA 125 acres
21. CTS Printex Inc., Mountain View, CA
22. Del Amo Facility, Los Angeles, CA 280 acres
23. Del Norte Pesticide Storage, Outside Crescent City, CA
24. Edwards Air Force Base, CA 301,000 acres
25. El Toro Marine Corps Air Station, Irvine CA 4,700 acres
26. Fairchild Semiconductor Corp. (Mountain View Plant) Mountain View, CA: 56 acres
27. Fairchild Semiconductor Corp. (South San Jose Plant), San Jose, CA 22 acres
28. Firestone Tire & Rubber Co. (Salinas Plant), Outside Salinas 256 acres (site deleted)
29. Fort Ord, Outside Monterey, CA 27,827 acres
30. Fresno Municipal Sanitary Landfill, Fresno, CA 145 acres
31. Frontier Fertilizer, Davis, CA 8 acres
32. George Air Force Base, Victorville, CA 5,347 acres
33. Grey Eagle Mine, Happy Camp, CA 20 acres
34. GTE, Mountain View, CA

35. Halaco, Oxnard, CA 37 acres
36. Hewlett-Packard (620-640 Page Mill Road), Palo Alto, CA 10 acres
37. Hexcel Corp., Livermore, CA 22 acres
38. Hunters Point Naval Shipyard, San Francisco, CA 936 acres
39. Industrial Waste Processing, Pinedale, CA ½ acre
40. Intel Corp. (Mountain View Plant), Mountain View, CA 2 acre
41. Intel Corp., Santa Clara, CA 4 acres
42. Intel Magnetics, Santa Clara, CA 1 acre
43. Intersil, Inc. – Siemens Components, Cupertino, CA 15 acres
44. Iron Mountain Mine, Outside Redding, CA 4,400 acres
45. Jasco Chemical Corp., Mountain View, CA 2 acres
46. Jervis B. Webb Co, South Gate, CA
47. Jet Propulsion Laboratory (NASA) Pasadena, CA 176 acres
48. Jibboom Junkyard, Sacramento, CA 9 acres
49. J.H. Baxter & Co., Weed, CA 205 acres
50. Klau Buena Vista Mine, Paso Robles, CA
51. Koppers Co., Inc. (Oroville Plant), Oroville, CA 205 acres
52. Lava Cap Mine, Outside Nevada City, CA 33 acres
53. Lawrence Livermore National Laboratory (site 300) (USDOE), Outside Livermore, CA 11 sq. miles
54. Lawrence Livermore National Laboratory, Main Site (USDOE) Livermore, CA 1 sq. mile
55. Lehr Old Campus Landfill (USDOE) Davis, CA
56. Leviathan Mine, Outside Markleeville, CA Nine Mile Stretch
57. Liquid Gold Oil Corp., Richmond, CA 29 acres
58. Lorentz Barrel & Drum Co., San Jose, CA 10 acres
59. Louisiana-Pacific Corp., South of Oroville, CA 215 acres
60. March Air Force Base, Outside Riverside, CA 7,123 acres
61. Mather Air Force Base, Outside Sacramento, CA 5,845 acres
62. McClellan Air Force Base, Outside Sacramento, CA 3,452 acres
63. McColl, Fullerton, CA 22 acres
64. McCormick & Baxter Creosoting Co., Stockton, CA 29 acres
65. MGM Brakes, Cloverdale, CA 5 acres
66. Modesto Ground Water Contamination, Modesto, CA
67. Monolithic Memories, Sunnyvale, CA 20 acres
68. Montrose Chemical Corp., Los Angeles, CA 13 acres
69. National Semiconductor Corp., Santa Clara, CA 50 acres
70. National Air Station Moffett Field, Moffett Field, CA 1,500 acres
71. New Idria Mercury Mine, Idria, CA 8,000 acres
72. Newmark Groundwater Contamination, San Bernardino, CA 8 sq. miles
73. Norton Air Force Base, San Bernardino, CA 2,165 acres
74. Omega Chemical Corp., Whittier, CA
75. Operating Industries, Inc. Landfill, Monterey Park, CA 190 acres
76. Pacific Coast Pipeline, Fillmore, CA
77. Palos Verdes Shelf, Palos Verdes peninsula
78. Pemaco, Maywood, CA (Daggett?)
79. Purity Oil Sales, Inc. Outside Fresno, CA 7 acres
80. Ralph Gray Trucking Co., Westminster, CA 23 acre
81. Raytheon Corp., Mountain View, CA 30 acre
82. Riverbank Army Ammunition Plant, Outside Modesto, CA 173 acre
83. Sacramento Army Depot, Sacramento, CA 485 acres

84. San Fernando Valley (All Areas), CA (Groundwater)
85. San Gabriel Valley (All Areas), CA
86. Santa Susana Field Laboratory, Simi Valley, CA 2,850 acres
87. Seam Master Industries, South Gate, CA
88. Selma Treating Co., Outside Selma, CA 18 acres
89. Sharpe Army Depot, Outside Lathrop, CA 724 acre
90. Sola Optical Usa, Inc., Petaluma, CA 35 acres
91. South Bay Asbestos Area, Alviso, CA 550 acres
92. Southern California Edison, Co. (Visalia Poleyard), Visalia, CA 20 acres
93. Spectra-Physics, Inc., Mountain View, CA 11 ½ acres
94. Stoker Co., Imperial, CA
95. Stringfellow, Outside Glen Avon, CA 17 acres (ponds overflowed to local rivers)
96. Sulphur Bank Mercury Mine, Clear Lake, CA 150 acres
97. Synertek, Inc. (Building 1), Santa Clara, CA 3 ½ acres
98. Teledyne Semiconductor, Mountain View, CA 1 acre
99. Tracy Defense Depot, Outside Tracy, CA 448 acres
100. Travis Air Force Base, Fairfield, CA 5,025 acres
101. TRW Microwave, Inc. (Building 825) Sunnyvale, CA
102. T.H. Agriculature & Nutrition Company, Fresno, CA 5 acre
103. United Heckathorn Co., Richmond, CA 20 acres
104. Valley Wood Preserving, Inc., Outside Turlock, CA
105. Verdese Carter Park, Oakland, CA 3 acres
106. Waste Disposal, Inc., Santa Fe Springs, CA 38 acres
107. Watkins-Johnson Company (Stewart Division), Scotts Valley, CA 3 acres
108. Western Pacific Railroad Co., Oroville, CA 90 acres
109. Westinghouse Electric Corp. (Sunnyvale Plant), Sunnyvale, CA 75 acres
110. Yosemite Creek Sediment, San Fransico, CA

16. CULTURAL RESOURCES

TESTIMONY OF C.R. MACDONALD, INTERVENOR

I. INTRODUCTION

A. Qualifications: Committee Order Granting Petition To Intervene

B. Prior Filings: In addition to the statements herein, this testimony includes by reference the following documents submitted in this proceeding:

Exhibits 700, 701, 702, 709, 710, 738

C. Additional Filings:

Exhibits 718, 719, 720, 747

D. Documents Prepared By Others:

Exhibits 737, 744, 746

It is my intent to invoke the requirement that the Applicant bear the burden of proof regarding the information provided in the HHSEGS AFC and subsequent documents throughout this proceeding. This will include requesting where the Applicant has addressed the issues previously raised and to provide evidence that supports the statements and conclusions presented in the AFC and throughout these proceedings.

It is also my intent to invoke Staff's requirements under CEQA and Title 20 to provide evidence of where they have addressed issues previously raised and to provide evidence that supports the statements and conclusions presented in the PSA and/or FSA.

Therefore, I will be focusing on many of the issues raised throughout these proceedings during the Evidentiary Hearings and consider much of my previous submissions as the foundation of my testimony.

To the best of my knowledge, all of the facts contained in this testimony are true and correct or were true and correct at the time they were previously filed. With respect to documents prepared by others, I have endeavored to find the most credible source of facts to incorporate by reference in these proceedings but can make no sworn testimony as to their truth or accuracy on the preparer's behalf. To the extent this testimony contains opinions, such opinions are my own. I make these statements, and render these opinions freely and under oath for the purpose of constituting sworn testimony in this proceeding.

II. PROPOSED FINDING OF FACTS

- The area around the proposed HHSEGS has a spiritual quality that cannot be quantified but has been recognized by people for more than a century.

- There is no substitution for experiencing an area. The Old Spanish Trail Highway (the real one) runs directly through the residence I grew up in. By being familiar with the harsh climate and isolation of the area, there were lots of times growing up (and since) I would think about what kind of character and fortitude people must have had to travel the OSTH. If a large scale industrial power plant such as the proposed HHSEGS is approved, the experience of remoteness and isolation of the area will disappear and there will be no way to get a feeling for how people who lived and traveled the area must have felt before "cell phones".

17. GEOLOGICAL & PALEONTOLOGICAL

TESTIMONY OF C.R. MACDONALD, INTERVENOR

I. INTRODUCTION

A. Qualifications: Committee Order Granting Petition To Intervene

B. Prior Filings: In addition to the statements herein, this testimony includes by reference the following documents submitted in this proceeding:

Exhibits 700, 701, 702, 713

C. Additional Filings:

Exhibits 718, 720, 729, 730, 731, 747

D. Documents Prepared By Others:

Exhibits 714, 726, 733, 734

It is my intent to invoke the requirement that the Applicant bear the burden of proof regarding the information provided in the HHSEGS AFC and subsequent documents throughout this proceeding. This will include requesting where the Applicant has addressed the issues previously raised and to provide evidence that supports the statements and conclusions presented in the AFC and throughout these proceedings.

It is also my intent to invoke Staff's requirements under CEQA and Title 20 to provide evidence of where they have addressed issues previously raised and to provide evidence that supports the statements and conclusions presented in the PSA and/or FSA.

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To the best of my knowledge, all of the facts contained in this testimony are true and correct or were true and correct at the time they were previously filed. With respect to documents prepared by others, I have endeavored to find the most credible source of facts to incorporate by reference in these proceedings but can make no sworn testimony as to their truth or accuracy on the preparer's behalf. To the extent this testimony contains opinions, such opinions are my own. I make these statements, and render these opinions freely and under oath for the purpose of constituting sworn testimony in this proceeding.

18. LAND USE

TESTIMONY OF C.R. MACDONALD, INTERVENOR

I. INTRODUCTION

A. Qualifications: Committee Order Granting Petition To Intervene

B. Prior Filings: In addition to the statements herein, this testimony includes by reference the following documents submitted in this proceeding:

Exhibit's 700, 701, 702, 703, 704, 709, 710, 711, 712, 713, 714, 738

C. Additional Filings:

Exhibit's 715, 718, 719, 720, 721, 725, 747

D. Documents Prepared By Others:

Exhibit's 722, 723, 724, 726, 728, 737, 741, 742, 744, 745, 746

It is my intent to invoke the requirement that the Applicant bear the burden of proof regarding the information provided in the HHSEGS AFC and subsequent documents throughout this proceeding. This will include requesting where the Applicant has addressed the issues previously raised and to provide evidence that supports the statements and conclusions presented in the AFC and throughout these proceedings.

It is also my intent to invoke Staff's requirements under CEQA and Title 20 to provide evidence of where they have addressed issues previously raised and to provide evidence that supports the statements and conclusions presented in the PSA and/or FSA.

Therefore, I will be focusing on many of the issues raised throughout these proceedings during the Evidentiary Hearings and consider much of my previous submissions as the foundation of my testimony.

To the best of my knowledge, all of the facts contained in this testimony are true and correct or were true and correct at the time they were previously filed. With respect to documents prepared by others, I have endeavored to find the most credible source of facts to incorporate by reference in these proceedings but can make no sworn testimony as to their truth or accuracy on the preparer's behalf. To the extent this testimony contains opinions, such opinions are my own. I make these statements, and render these opinions freely and under oath for the purpose of constituting sworn testimony in this proceeding.

II. PROPOSED FINDING OF FACTS

- Currently, the FSA incorporates 9,277 acres as "part of the project" and equally denies that 9,277 acres is "part of the project". Therefore, either Staff needs to retract the definition of the "plant size" and its subsequent analysis, assumptions and conclusions regarding these 6,000 additional acres from the FSA entirely or it needs to uniformly and consistently analyze and incorporate the significance an additional 6,000 acres as part of the proposed project through appropriate CEQA review.

- The proposed project site is an active grazing allotment managed by the BLM. The conclusions stated in the FSA regarding no existing agricultural uses are present on the proposed project site is refuted by the available evidence.

- No CEQA analysis was performed on the proposed HHSEGS impacts to scheduled agricultural projects adjacent to the proposed project sites boundaries.

- The AFC and FSA give little consideration to the heavily impacted residents of Charleston View, how the proposed project would permanently and irrevocably destroy our rural quality of life, the disproportionate burdens Charleston View residents will be forced to bear should the proposed project be approved, its significant direct, indirect and cumulative impacts to the community, our lifestyle or the compliance of the proposed project with Title 21 with respect to residents of Charleston View.

- Parcels located within a six-mile radius of the proposed project classified under a "Rural Protection" designation by Inyo County were not included in maps depicting land use and zoning classifications surrounding the proposed project area in the FSA.

- The construction and operation of the proposed power plant would constitute a radical deviation from the existing environment that cannot be mitigated to less than significant. The conversion of an area that has long been designated as Open Space/Recreation with adjacent wilderness areas and Rural Protection designations, which have ensured a "frontier like" environment for the area, to one of large scale industrial use would permanently, adversely and irreparably alter the current and historical landscape in and around the proposed project site.

- It is currently unclear if the proposed project is being developed to achieve state or federal mandates for renewable energy production.

- Project approval will result in a singularly significant land use decision that will provide both a reason and a need to develop infrastructure resources to serve the proposed project that will result in reasonably foreseeable wide scale "renewable industrialization" of the Pahrump Valley.

III. SUMMARY OF TESTIMONY

Overall, I am in agreement with the FSA's Land Use determinations that the proposed project is incompatible with historical and existing land uses of the area. However, there are still some unresolved and/or contested issues as outlined below.

1. Acreage Impacts of The Proposed Project Under CEQA

In my second set of comments addressing the PSA, I submitted a series of comments and questions regarding the discrepancies in acreage associated with the proposed project site. (*See* MacDonald PSA Comments, Supplemental Comments and Analysis, #1: Zone of Impact: Inadequate Analysis, p. 10-1, 10-2, Questions 1-7, #2: Feasibility of On-Site Private Lands For Mitigation Purposes, p. 10-2, 10-3, Questions 1-4).

These comments/questions were partially addressed in the FSA (HHSEGS FSA, Land Use, Appendix 1-PSA Response To Comments, Land Use, Intervenor Cindy MacDonald, p. 2-5, Comment # 10.1-10.20).

Upon review of these responses, it is not clear if there has been a partial misunderstanding regarding the subject area of mitigation land associated with the proposed project site or if the responses are thus far, inadequate as they failed to fully address the issues raised.

Additionally, there is conflicting data, analysis, responses and conclusions surrounding the issue of the actual acreage associated with the proposed power plant that I do not believe have been fully addressed to date.

The FSA response to Comment #10.8, "Why didn't the CEC include a specific recommendation for setting aside additional private land in the Condition of the Permit?", stated:

> "*The 6,800 acres that is referred to is the approximate acreage of compensatory mitigation that is required for the project impacts. The actual amount of acreage is 6,480 acres and was determined by staff in consultation with the California Department of Fish and Game (CDFG) and U.S. Fish and Wildlife Service (USFWS). This requirement is a Condition of Certification,* ***BIO-12****. Please see the* ***Biological Resources*** *section*."

The referenced acreage included in Comment #10.8 was not referring to the projected compensatory mitigation lands assessed for biological impacts of the proposed project. The referenced acreage was taken from the PSA's Socioeconomic analysis that described the proposed project size as approximately 9,277 acres with approximately 6,000 acres "assumed" by Staff to be used for mitigation purposes. (*See* Socioeconomic and Fiscal Impacts of the Hidden Hills Solar Electric Generating System on Inyo County, TN-65530, p. 6)

The PSA's Fiscal Impact Study describes the "Plant Size" as 9,277 acres. (*See* Socioeconomic and Fiscal Impacts of the Hidden Hills Solar Electric Generating System on Inyo County, Table 3-1, HHSEGS Economic Parameters and Costs, TN-65530, p. 7).

The HHSEGS "Plant Size" of 9,277 acres was again reiterated and reaffirmed in the FSA. (*See* HHSEGS FSA, Socioeconomics, Appendix Socio-1, Table 4, HHSEGS Economic Parameters and Costs, p. 6).

The unsubstantiated assumption by Staff that the additional 6,000 acres of the plant "size" would be used for mitigation purposes was the impetus for the above referenced comments and questions submitted to CEC Staff during the PSA's comment period.

The FSA's continued declaration that the additional 6,000 acres, which is assumed by Staff to be used for mitigation purposes, is both unsubstantiated and speculative at best.

The FSA declares that the plant size is 9,277 acres of which 3,227 acres will be developed. The developed portion of the plant size includes a total of 3,096 acres for Solar 1, Solar 2 and the Common Area plus an additional 180 acres to be used as a temporary construction laydown area.

The HHSEGS AFC states that,

> "*The Applicant intends to acquire a leasehold estate in privately held land located in the Mojave Desert between Death Valley and the California-Nevada border as the site for their respective plants and the common area. The land is owned by The Roland John Wiley Trust, The Mary Wiley Trust and Section 20, LLC and is under options to lease with BrightSource."* (*See* HHSEGS AFC 1.0 Executive Summary, p. 1-1)

Based on this information, it can be reasonably predicted that currently the Applicant is enjoined in a lease *option* agreement with The Roland John Wiley Trust, The Mary Wiley Trust and Section 20, LLC but the Applicant has not formally entered into a *leasehold estate* agreement, which would grant the Applicant ownership of a temporary right to utilize the property for a fee, and would be contingent on CEC project approval.

Based on the available evidence, the approval of the proposed project will create the direct impact of the Applicant entering into a leasehold estate agreement to formally secure the site and occupy the land/acreage in question. The question is, how much acreage is actually connected to the proposed project?

I could find no references or maps in the AFC files or subsequent documents to indicate the "plant size" totaled 9,277 acres as declared and used in CEC Staff's socioeconomic analysis. I could find no references, maps or depictions in either the PSA or the FSA outside the Socioeconomic analysis that indicated the "plant size" totaled 9,277 acres.

Regardless of these facts, the FSA's Socioeconomic section continues to define 9,277 acres as the "plant size", not 3,277 acres or even 3,096 acres, and carries forward an economic analysis that defines 9,227 acres as the plant size of the proposed project.

In response to Comment#10.3, the FSA states:

> "*As indicated above, the Energy Commission cannot assume jurisdiction of any additional acreage "not part of the project" that is agreed to in a lease. Staff is not aware of any plans to develop additional acreage for the HHSEGS project and to assume that the additional acreage will be developed is speculative and outside the scope of the CEQA analysis*."

The additional acreage of 6,000 acres now in question was included by Staff in the Socioeconomic analysis and incorporated in its economic conclusions. It was also listed as "part of the project" as 9,277 acres was identified as the size of the plant in both Table 3 of the PSA and Table 4 of the FSA. The FSA continues to identify 6,000 additional acres associated with the proposed project as being "assumed" by Staff to be used for mitigation purposes.

Currently, the FSA incorporates 9,277 acres as "part of the project" in their Socioeconomic analysis and equally denies that 9,277 acres is "part of the project" throughout the remainder of the FSA.

A CEQA review does not require analysis to conform solely to speculative development plans as the FSA responses suggest. It *does* require due diligence and analysis of a proposed project be adequately and reasonable performed to determine impacts and significance.

The bottom line is, either Staff needs to retract the definition of the "plant size" and its subsequent analysis, assumptions and conclusions regarding these 6,000 additional acres from the FSA entirely or it needs to uniformly and consistently analyze and incorporate the significance of these additional 6,000 acres as part of the proposed project through appropriate CEQA review.

2. The Proposed Site Is An Active Grazing Allotment

The FSA concludes that the proposed HHSEGS project would have no impact with respect to farmland conversion. This conclusion is based exclusively on a search of the Farmland Mapping and Monitoring Program (FMMP) maintained by the Department of Conservation. The FMMP has designated the proposed HHSEGS project site as "Other Land", which is defined as land not included in any other mapping category.

Given the remote location of the proposed project site, it is possible that the historical grazing allotment has not yet been added to the FMMP or perhaps because the grazing allotment is authorized through the BLM Barstow Field Office, the DOC did not feel it was under their jurisdiction to report. In any event, information obtained for the BLM has confirmed that the proposed HHSEGS project site is included in its entirety as part of the Pahrump Valley Grazing Allotment and can be viewed in more detail in the 2007 Environmental Assessment (CA-680-06-81) for the Pahrump Valley Allotment. (*See* Exhibit 722 and 723)

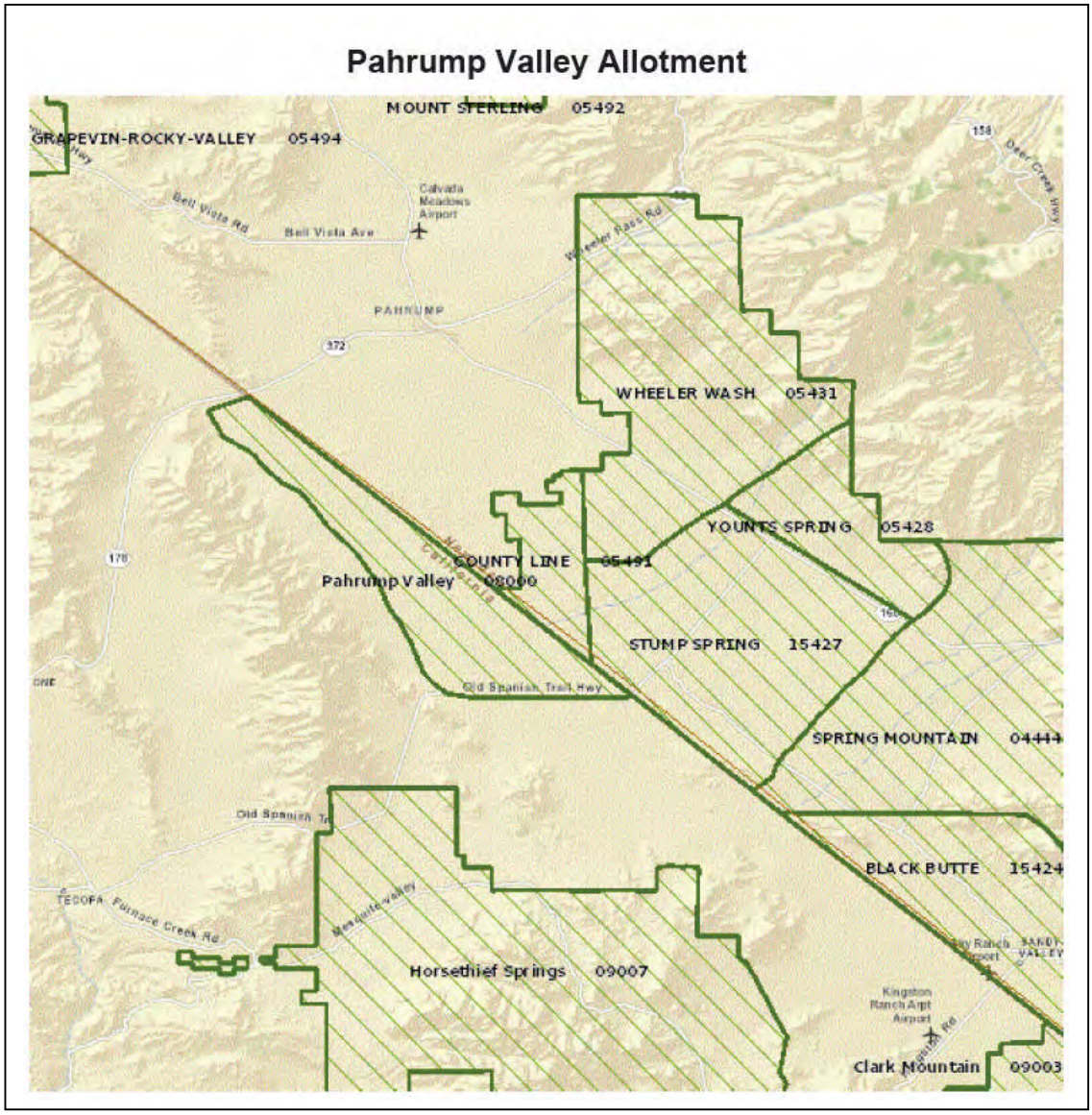
The FSA also includes verification that the Pahrump Valley allotment is both a long-standing historical grazing allotment as well as actively in use at the proposed project site as illustrated below.

> *"*The only noted information related to the historic land use of the site and surrounding area is their location on the Hidden Hills Ranch, which has been in operation as a cattle ranch since the 1920s*". (HHSEGS FSA, Cultural Resources, p. 4.3-59)*
>
> *"*Cattle and sheep grazing are permitted activities within portions of the Pahrump Valley and the project site has been subject to historic grazing. The sign of domestic cattle (Bos taurus), sheep (Ovis aries), and free ranging burrow (Equus asinus) was present on the HHSEGS site*." (HHSEGS FSA, Biological Resources, p. 4.2-28)*

The FSA provides definitions within the FMMP of California agricultural resources that qualify for agricultural use determinations during the planning process; these definitions include grazing land.

Therefore, the conclusions stated in the FSA regarding no existing agricultural uses being present on the proposed project site, that the proposed project would not conflict with existing agricultural zoning or that there will be no impact with respect to farmland conversion, is not supported by the available evidence; unless the CEC considers the FMMP data base the only recognized legitimate source for determining agricultural land use in California.

Figure 1: BLM Map of Pahrump Valley Grazing Allotment



Map Source: BLM Rangeland Administration System, Rangeland Maps, Pahrump Valley Allotment.

3. No Impact Determination for Agricultural Use In The Project Site Vicinity

In the Water Resources section of my second set of public comments, I provided evidence of authorized irrigation water permits for agricultural crops(s) adjacent to the proposed project boundary granted to Linda N. Ekins and Mary J. McMonigle, Co-Trustees of the Mary Lee Wiley Trust. (*See* MacDonald Comments, Supplemental Comments and Analysis, Water Resources, Appendix I). The applications for the total use of 211 afy between four separate permits identified the purpose of the water was for "irrigation of alfalfa or other crops".

However, the FSA fails to include these agricultural crops in any land use analysis, make any determination of impacts the proposed project may have on these crops or include these agricultural projects in the cumulative assessment as evidenced in Land Use Table 3: Cumulative Projects (See HHSEGS FSA, Land Use, p. 5-4.28.)

Therefore, it cannot be stated with confidence that the proposed project will have no impacts to existing agricultural uses located adjacent to the proposed project's boundaries or that indirectly, the construction and operation of the proposed HHSEGS will not cause abandonment of existing agricultural uses due to unforeseen impacts and/or the conversion of the area to heavy industrial use.

4. Inadequate Impact Analysis To Charleston View Residents Under Title 21

Throughout the FSA, the community of Charleston View is given little to no consideration or discussion regarding the significant, irreparable and adverse impacts the proposed project would have on the remote, rural "frontier like" lifestyle that has historically and currently enjoyed by the people who live in there.

In 1971, my father purchased the land that became our home for the last forty years. This location was chosen specifically because of its remote, wilderness qualities and is picture perfect natural setting as not everyone appreciates the frenzied, over-crowded, disconnected, noisy, smelly, crime ridden, and asphalt incrusted lifestyle that must be endured while living in a city.

The ability to live on a daily basis in a quiet, remote, rural, natural, wide-open environment that allows one to connect to the seasons, to the wildlife, to the sky, the sun, the air - is a lifestyle value that cannot be quantified or easily replaced.

The wilderness values and lifestyle that myself and my family love, that we have immensely enjoyed, that we treasure and that is inherent in the Charleston View area, will be permanently and irreparably destroyed by the conversion of the wilderness like values of the area to one of heavy industrialization.

The approval of the HHSEGS will result in not only industrialization of over 3,000 acres located directly adjacent to Charleston View, it will also most likely be indirectly responsible for the construction and operation of the 15,000 acre proposed Sandy Valley SEGS approximately 5 miles east of Charleston View because of the connected action of the transmission and gas line required to service the HHSEGS and the SVSEGS.

For the FSA to conclude that the proposed project would not directly or indirectly divide an established community or disrupt an existing or recently approved land use is not accurate. The construction and operation of a power plant being responsible for the direct conversion of a wildness like natural setting to one of heavy industrialization is considered highly disruptive to existing land uses in the project vicinity, i.e., Charleston View residents, their lifestyle and the aesthetic and social values associated with living in this unique, remote, natural, rural and picturesque environment.

While the FSA does acknowledge that the proposed project would conflict with the applicable land plan and recognizes the degree of variance from local planning designations, it fails to provide adequate analysis of the impacts to residents of Charleston View under the provisions of Title 21, some of which state:

> 21.08.010 Environment
> For the purposes of this title, the term environment includes the ecological environment of the County as well as the social, aesthetic and economic environment of the County. Impacts upon the quality of life within the County are considered environmental impacts. Therefore, the definition of environment is not limited by and may be broader than environmental considerations under the California Environmental Quality Act or the National Environmental Policy Act. [emphasis added]
>
> 21.04.020 Authority
> Article XI, section 7 of the California Constitution empowers Inyo County ("County") to make and enforce within its limits all local, police, sanitary and other ordinances and regulations not in conflict with general laws. The County's police powers extend to all lands within the County. The police powers of the County of Inyo include:
>
> A. Protection of the environment of Inyo County, including biological and other natural resources, aesthetics, recreational attractiveness and availability, traditional social activities and values of the citizens of the County, housing, public services, utilities, and economic potential within the County. [emphasis added].
>
> SECTION 1 DECLARATIONS
> G. The County has a responsibility to exercise its full authority to ensure that its citizens and its environment do not bear an undue burden as a result of the development of the County's solar and wind resources to generate and transmit clean, renewable electric energy. [emphasis added].

The FSA's declaration that the proposed HHSEGS would create a land use incompatibility due to significant and unavoidable visual impacts, though partially accurate, is incomplete as it fails to wholly describe the impact of its infliction upon the land, how it will significantly degrade the visual and aesthetic character of the environment as well mean an end to a lifestyle and values we have, and continue to enjoy, in Charleston View.

For example, the majority of residents in Charleston View will be less than 1 mile away from Solar 2's SRGS. Additionally, many residents will be forced to drive directly into the glare emanating from the solar receivers every time we check the mail, deposit our trash, use existing exits or even try to view the northern portion of the Pahrump Valley. CEC Staff described this glare as:

> *"This level of luminance would be 32 times more luminous than the desert sky and be perceived as intensely bright to considerable distances. Noting that no such light source of spatial extent and luminance has been known to exist previously and therefore extensive data are nonexistent, staff estimates that the SRSGs would appear very bright to a distance of approximately 17 miles, and <u>would potentially constitute a significantly disruptive source of **discomfort** glare to viewing distances of approximately 8.5 miles.</u>"* (*See* CEC HHSEGS FSA, APPENDIX VR-2, Visual Resource Glint and Glare Impact Assessment, p. 4.12-64)

Land Use: Photo 1

KOP4, a Charleston View residence located approximately 1 mile from Solar 2's SRGS with a simulated view prepared by Applicant. Source: Applicant's Data Response Set 2C, TN-63966*, 3/05/12.*

In addition to the glare, the sounds of peace, quiet and the natural world that have surrounded us for so long will be dramatically altered to one of constant hums and roars of industrialization without end. The smell of fresh aromatic air will be transformed to one of industrial discharge, emissions, waste and dust.

The open, vast expanses of desert floor where now - life moves about freely - will become shaved, cut, carved, fenced, walled up and equipped with razor wire signaling the end of what was once abundant freedom, now lost.

The people of Charleston View will be forced to carry the majority of the burden for the development of the proposed HHSEGS and its construction and operation will mean the permanent and irrevocable end of a lifestyle that has been embraced and enjoyed for over four decades.

As such, the FSA's failure to reasonably include, consider, incorporate, analyze or issue impact determinations under Title 21 regarding the residents of Charleston View being forced to accept the irreplaceable loss of our lifestyle, the permanent degradation of the landscape, and the destruction of the abundant beauty, resources and natural environment through sacrificing a large portion of the landscape for this singular, dominate facility should not be considered adequate to met the substantive requirements of CEQA.

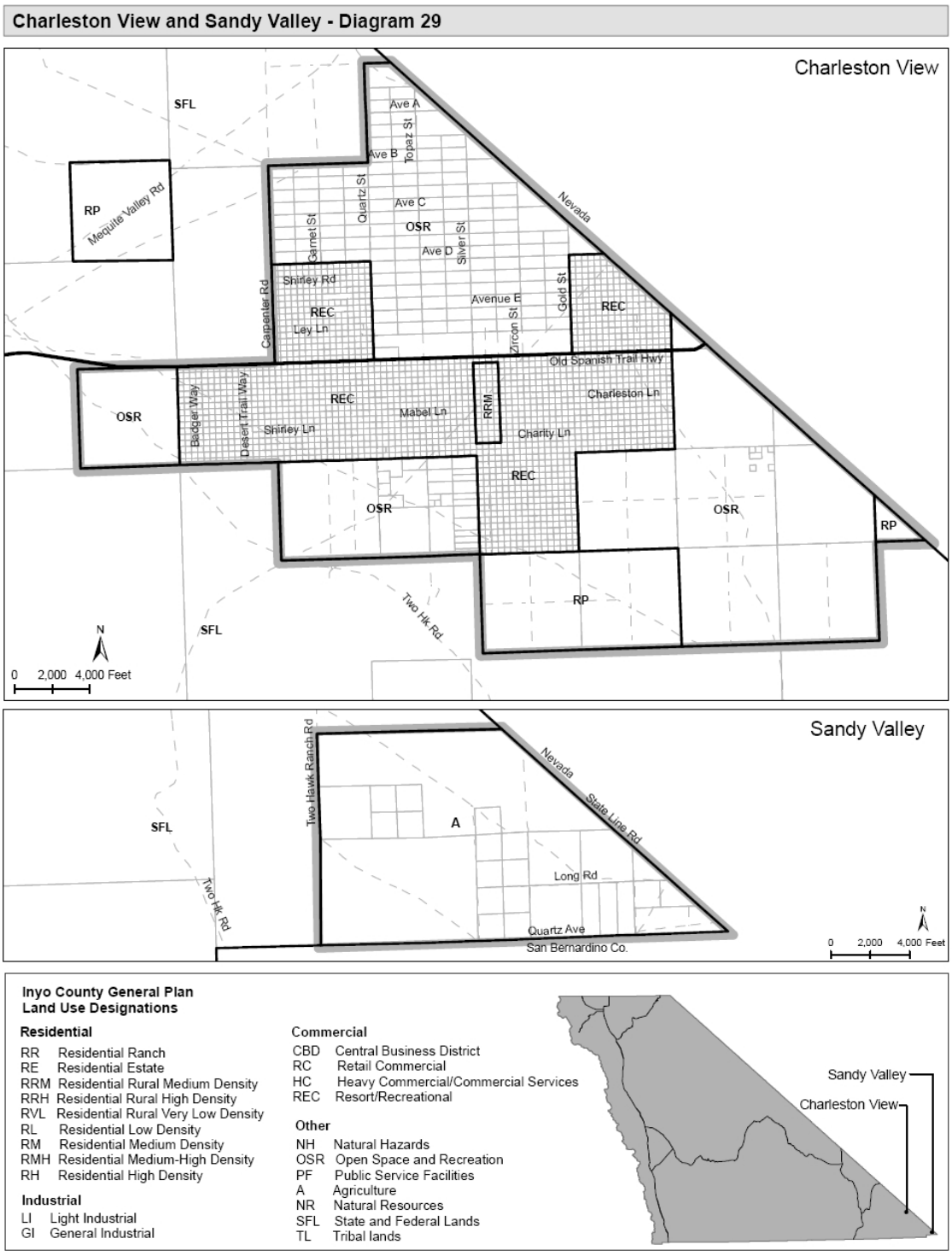
Furthermore, there are parcels within a six-mile radius of the proposed HHSEGS that have been designated under a "Rural Protection" status by Inyo County. See Figure 2.

It is impossible to preserve the intent and quality of life a "Rural Protection" designation aims to achieve if such land is in close proximity to a heavily industrialized facility (or facilities) that will encompass approximately five square miles, host two 750 ft. towers and incorporate receivers that cast an uncomfortable glare of light for an estimated 8.5 square miles in every direction.

Unfortunately, the CEC FSA fails to depict the Rural Protection designations within the proposed HHSEGS vicinity. (See CEC HHSEGS FSA, Land Use, Figures 1-3, pdf. p. 49-51)

Finally, though the land use section does declare that the proposed project would not yield any noteworthy public benefits related to land use, it stops short by failing to declare the considerable harm the proposed project will cause to local residents, wildlife, cultural resources, visual resources, recreational use and the tangible spiritual quality inherent in the area.

Figure 2. Map of Inyo County General Plan Land Use Designations: Draft



Source: Inyo County, Attachment 6, General Plan Land Use Diagrams (maps), Diagram 29. http://inyoplanning.org/GPandZoningUpdates.htm

5. Environmental Justice & Minority Population of Charleston View

The FSA declares in the Socioeconomics section that the people of Charleston View fail to qualify as an environmental justice community. It is then used as the basis to dismiss the people of Charleston View as an Environmental Justice population and/or community throughout the FSA.

The methods used to erase us "from the map" included combining Pahrump, Nevada populations with us, combining Tecopa and Shoshone populations with us or combining us with the entire population of Inyo County to derive the statistics necessary to dismiss the impacts of the proposed HHSEGS on the residents of Charleston View.

What makes this so egregious is I had submitted extensive comments regarding environmental justice issues concerning the proposed HHSEGS and Charleston View residents as early as March 9, 2012.

It is one thing to use mass statistical data to develop a preliminary analysis – it is quite another to have direct knowledge of specifics related to a proposal (such as provided in my comments) but substitute the real people affected by the proposal with the computer models that are used to justify erasing us!

The FSA is wrong in their conclusions that the people of Charleston View are not primarily comprised of low income, disadvantaged or senior populations.

There is no excuse for the FSA's conclusions that no environmental justice populations or issues are affected by the proposed HHSEGS.

6. Project Approval Constitutes A Singularly Significant Land Use Decision

I wholly disagree, and the evidence does not support, the FSA's land use conclusion that the proposed project would not result in incremental impacts that are cumulatively considerable when viewed in connection with other project-related effects or the effects of past projects, other current projects, and probable future projects.

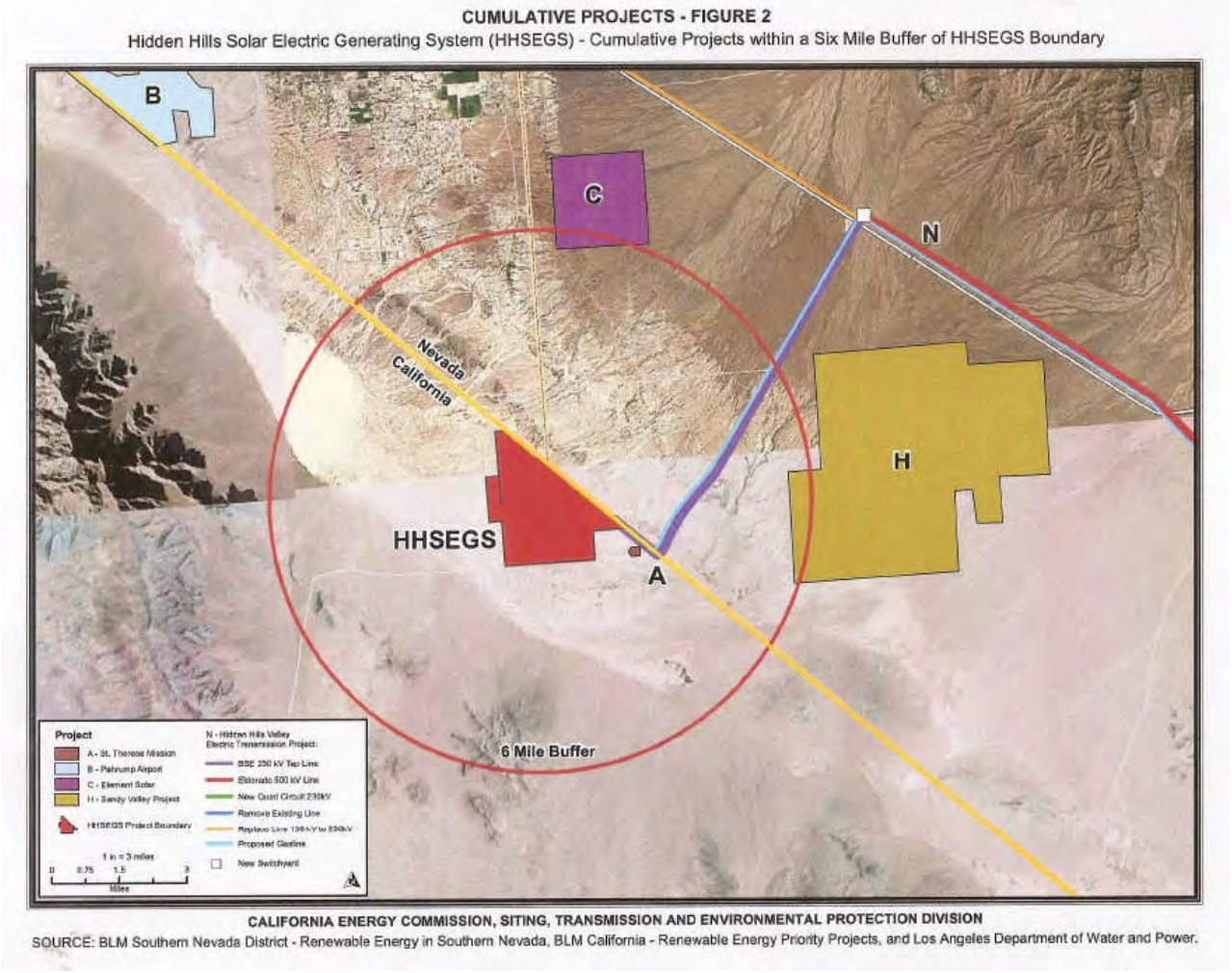
The proposed HHSEGS is *the hinge pin* to a proliferation of industrial scale renewable development throughout the Pahrump Valley. It is because of the proposed HHSEGS that BLM initiated the Valley Electric Association's Hidden Hills Transmission Project NEPA analysis, which states in the scoping notice that:

> *"….the construction, operation, maintenance, and termination of transmission infrastructure improvements, both 230 kilovolt (kV) and 500 kV, and a natural gas pipeline to* ***support*** *the development of the Hidden Hills Solar Electric Generating Project*." [emphasis added]

If the HHSEGS is approved, it will be the first of its kind in the Pahrump Valley. Its presence will dominate the landscape both near and far. It will change the existing character of the landscape through the industrialization of almost 5 square miles that can be seen from almost any vantage point.

Without the CEC's approval of the HHSEGS AFC, there is no reason to carry forward the VEA Hidden Hills Transmission Project's NEPA analysis. However, if the CEC approves the HHSEGS, the BLM has both a reason and a need to approve the transmission project. Once constructed, the transmission and gas pipeline will result in the necessary infrastructure to allow other projects such as the Sandy Valley SEGS to "tap into" that same infrastructure because of the availability of natural gas and transmission lines that would not have been made available without approving the HHSEGS.

Figure 3. Proposed HHSEGS & Sandy Valley SEGS



As illustrated in Land Use: Photo 2, the proposed HHSEGS 3,227 acre project will be clearly visible from at least 25 miles away.

Land Use: Photo 2

Photo of Pahrump Valley and Pahrump Dry Lake looking west from SR160. 1/02/13

The Pahrump Dry Lake in the background, slightly northwest of the HHSEGS site, is 7.85 square miles(1), the proposed HHSEGS project is approximately 5 square miles (roughly two thirds the size of the dry lake bed), while the 10,000 acre Sandy Valley SEGS would be approximately 15 square miles.

Land Use: Photo 3

Looking southeast at Mt. Potosi in the opposite direction shown in Land Use: Photo 2. Photo taken in the vicinity of the proposed Sandy Valley SEGS from the Old Spanish Trail Highway/Tecopa Road. 1/02/13.

(1) Pahrump Dry Lake square mileage provided by TopFusion, Courtesy of Scott Smith, 12/30/13

19. TRAFFIC & TRANSPORTATION

TESTIMONY OF C.R. MACDONALD, INTERVENOR

I. INTRODUCTION

A. Qualifications: Committee Order Granting Petition To Intervene

B. Prior Filings: In addition to the statements herein, this testimony includes by reference the following documents submitted in this proceeding:

Exhibits 702, 704, 705, 707, 708, 711, 712, 713

C. Additional Filings:

Exhibits 718, 719, 720, 728, 729, 730, 731, 747

D. Documents Prepared By Others:

Exhibits 714, 721, 725, 726, 728, 744, 746

It is my intent to invoke the requirement that the Applicant bear the burden of proof regarding the information provided in the HHSEGS AFC and subsequent documents throughout this proceeding. This will include requesting where the Applicant has addressed the issues previously raised and to provide evidence that supports the statements and conclusions presented in the AFC and throughout these proceedings.

It is also my intent to invoke Staff's requirements under CEQA and Title 20 to provide evidence of where they have addressed issues previously raised and to provide evidence that supports the statements and conclusions presented in the PSA and/or FSA.

Therefore, I will be focusing on many of the issues raised throughout these proceedings during the Evidentiary Hearings and consider much of my previous submissions as the foundation of my testimony.

To the best of my knowledge, all of the facts contained in this testimony are true and correct or were true and correct at the time they were previously filed. With respect to documents prepared by others, I have endeavored to find the most credible source of facts to incorporate by reference in these proceedings but can make no sworn testimony as to their truth or accuracy on the preparer's behalf. To the extent this testimony contains opinions, such opinions are my own. I make these statements, and render these opinions freely and under oath for the purpose of constituting sworn testimony in this proceeding.

II. PROPOSED FINDING OF FACTS

- There is absolute zero analysis or determinations of significance with respect to construction traffic impacts to the Old Spanish Trail Highway/Tecopa Road at the project site entrances or during "peak" times.

- There is absolute zero analysis or determinations of significance with respect to the community of Charleston View and its residents, our ability to enter and exit the area – including the school bus, if construction traffic will pose a significant public nuisance to those properties within less than a 1,000 feet of the Old Spanish Trail Highway/Tecopa Road due to noise from idling and/or slow moving vehicles, if additional mitigation may be required with respect to longer turn lanes from those currently planned, or the possible need for an additional lane altogether in front of the proposed site.

- The Applicant has not satisfied the requirements to provide the burden of proof that construction vehicle traffic and/or or "peak" vehicle times will not result in significant, unmitigated impacts to the public on the Old Spanish Trail Highway/Tecopa Road at the sites entrances.

- I have provided evidence that during "peak" hours, the construction traffic will need to enter the project site at a continuous rate of 0.085 vehicles p/second, a wholly impossible task, without causing significant disruptions to vehicle flow around the proposed site.

- To date, I am the only one that has provided any evidence that determines significant impacts to the Old Spanish Trail Highway/Tecopa Road at the project site entrances due to construction traffic attempting to gain entry to the site and offered any realistic, feasible solution that also shifts the burden of the proposed project's impact to the Applicant versus the public. As such, unless the Applicant can prove otherwise, the Commission should incorporate a COC requiring the Applicant to construct and use the proposed alternate route as the projects main site entrance as provided in Exhibit 704 during the construction of the proposed HHSEGS.

- The Applicant disclosed potential risks to investors that were not equally and as accurately disclosed to the CEC or Staff during the AFC proceedings, (setting aside the HHSEGS AFC proceedings should be terminated for this fact), there is outstanding proof that the mitigation measures offered in **Trans-8** may be wholly inadequate to mitigate project impacts to less than significant or protect the public.

III. SUMMARY OF TESTIMONY

1. No Traffic Analysis or Impact Determination For Charleston View

Neither the Applicant's Updated Workforce Analysis (TN#67434, 10-01-12) nor the FSA every describe, report, or analyze the HHSEGS construction impacts to the community of Charleston View at any time.

The closest traffic impact analysis offered in the FSA for the area to be hit hardest by the construction traffic (Charleston View) is limited to two words, "heavily impacted" regarding St. Therese, which is well over two miles from the project site entry. Even then, the FSA's substandard minimal description merely refers to vehicles traveling to and from St. Therese via SR160 as illustrated below.

> *"The only project that would utilize SR 160, and would be heavily impacted by the HHSEGS construction, would be the St. Therese Mission which is currently under construction and has identified 40 daily commercial trips."* (1)

While the FSA provides a brief report on potential traffic impacts associated with the Front Sight Firearms Training Institute, a commercial operation, which also utilizes SR160 and the Old Spanish Trail Highway/Tecopa Road, all analysis and impact determinations are deferred to a "Traffic Control Plan" to be developed only after project approval.

However, absolute zero analysis or determinations of significance regarding what "heavily impacted" means with respect to the community of Charleston View and its residents, our ability to enter and exit the area – including the school bus, if construction traffic will pose a significant public nuisance to those properties within less than a 1,000 feet of the Old Spanish Trail Highway/Tecopa Road due to noise from idling and/or slow moving vehicles, if additional mitigation may be required with respect to longer turn lanes from those currently planned, or the possible need for an additional lane altogether in front of the proposed site.

Disclosing impacts, determining significance and developing a "Traffic Control Plan" after project approval is not in conformance with the substantive requirements of CEQA nor in compliance with Inyo County Policy 2.21 to provide proper access to residential, commercial and industrial areas and Title 21!

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(1) HHSEGS FSA, Traffic & Transportation, p. 4.10-44

The FSA reports the following daily "peak" construction related traffic trips to the proposed project site as follows:

> *"Based on the UWA assumptions, HHSEGS would generate a total of 4,000 daily construction related trips (3,820 daily automobile trips and 180 truck trips) during the peak construction month. Of the 3,820 daily automobile trips, 1,411 (1,401 automobile and 10 truck) trips would occur during the morning peak hour and 1,411 (1,401automobile and 10 truck) trips would occur during the afternoon peak hour."* (2)

This if further refined in Traffic and Transportation Table 4 as shown in Figure 1 below.(3)

Figure 1.

Traffic and Transportation Table 4
Peak Construction Trip Generation (Month 19)

	Daily Trips*					Peak Hour Trips		
	Monday	Tuesday-Thursday	Friday			Monday	Tuesday-Thursday	Friday
Automobiles	3,714	3,430	3,820			1,284	1,206	1,401
Trucks**	180	180	180			10	10	10
Total	3,894	3,610	4,000			1,294	1,216	1,411

Source: Hidden Hills Solar Electric Generating System Updated Workforce Analysis Table 5.12-4R1.
*Daily trips include combined trips generated by dayshift and swing shift.
** Assumes truck trips are spread equally throughout the day from 6:00 a.m. to 6:00 p.m.

Notice also that all the above statistics are based on "best-case" assumptions of truck arrivals and departures at the site being spread equally throughout a 10-hour period, which is obviously not reasonable or feasible.

Based on my analysis of "peak" construction traffic(4) attempting to gain access to the site, each vehicle, including trucks arriving in perfect unison according to the Applicant's unbelievable "best case" assumptions, would require 0.08 seconds time per vehicle(5) to access the site in an uninterrupted, continuous manner to prevent significant traffic impediments or causing construction traffic to back up and stop completely on the Old Spanish Trail Highway/Tecopa road for potential significant but unknown and undisclosed distances.

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(2) HHSEGS FSA, Traffic and Transportation, p. 4.10-20.
(3) HHSEGS FSA, Traffic and Transportation, p. 4.10-21
(4) HHSEGS FSA, Traffic and Transportation, p. 4.10-20: ("generally 7:00 am to 9:00 am and 4:00 pm to 6:00 pm").
(5) 120 minutes divided by 1,411 vehicles = 0.085 seconds p/vehicle.

The Applicant has the burden of proof to disclose impacts of the proposed project on the surrounding environment and to make efforts to mitigate them under CEQA. Staff is required to independently analyze the proposed project, make determinations of significance and offer mitigation measures to offset project impacts if any impacts are found to be significant.

With respect to construction traffic impacts associated with the proposed HHSEGS, neither Applicant or Staff have described, disclosed, analyzed, reported on, issued impact determinations or made any effort to mitigate potentially significant and profound impacts associated with the construction phase of the proposed project to residents of Charleston View, Front Sight Firearms Training Institute, St. Theresa, other recreationalists known to travel the Old Spanish Trail Highway/Tecopa Road known as "Dumont Duner's" or for travelers heading to Tecopa, Tecopa Hot Springs, or China Ranch.

Furthermore, the continual "erasure" of the community of Charleston View, its residents and the impacts the proposed HHSEGS will have on us is the very reason "environmental justice" has become such a big issue in land use planning. Too vulnerable, too small, too poor, too illiterate and too insignificant to even be mentioned, much less considered!

In the PSA, the Traffic and Transportation section acknowledged the residents of Charleston View exceeded a 50% minority population.(6) After the Applicant demanded Staff change this fact due to applying the sole criteria of "Census Blocks",(7) the FSA has again deleted us from any further consideration or impact determinations. Finally, the Traffic and Transportation maps provided in the FSA have "erased" Charleston View and pasted it over with "Inyo County" to finish the job!

2. Mitigation: Alternate Route For HHSEGS Site Entry

The Applicant has not satisfied the requirements to provide the burden of proof that construction vehicle traffic and/or or "peak" vehicle times will not result in significant, unmitigated impacts to the public on the Old Spanish Trail Highway/Tecopa Road at the sites entrances.

I have provided evidence that during "peak" hours, the construction traffic will need to enter the project site at a continuous rate of 0.085 vehicles p/second. If this is incorrect, the Applicant must prove otherwise.

As it stands, simple arithmetic provides evidence that significant disruptions in traffic flow will occur on the Old Spanish Trail Highway/Tecopa Road near the site entrances and to Charleston View that have yet to be adequately reported, analyzed or mitigated or determined to be in compliance with existing LORS.

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(6) HHSEGS PSA, Traffic and Transportation, p. 4.11-33

(7) HHSEGS FSA, Traffic and Transportation, Appendix 1- Response To Public Comments, Applicant- Comment #13.28, p. 12.

In my HHSEGS Status Report #1 (*See* Exhibit 704), I outlined a reasonable and feasible route for site entrance that would relieve the majority of construction traffic congestion due to its long "runway", increase site security, and protect biological resources such as the mesquite dunes.

Based on these facts, to date, I am the only one that has provided any;

a) Evidence that determines significant impacts to the Old Spanish Trail Highway/Tecopa Road at the project site entrances due to construction traffic attempting to gain entry to the site, and

b) Offered any realistic, feasible solution that also shifts the burden of the proposed project's impact to the Applicant versus the public.

As such, the Commission should incorporate a COC requiring the Applicant to construct and use the proposed alternate route as the projects' main site entrance, as provided in Exhibit 704, during the construction of the proposed HHSEGS.

3. Glint, Glare & Public Safety

Based on information filed with the AFC and subsequent data responses from Applicant, the FSA concluded that glint and glare from heliostat/mirror assemblies will not pose a risk to passing motorists, ground-based or airborne observers or endanger the public in any manner.

However, many concerns were raised about potential impacts of glint and glare and the FSA relied on the Applicant's responses as the basis for their mitigation and final determinations that "impacts would be reduced to less than significant".

Unfortunately, Applicant never disclosed to the CEC or Staff what they disclosed to investors about the "proprietary technology" that controls the heliostat/mirror assemblies as described below.

> *"Our proprietary technology has a limited history and may perform below expectations when implemented on utility-scale projects. We use proprietary technology that has not been previously implemented on utility-scale projects of the size and complexity of the Ivanpah Solar Electric Generating System, or Ivanpah, and Ivanpah may experience technological problems that neither we nor any of the third-party independent engineers that have reviewed our projects are able to foresee. The systems that we will implement on utility-scale projects include a solar field with heliostats controlled by advanced software systems that concentrate sunlight onto a receiver to produce high-temperature steam. If the implementation of our proprietary technology is unsuccessful, it could negatively impact the successful operation of projects using our systems and may result in additional payments, deductions or defaults under key project documents, including our PPAs or other financing arrangements."*(8) [emphasis added]

(8) Exhibit 726, BSE/SEC Excerpts, p. 2

The entire mitigation plan contained in Trans-8 designed to protect the public and mitigate potentially significant impacts is based on the FSA's confidence in the Applicant's accurate and truthful descriptions of their "proprietary systems".

Since the Applicant disclosed potential risks to investors that were not equally and as accurately disclosed to the CEC or Staff during the AFC proceedings, (setting aside the HHSEGS AFC proceedings should be terminated for this fact), there is outstanding proof that the mitigation measures offered in **Trans-8** may be wholly inadequate to mitigate project impacts to less than significant or protect the public.

As such, current recommendations based from the information submitted in the AFC files and subsequent data responses are meaningless and cannot be incorporated in COC's with any degree of confidence.

20. SOCIOECONOMICS

TESTIMONY OF C.R. MACDONALD, INTERVENOR

I. INTRODUCTION

A. Qualifications: Committee Order Granting Petition To Intervene

B. Prior Filings: In addition to the statements herein, this testimony includes by reference the following documents submitted in this proceeding:

Exhibit's 700, 702, 709, 710, 711, 712, 713

C. Additional Filings:

Exhibit's 719, 720, 721

D. Documents Prepared By Others:

Exhibit's 724, 725, 726, 727, 735, 737, 744, 745, 746

It is my intent to invoke the requirement that the Applicant bear the burden of proof regarding the information provided in the HHSEGS AFC and subsequent documents throughout this proceeding. This will include requesting where the Applicant has addressed the issues previously raised and to provide evidence that supports the statements and conclusions presented in the AFC and throughout these proceedings.

It is also my intent to invoke Staff's requirements under CEQA and Title 20 to provide evidence of where they have addressed issues previously raised and to provide evidence that supports the statements and conclusions presented in the PSA and/or FSA.

Therefore, I will be focusing on many of the issues raised throughout these proceedings during the Evidentiary Hearings and consider much of my previous submissions as the foundation of my testimony.

To the best of my knowledge, all of the facts contained in this testimony are true and correct or were true and correct at the time they were previously filed. With respect to documents prepared by others, I have endeavored to find the most credible source of facts to incorporate by reference in these proceedings but can make no sworn testimony as to their truth or accuracy on the preparer's behalf. To the extent this testimony contains opinions, such opinions are my own. I make these statements, and render these opinions freely and under oath for the purpose of constituting sworn testimony in this proceeding.

21. NOISE AND VIBRATION

TESTIMONY OF C.R. MACDONALD, INTERVENOR

I. INTRODUCTION

A. Qualifications: Committee Order Granting Petition To Intervene

B. Prior Filings: In addition to the statements herein, this testimony includes by reference the following documents submitted in this proceeding:

Exhibits 700, 702, 703, 704, 705, 706, 709, 711, 712, 713

C. Additional Filings:

Exhibits 719, 720, 747

D. Documents Prepared By Others:

Exhibits 714, 724, 726, 740, 744, 746

It is my intent to invoke the requirement that the Applicant bear the burden of proof regarding the information provided in the HHSEGS AFC and subsequent documents throughout this proceeding. This will include requesting where the Applicant has addressed the issues previously raised and to provide evidence that supports the statements and conclusions presented in the AFC and throughout these proceedings.

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II. PROPOSED FINDING OF FACTS

- There are outstanding unresolved issues surrounding noise and vibrational impacts associated with the construction and operations of the proposed project.

- Raw data from the Applicant's nine-day noise survey results was not requested, reviewed or verified for adequacy or accuracy by Staff.

- Applicant's detailed noise survey results from M1 (St. Theresa Mission) and M2 (Charleston View Residence) indicate potential discrepancies in reported data, errors, and/or inadequate representation of noise levels in the surrounding environment. As of yet, there is no reasonable explanation for Applicant's reported average noise level difference of 14 dBA's between M1 and M2 at 5:00 a.m. during the nine-day test period.

- The use of sound survey results from M1 versus M2 would better represent the ambient noise levels at CR1 as it is located much closer to the Old Spanish Trail Highway/Tecopa Road.

- No data or analysis has been presented in either the AFC files or the FSA to determine the level of significance of noise impacts to CR1 or M1 from construction traffic on the Old Spanish Trail Highway/Tecopa Road during the 29-month construction phase.

- No analysis or determinations of significance regarding noise level impacts to CR1 or M1 were included in the FSA for operations of the concrete batch plant or concrete pouring during nighttime hours, despite these activities being projected to occur 21 hours per day for 12 months during the construction phase of the proposed project.

- The operational noise levels of the proposed project at CR1 will be, at minimum, at least 11 dBA's higher than reported by either the AFC or the FSA.

- The FSA fails to analyze operational noise impacts or render significance determinations to CR1 or M1 based on the predicted production of electricity for up to 16 hours per day.

- The FSA's proposed mitigation measures fail to describe how operational noise levels will be reduced to the newly proposed levels or how the facility may achieve any further reductions if the proposed limits are not met.

- The FSA presents contradictory determinations of significance and fails to substantiate or adequately support several of Staff's Proposed Findings of Fact that determine the projected noise levels to CR1 or M1 will be insignificant.

- The FSA's recommended Conditions of Certifications fails to adequately analyze or protect the people of Charleston View from significant adverse noise impacts during both the construction and operation of proposed project during its 25-30 year lifetime.

III. SUMMARY OF TESTIMONY

1. Accuracy of Noise Survey Data

An ambient noise survey was conducted in the proposed project vicinity at two locations, St. Therese Mission (M-1) and a residence approximately 0.5 miles from the Old Spanish Trail Highway/Tecopa Road (M-2) between May 18 and May 27, 2011. (See AFC, Noise, 2011.)

Though the M-2 residence was not the closest residence to the proposed project boundary, data acquired from the survey results was used to calculate the projected noise level to the nearest residence located approximately 950 south of the project boundary. The results from the sound survey were presented in Figure 1, Table 5.7-5 as illustrated below.

Figure 1

TABLE 5.7-5
Summary of Measurement Results (dBA)

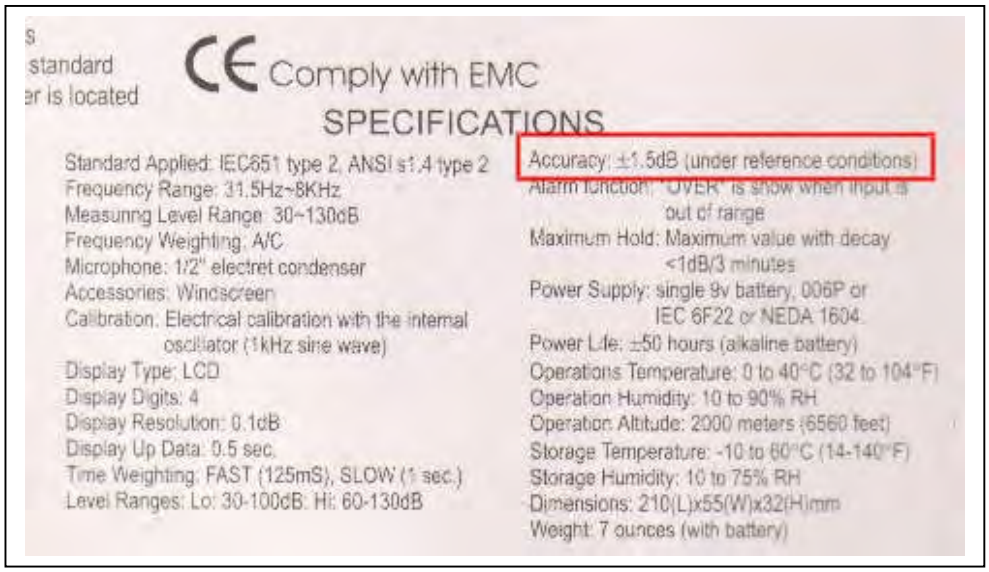
Map ID	Location Description	Average Daytime L_{eq}	Average Nighttime L_{eq}	Average L_{dn}
M1	St. Therese Mission Project	42	34	47
M2	Residential Monitor	45	40	51

Due to my experience with how quiet the project vicinity is, I submitted extensive comments and questions regarding the results of the sound survey data and conclusions. (*See* Preliminary Comments, Technical Analysis and Recommendations, HHSEGS, by C.R. MacDonald, Land Use, Development & Zoning, #3, Noise Pollution: The Bureaucratic Void, p. 117-122, March 9, 2012. Also see questions 1-3).

While neither the PSA or the FSA addressed these comments or questions, staff merely stated the Applicant's survey results were "reasonable". (See FSA, Noise & Vibration, Ambient Noise Monitoring, p. 4.6-5)

As a result, I purchased a sound pressure meter in attempt to provide some measure of independent verification of the noise monitoring results. Figure 2 is the specifications for the American Recorder, Digital Sound Pressure Level Meter, Model No. SPL-8810. This digital sound meter is described as, *"conforms to the IEC651, ANSI S1.4 type 2 for sound level meters and has been designed to meet measurement requirements of sound engineers, musicians, and health and industrial safety engineers."* It has both A and C weighting options, was calibrated at the time of packaging and has a reported accuracy rate of +/- 1.5 db.

Figure 2. American Recorder Digital Sound Pressure Level Meter Specifications



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SPECIFICATIONS

Standard Applied: IEC651 type 2, ANSI s1.4 type 2
Frequency Range: 31.5Hz~8KHz
Measuring Level Range: 30~130dB
Frequency Weighting: A/C
Microphone: 1/2" electret condenser
Accessories: Windscreen
Calibration: Electrical calibration with the internal oscillator (1kHz sine wave)
Display Type: LCD
Display Digits: 4
Display Resolution: 0.1dB
Display Up Data: 0.5 sec.
Time Weighting: FAST (125mS), SLOW (1 sec.)
Level Ranges: Lo: 30-100dB. Hi: 60-130dB

Accuracy: ±1.5dB (under reference conditions)
Alarm function: "OVER" is show when input is out of range
Maximum Hold: Maximum value with decay <1dB/3 minutes
Power Supply: single 9v battery, 006P or IEC 6F22 or NEDA 1604.
Power Life: ≥50 hours (alkaline battery)
Operations Temperature: 0 to 40°C (32 to 104°F)
Operation Humidity: 10 to 90% RH
Operation Altitude: 2000 meters (6560 feet)
Storage Temperature: -10 to 60°C (14-140°F)
Storage Humidity: 10 to 75% RH
Dimensions: 210(L)x55(W)x32(H)mm
Weight: 7 ounces (with battery)

On January 2, 2013, an informal independent sound test was performed at the residence known by the Visual Resource staff as "KOP 4" as it is in near proximity to the residence used by the Applicant to record noise survey data known as M2. The test was performed over a brief 5-minute period using an A-weighted sound level measurement with a "fast" response (for normal measurements) at approximately 3:00 p.m. (15:00 hours) in the afternoon. Test results ranged from 31.3 to 39.4.

Photo 2 & 3. Sound Monitoring Averages at KOP4, January 2, 2013, 3:00 p.m.

Comparing Applicant's test results of M-2 with this brief survey for the same time period (15:00 hours or 3:00 p.m.), measurements ranged over the nine-day test period from 41.5 to 60.3 averaging 46.6. (*See* HHSEGS AFC Files, Appendix 5.7A, Sound Monitoring Results, Table 5.7A-2, Sound Level Monitoring Results at Location M2).

While the location and activities associated with M2 during the test period are rather unclear, data provided by the Applicant from this location has raised questions regarding its accuracy or possibly the representiveness of M2 to accurately characterize the sound environment of the project vicinity as a whole.

One example includes questionably high sound pressure levels recorded at 5:00 a.m. throughout the test period at M2, the Charleston View residence, compared to the same time frame for St. Theresa. These test results appear to be very high for 5:00 am in the morning and especially so considering the 14 dba difference between St. Theresa Mission and the Charleston View residence as illustrated in Table 1 below.

Table 1. Comparison of Selective AFC Sound Survey Results

Date	St. Therese (M1) 5:00 AM	Charleston View (M2) 5:00 AM	St. Therese (M1) 3:00 PM	Charleston View (M2) 3:00 PM
5/18/2011	N/A	N/A	56	60.3
5/19/2011	36.9	47.1	46.1	49.4
5/20/2011	36.9	48.4	41.5	41.5
5/21/2011	32	48.5	45.1	46.4
5/22/2011	25.4	55.1	45.9	43.8
5/23/2011	38.1	46.8	52.1	47.2
5/24/2011	38.2	49.5	43.1	40.7
5/25/2011	31.8	48.9	51.3	48
5/26/2011	34.8	49.5	46.5	42.3
5/27/2011	41.9	47.5	N/A	N/A
Average	**35**	**49**	**47.5**	**46.6**

Source: HHSEGS AFC Files, Appendix 5.7A, Sound Monitoring Results.

2. Adequacy of Analysis and Noise Survey Results

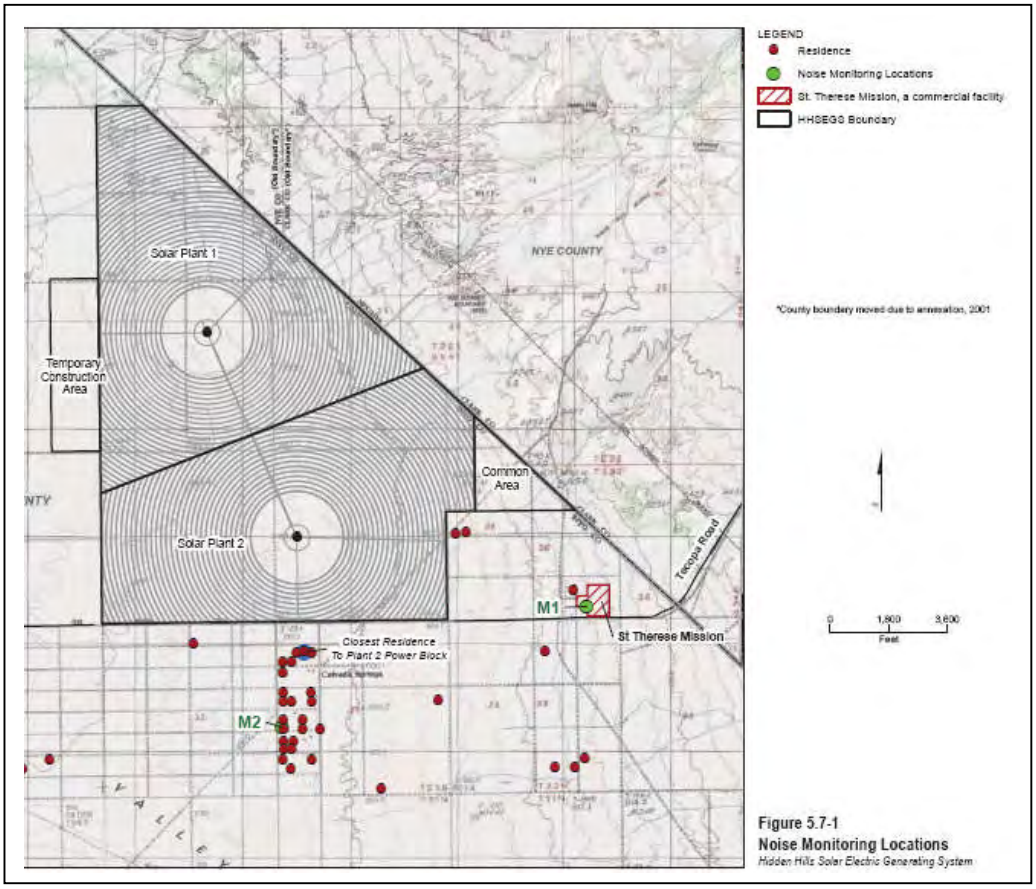
A. Predicted Impacts To CR1

An additional factor that heightens questions surrounding the AFC's reported data and/or accurate representativeness of the area noise levels was brought to CEC staff's attention early on in the AFC proceedings because the noise survey's results at the Charleston View residence were reported as being higher overall than those at St. Therese Mission, which is located almost directly adjacent to the Old Spanish Trail Highway/Tecopa Road. As such, the St. Therese location should have reflected a higher level of ambient noise levels due its proximity to passing vehicle traffic that would have contributed to higher recorded average noise disturbance levels versus a residence located approximately a half a mile from the paved highway; but it didn't.

The use of the sound survey results at M2 were used by Applicant to calculate noise level impacts to the residence closest to the power block at Solar Plant 2, known as CR1, which is reported at 3500 ft. (0.66 miles) from the power block and 950 ft. south from the proposed project's boundary.

However, based on my experience in the area, a more accurate representation for CR1 would have used the St. Therese's sound survey results because it would account for passing vehicle traffic on the Old Spanish Trail Highway/Tecopa Road since CR1 is much closer to the road than M2.

Figure 3. HHSEGS AFC Noise Monitoring Locations



With respect to the higher level of recorded sound data at M2, the only thing that I can think of that might have driven up the recorded sound levels at this location is its proximity to a residence that is known for the occasional use of heavy equipment and temporary "projects". Perhaps the sound test was performed during a time when this nearby residence was engaged in one such project or the sound monitoring equipment was placed next to a chicken coop with early morning crowing roosters. However, this would not be indicative of the overall ambient sound environment for Charleston View nor does it reasonably explain the large gap in survey results between the Charleston View residence and St. Therese Mission reported for 5:00 a.m. during the test period.

3. Concrete Batch Operations & Construction Noise

Based on emissions calculations for the onsite Concrete Batch Plant, the estimated hours of operation is approximately 21 hours per day for one year. (*See* 2012-04-09, Supplemental Data Response, Set 2, TN-64558, Attachment 5.1F-1, Construction Equipment Emission Factors pdf. p. 234.)

The Applicant also affirmed the length and duration of activities associated with concrete batch operations and pouring by stating:

> "*Double-shift work schedules will be used during solar field assembly and installation activities and construction activities will continue around the clock when concrete is poured for the solar towers*." (*See* 2012-04-09 Supplemental Data Response, Set 2, TN-64558, pg. 5.1-47).
>
> "*A concrete batch plant will also be operated for about 12 months of the 29-month construction period*." (*See* 2012-04-09 Supplemental Data Response, Set 2, TN-64558, pg. 5.1-48).

With respect to limits on noise associated from construction of the proposed project, in the PSA, Noise-6, CEC Staff proposed the following mitigation measure:

> "*NOISE-6: Heavy equipment operation and noisy construction work relating to any project features, including pile driving, shall be restricted to the times delineated below: Mondays through Saturdays: 7:00 a.m. to 7:00 p.m. Concrete pouring during hot summer days may be performed outside the above hours, with the CPM approval*." (*See* CEC Preliminary Staff Assessment, Noise, Construction Restrictions, Noise-6, pg. 491).

In response to the PSA, I raised several issues and questions regarding noise impacts associated with potentially unrestricted operations of the concrete batch plant. (*See* MacDonald PSA Comments, Supplemental Comments & Analysis, 11. Noise and Vibration, 2. Unrestricted Concrete Pouring: No Impact Disclosure, p. 11-4.)

As noted with the first set of comments submitted on March 9, 2012, Staff failed to acknowledge any comments or respond directly to any of my questions as is evident in the Noise & Vibration section of both the PSA and FSA.

However, with respect to the following question, "*What are the predicted noise levels the activity of concrete pouring will have during daytime and nighttime hours*?", (See MacDonald PSA Comments, Supplemental Comments & Analysis, 11. Noise and Vibration, 2. Unrestricted Concrete Pouring: No Impact Disclosure, p. 11-4, Q. #2), the FSA provides a partial, indirect response as evidenced in Noise Table 3: Predicted Construction Noise Levels from the FSA, p. 4.6-7.

Here, Staff reported noise levels for various construction activities including concrete pouring at CR1 and St. Therese. However, Staff provided no data source for dba levels for each construction activity including any distinction between the noise levels produced at the concrete batch plant versus concrete pouring, provided no distances from the concrete batch plant to CR1 or M1 to verify the accuracy of Staff's calculations (dba levels without distance calculations are meaningless), presented no means to illustrate how Staff derived these conclusions as well as omitted a critical component from both the calculations and conclusions, this being an analysis of the concrete batch plant and concrete pouring noise impacts during the average nighttime L_{eq}.

Figure 4

Noise Table 3: Predicted Construction Noise Levels

Receptor	Type of Construction Activity	Highest Construction Noise Level L_{eq} (dBA) [1]	Measured Existing Ambient, Average Daytime L_{eq} (dBA) [2]	Cumulative, Construction Plus Ambient	Change
CR1	Concrete Pouring	41	45	46	+1
	Steel Erection & Mechanical	50		51	+6
	Site Cleaning, Excavation, & Cleanup	53		54	+9
M1	Concrete Pouring	33	42	43	+1
	Steel Erection & Mechanical	43		46	+4
	Site Cleaning, Excavation, & Cleanup	44		46	+4

Sources: [1] EPA, 1971, Barnes et al., 1976, HHSG 2011a, AFC Table 5.7-6, and staff calculations
[2] Noise Table 2, above

The AFC files also provided a table with construction equipment and composite noise levels associated with the construction phase of the proposed project as illustrated in Figure 5, Table 5.7-6, Construction Equipment and Composite Noise Levels, p. 5.7-10.

Figure 5

TABLE 5.7-6
Construction Equipment and Composite Site Noise Levels

Construction Phase	Loudest Construction Equipment	Equipment Noise Level (dBA) at 50 feet	Composite Site Noise Level (dBA) at 50 feet	Composite Site Noise Level (dBA) at 1 mile
Demolition, Site Clearing, and Excavation	Dump truck Backhoe	91 85	89	49
Concrete Pouring	Truck Concrete mixer	91 85	78	38
Steel Erection	Derrick crane Jack hammer	88 88	87	47
Mechanical	Derrick crane Pneumatic tools	88 86	87	47
Cleanup	Rock drill Truck	98 91	89	49

Source: EPA, 1971; Barnes et al., 1976.

Based on the available evidence, neither Applicant or Staff's data, analysis or conclusions provide any consistent application or standard to measure or compare methods or results, both fail to provide background information describing the methods and analysis used to derive their conclusions as well as Staff failing to explain why and for what reasons Staff derived different results than the AFC files for noise levels associated with same construction equipment and activities.

As such, there is no basis to support either the analysis or the determination that noise impacts from construction activities including batch plant operational noise levels or noise associated with concrete pouring is within tolerances or that these activities will not result in significant adverse noise impacts to the environment and residences in Charleston View.

4. Significant Operational Noise Impacts To Charleston View

The AFC files provided dBA levels of sound power levels for major plant components as illustrated in Figure 6, Table 5.7-8.

Figure 6

TABLE 5.7-8
Sound Power Levels Used to Model HHSEGS, dBA

Plant Component	Sound Power Level dBA
Transformers	106
Steam Turbine Generator	111
Boiler Feed Water Pumps	109
Auxiliary Boiler	117
Air Cooled Condenser	112

Applicant states that a very sophisticated modeling program was used that calculated, "the sound pressure level that would occur at each receptor from each source after losses from distance, air absorption, blockages, and other factors [were] considered" after using the base noise levels outlined above. The model concluded that, "Operational noise from the HHSEGS is predicted not to exceed 54 dBA at the closest residence or 52 dBA at the St. Therese Mission." (*See* HHSEGS AFC, 5.7 Noise, p. 5.7-12/13)

In my first submission to CEC Staff regarding questions surrounding the Applicant's data, analysis and conclusions, I asked if Staff had received, requested or reviewed the raw data results of the Applicant's sound monitoring tests at M1 and M2 as well asking if Staff had reviewed the Applicant's modeling methods, averages, and predicted operational noise impacts for accuracy.

While Staff requested additional modeling data and/or information from Applicant regarding other technical disciplines such as emissions, water supply and solar flux, there is no indication that Staff requested any additional information or data concerning the modeling parameters used to predict operational noise levels or even if the Applicant's modeling and its resulting conclusions were ever evaluated for accuracy or adequacy.

Instead, Staff merely assumed Applicant's modeling parameters, data and conclusions were correct and made all operational noise impact assumptions based solely on AFC data without any attempt to independently verify the data or determine if the conclusions were reached through adequate and reasonable analysis and methods.

However, what Staff did do is determine that noise associated with pile driving (rated at 104 dBA at 50 ft.) during the construction phase of the proposed project would result in a 65 dBA noise level at CR1 (approximately 0.66 miles south of Solar Plant 2's power block) and 57 dBA at M1 (approximately 1.7 miles from the nearest power block).

Staff's calculations of producing a noise level at CR1 of 65 dBA for pile driving at 3500 feet is almost identical to the dBA level presented by the Applicant for pile driving at one mile as illustrated below in Figure 7Table 5.7-7.

Figure 7

TABLE 5.7-7
Noise Levels from Common Construction Equipment at Various Distances

Construction Equipment	Typical Sound Pressure Level (dBA)			
	50 feet	1,500 feet	3,000 feet	1 mile
Pile drivers (20,000-32,000 ft-lb/blow)	104	74	68	64
Dozer (250-700 hp)	88	58	52	48
Front end loader (6-15 cu. yds.)	88	58	52	48
Trucks (200-400 hp)	86	56	50	46
Grader (13 to 16 ft. blade)	85	55	49	45
Shovels (2-5 cu. yds.)	84	54	48	44
Portable generators (50-200 kW)	84	54	48	44
Derrick crane (11-20 tons)	83	53	47	43
Mobile crane (11-20 tons)	83	53	47	43
Concrete pumps (30-150 cu. yds.)	81	51	45	41
Tractor (3/4 to 2 cu. yds.)	80	50	44	40
Unquieted paving breaker	80	50	44	40
Quieted paving breaker	73	43	37	33

Note: At a distance of 1 mile, atmospheric and other attenuation would result in at least another 7 dBA reduction.

While pile driving was rated at 104 dBA at 50 feet, all of the major plant components listed in Table 5.7-8 used during operations rated between 106 and 117 dBA. Despite a request to do so, the FSA failed to explain, analyze or provide operational noise level data for any of these plant components and their associated noise impacts to CR1 or M1. However, it is reasonable to assume that if a pile driver used at the power block location of Solar Plant 2 would produce a noise level impact of 65-68 dBA's to CR1, then the auxiliary boiler rated at 117 dBA would create, at minimum, an equivalent noise level as the pile driver at the same location.

Though the AFC concluded that operational noise impacts at CR1 would not exceed 54 dBA, Staff concluded pile driving performed at Solar 2's power block would be the equivalent of 65 dBAs or 11 dBA's higher than the AFC's highest projected operational noise impacts to CR1. Since the noise levels from the auxiliary boilers are rated at 117 dBAs, it is reasonable to assume that operational noise impacts would be, at minimum, the equivalent noise levels of the pile drivers operating in the same location.

This is one of the reasons the adequacy of the AFC's modeling parameters, data input, and conclusions regarding operational noise impacts were called into question very early on in the AFC process. Unfortunately, these issues have yet to be addressed.

With respect to CR1, the PSA describes the impact of pile driving noise as representing a "quadrupling in noise level" based on solely applying noise level impacts to ambient daytime Leq levels.

However, this key conclusion was removed in the FSA regarding the quadrupling of noise levels associated with the proposed project's and its affects on CR1 and the surrounding community with no further explanation.

5. Nighttime Operational Impacts And Predicted Noise Levels

Neither Applicant or Staff have provided either analysis or conclusions regarding operational noise level impacts during nighttime hours. This omission of nighttime impact analysis is justified by alleging that noise levels associated with facility operations will only be applicable during daylight hours, not during the night because the plant will not be operational.

However, according to the AFC and the FSA, the proposed power plant is projected to be operational and generating electricity for up to 16 hours per day. (*See* FSA, Cover, Executive Summary, Introduction, Description, p.1.1-1)

Despite the areas "high solarity", the sun does not shine in the project vicinity for 16 hours a day – ever. As such, a failure to analyze the operational noise levels impacts to the community and adjacent residence's under nighttime conditions is both inappropriate and inadequate according to the substantive requirements of CEQA.

6. No Data or Analysis To CR1 of Noise Levels From Construction Traffic

The residence known as CR1 is located 950 feet south from the proposed project's boundaries and approximately 600 feet from the Old Spanish Trail Highway/Tecopa Road.

Construction traffic at its peak is projected to generate a total of 4,000 daily construction related trips comprised of 3,820 daily automobile trips and 180 truck trips. This is further refined by estimating 1,401 automobiles and 10 trucks would occur during the morning peak hour with the same estimate occurring for the afternoon peak hour. (*See* FSA, Traffic and Transportation, p. 4.10-20).

Though the FSA Traffic and Transportation analysis fails to include impacts to the community of Charleston View in any manner, a brief declaration of construction traffic impacts to St. Therese is described as "heavily impacted". (*See* FSA, Traffic and Transportation, p. 4.10-44).

Comparatively, St. Therese is located much farther away than CR1 is from the temporary construction area located at the western boundary of the proposed project site. Due to the projected construction traffic, it is possible that a high volume of construction traffic will be idling and/or moving very slowing directly in front of CR1 (and other residences) on the Old Spanish Trail Highway/Tecopa Road as they attempt to gain entry or exit the proposed project site.

The noise levels and cumulative impacts of this construction traffic to CR1 (and other residences) has not been analyzed in any manner in efforts to determine if these noise levels impacts would be significant.

7. Contradictory Determinations of Significance

The FSA provides contradictory determinations and conclusions regarding noise impacts of the proposed project that are yet to be resolved. First, Staff concludes that an increase of 10 dBA at the project's noise-sensitive receptors and presence of people in Charleston View during the day would result in significant noise impacts. (*See* FSA, Noise and Vibration, p. 4.6-12)

The FSA also concludes that additional mitigation measures may be required and as described below, makes the following declaration:

> "*Staff believes that adequate feasible mitigation measures are available to reduce the project noise alone by up to 3 dBA at CR1, but any reduction beyond that would likely be extremely difficult to achieve, considering the quiet character of the noise environment and the lack of intervening structures or topographical/natural barriers between the project site and the noise-sensitive receptors. Thus, staff concludes that the projected project noise levels must be reduced*."

This declaration is followed by Noise Table 5: Staff-Proposed Operational Noise Levels at the Identified Sensitive Residential Receptors. Here, Staff removes 3 dBAs from the Applicant's projected operational noise levels of 54 dBA at CR1 and 52 dBA at M1; but fails to describe or specify how Staff believes this reduction in operational noise levels will be achieved.

The FSA then cites a revised Condition of Certification, Noise-4, as the method for ensuring compliance with the proposed operational noise levels presented in Table 5. However, Noise-4 requires the reduction of operational sound levels if they exceed the limits proposed in Table 5, <u>even though by Staff's own admission, any reduction beyond the 3 dBA that had already been applied in Table 5 would likely be extremely difficult to achieve.</u>

After declaring in at least two instances that noise level impacts of the proposed project are "significant" and must be reduced, Staff applies an unknown set of mitigation measures to reduce projected operational noise levels by 3 dBAs, then concludes that "somehow, someway", if project operation noise levels exceed these new limits, operational noise levels can be reduced again by some unknown mechanism(s) until suddenly, the FSA is able to state in the Proposed Findings of Fact that construction and operation of the HHSEGS would not significantly increase noise levels above existing ambient levels in the surrounding project area and operational noise would not cause significant impacts to nearby residences.

22. VISUAL RESOURCES

TESTIMONY OF C.R. MACDONALD, INTERVENOR

I. INTRODUCTION

A. Qualifications: Committee Order Granting Petition To Intervene

B. Prior Filings: In addition to the statements herein, this testimony includes by reference the following documents submitted in this proceeding:

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D. Documents Prepared By Others:

Exhibits 714, 722, 724, 725, 726, 728, 733, 734, 737, 741, 744, 746
Attachment 1. Testimony of Kevin Emmerich

It is my intent to invoke the requirement that the Applicant bear the burden of proof regarding the information provided in the HHSEGS AFC and subsequent documents throughout this proceeding. This will include requesting where the Applicant has addressed the issues previously raised and to provide evidence that supports the statements and conclusions presented in the AFC and throughout these proceedings.

It is also my intent to invoke Staff's requirements under CEQA and Title 20 to provide evidence of where they have addressed issues previously raised and to provide evidence that supports the statements and conclusions presented in the PSA and/or FSA.

Therefore, I will be focusing on many of the issues raised throughout these proceedings during the Evidentiary Hearings and consider much of my previous submissions as the foundation of my testimony.

To the best of my knowledge, all of the facts contained in this testimony are true and correct or were true and correct at the time they were previously filed. With respect to documents prepared by others, I have endeavored to find the most credible source of facts to incorporate by reference in these proceedings but can make no sworn testimony as to their truth or accuracy on the preparer's behalf. To the extent this testimony contains opinions, such opinions are my own. I make these statements, and render these opinions freely and under oath for the purpose of constituting sworn testimony in this proceeding.

II. PROPOSED FINDING OF FACTS

- The facts surrounding the actual operational impacts of glint and glare to visual and other resources remain unknown. As such, the utility scale system being considered for deployment at the proposed HHSEGS should be regarded as highly experimental due to their unproven status.

- At best, the glare emanating from the "power towers" SRGS will result in an inescapable visual nuisance for the residents of Charleston View, many of which spend a great deal of time outdoors. Views looking north will "disappear" as visual discomfort will force us to avert our sight from the glares direction during operations. At worst, calculations assuring safety and lack of long-term impact from the glares to regular viewers in the area will prove inaccurate.

- Glint from heliostat/mirror assemblies may post risks to passing motorists due to factors beyond anyone's control. Those who travel the road on a frequent basis such as residents of Charleston View will be most susceptible to increased exposure if these events occur.

- The FSA noted that older people were more susceptible to the effects of glare from the receivers than younger viewers under age 40. Therefore, a large portion of residents in Charleston View would be "more susceptible" because of their ages.

- The visual impacts of heliostat/mirrors appearing to "glow in the dark" to nighttime views have yet to be addressed by Applicant or Staff.

- Safety glasses should be offered to local residents for "free" since they are in such close proximity to the "discomforting" glare

- Screening the proposed HHSEGS perimeter with trees to block the views and add a layer of protection to passing motorists increase risks to avian species as "trees" are the preferred habitat of most birds. When trees are combined with the reported "lake like reflection" of the heliostat fields, it may also serve to increase migratory bird injuries or fatalities. Trees will also increase the water demands of the proposed project, though to what extent has remained undisclosed. As such, other methods of screening the proposed projects boundaries visual degradation must be incorporated in the COC's instead.

- Approving the HHSEGS will provide the reason to approve the VEA Hidden Hills transmission and gas pipeline. Once constructed, infrastructure will be in place to allow further development of industrialized solar facilities such as the proposed Sandy Valley SEGS, which will also incorporate "power towers" with associated discomfort glare extending for over 16 miles on the Old Spanish Trail Highway/Tecopa Road with possible overlaps.

III. SUMMARY OF TESTIMONY

Throughout the FSA, the community of Charleston View is given little to no consideration or discussion regarding the significant, irreparable and adverse impacts the proposed project would have on the remote, rural "frontier like" lifestyle and visually aesthetic resources that have historically and are currently enjoyed by the people who live in there.

In 1971, my father purchased the land that became our home for the last forty years. This location was chosen specifically because of its remote, wilderness qualities and is picture perfect natural setting as not everyone appreciates the frenzied, over-crowded, disconnected, noisy, smelly, crime ridden, and asphalt incrusted lifestyle that must be endured while living in a city.

The ability to live on a daily basis in a quiet, remote, rural, natural, wide-open environment that allows one to connect to the seasons, to the wildlife, to the sky, the sun, the air - is a lifestyle value that cannot be quantified or easily replaced.

The wilderness values and lifestyle that myself and my family love, that we have immensely enjoyed, that we treasure and that is inherent in the Charleston View area, will be permanently and irreparably destroyed by the conversion of the wilderness like values and panoramic views of the area to one of heavy industrialization.

The approval of the HHSEGS will result in not only industrialization of over 3,000 acres located directly adjacent to Charleston View, it will also most likely be indirectly responsible for the construction and operation of the 15,000 acre proposed Sandy Valley SEGS approximately 5 miles east of Charleston View because of the connected action of the transmission and gas line required to service the HHSEGS and the SVSEGS.

For the FSA to conclude that the proposed project would not directly or indirectly divide an established community or disrupt an existing or recently approved land use is not accurate. The construction and operation of a power plant being responsible for the direct conversion of a wildness like natural setting to one of heavy industrialization is considered highly disruptive to existing land uses in the project vicinity, i.e., Charleston View residents, their lifestyle and the aesthetic and social values associated with living in this unique, remote, natural, rural and picturesque environment.

For example, the majority of residents in Charleston View will be less than 1 mile away from Solar 2's SRGS. Additionally, many residents will be forced to drive directly into the glare emanating from the solar receivers every time we check the mail, deposit our trash, use existing exits or even try to view the northern portion of the Pahrump Valley. CEC Staff described this glare as:

*"This level of luminance would be 32 times more luminous than the desert sky and be perceived as intensely bright to considerable distances. Noting that no such light source of spatial extent and luminance has been known to exist previously and therefore extensive data are nonexistent, staff estimates that the SRSGs would appear very bright to a distance of approximately 17 miles, and <u>would potentially constitute a significantly disruptive source of **discomfort** glare to viewing distances of approximately 8.5 miles."</u>* (*See* CEC HHSEGS FSA, APPENDIX VR-2, Visual Resource Glint and Glare Impact Assessment, p. 4.12-64)

Visual Resource: Photo 1

KOP4, a Charleston View residence located approximately 1 mile from Solar 2's SRGS with a simulated view prepared by Applicant. Source: Applicant's Data Response Set 2C, TN-63966, *3/05/12.*

The open, vast expanses of desert floor where now - life moves about freely - will become shaved, cut, carved, fenced, walled up and equipped with razor wire signaling the end of what was once abundant freedom, now lost.

The people of Charleston View will be forced to carry the majority of the burden for the development of the proposed HHSEGS and its construction and operation will mean the permanent and irrevocable end of a lifestyle that has been embraced and enjoyed for over four decades.

As such, the FSA's failure to reasonably include, consider, incorporate, analyze or issue impact determinations under Title 21 regarding the residents of Charleston View being forced to accept the irreplaceable loss of our lifestyle, the permanent degradation of the landscape and its visual qualities, and the destruction of the abundant beauty, resources and natural environment through sacrificing a large portion of the landscape for this singular, dominate facility should not be considered adequate to met the substantive requirements of CEQA.

Furthermore, there are parcels within a six-mile radius of the proposed HHSEGS that have been designated under a "Rural Protection" status by Inyo County. See Figure 2.

It is impossible to preserve to preserve the visual landscapes associated with a "Rural Protection" designation aims to achieve if such land is in close proximity to a heavily industrialized facility (or facilities) that will encompass approximately five square miles, host two 750 ft. towers and incorporate receivers that cast an uncomfortable glare of light for an estimated 8.5 square miles in every direction.

ATTACHMENT 1

KEVIN EMMERICH
TESTIMONY & RESUME

VISUAL RESOURCES

HHSEGS 11-AFC-02

Testimony of Kevin Emmerich

1. The photographs are taken with a digital Nikon Cool pix P500 36 X optical zoom .

2. I have visited the Hidden Hills SEGS proposed site on 25 August 2011, and on the California Energy Commission Field Trip on 3 November, 2011. On these visits I spent from one to three hours on the site and the immediate vicinity. On the visits, we had a clear view of the adjacent mountain ranges, wilderness areas and Stump Spring Area of Critical Environmental Concern. All of these viewing areas are in clear view of the project site and the project would clearly be visible from these areas.

3. On July 5th, 2012 and July 23rd, 2012, I visited the Stump Spring Area of Critical Environmental Concern (ACEC), Nevada. The view looking northwest from Stump Spring and looking east and southeast will be dramatically changed by the view of the project and the view of the pending Hidden Hills Transmission Project. I believe that the historic and prehistoric character of the Old Spanish Trail, the ACEC and the region in general will be degraded and permanently altered.

^View towards project site from Stump Spring ACEC July 5th, 2012

^View towards project site from Stump Spring ACEC, July 23rd, 2012

^Looking towards proposed Hidden Hills Transmission Project from Stump Spring ACEC, July, 5, 2012

4. On July 17th, 2012, I hiked on the Bonanza Peak Trail, in the Mt. Charleston Wilderness Area, in the Toiyabe National Forest, Clark County Nevada, Spring Mountains National Recreation Area and photographed the project site from the ridge. The glow from the power towers and the potential flash glare events from the heliostats would be visible from this wilderness area. Red flashing aviation lights would also be visible at night time. It would add an un-natural element to the view looking southwest from the wilderness area. The Energy Commission used this photo in their review.

^From the ridge of Bonanza Peak, Mt. Charleston Wilderness Area, July 17th, 2012

5. On September 14th, 2012 and September 29th, 2012 I visited the Nopah Range Wilderness Area, California and photographed the proposed project site to the east during the late afternoon hours. I believe that this wilderness area would be particularly susceptible to the visual impacts of the proposed project. The glow effects from the towers and probable flash-glare from the heliostats will most likely be visible from this wilderness area throughout different times of year.

^View of the proposed project site in late afternoon from the Nopah Range Wilderness Area. September 14th, 2012

^View of the proposed project site in late afternoon from the Nopah Range Wilderness Area. September 14th, 2012

^Moonrise seen from the Nopah Range Wilderness area looking directly across the project site. September 29th, 2012

6. From 1991 to 2002 I was employed as a park ranger with the National Park Service in Death Valley National Park, California. Part of my job was to staff the visitor center information desk. Visitors would often make requests for information about The Old Spanish Trail and would often choose to travel from Death Valley to Las Vegas via the Old Spanish Trail Highway. Their goal was to take a scenic route to Las Vegas, stop at China Ranch and see the actual site of the Old Spanish Trail site. I believe they were looking to see the area in its historic nature, not partially as

an industrial power plant. I believe the proposed project and transmission line will degrade the visitor experience. In my experience, desert recreationists are seeking the wide open vistas, natural landscapes, wildlife,
viewing, and wild feel of the American Southwest, and a large power plant with flash- glare from heliostats and unsightly new transmission lines could negatively affect their visit

7. I feel that the scenery in the southern Pahrump Valley and surrounding conservation areas are more deserving of preservation over development. The sweeping views of undeveloped mountains and desert basins have qualities that compliment adjacent Wilderness Areas. Both the direct and cumulative impacts from the Hidden Hills SEGS, the Valley Electric Hidden Hills Transmission Project, as well as proposed projects like Abengoa's Pahrump Valley Solar Project will drive visitors away. I own a 4x4 vehicle, and enjoy traveling on the dirt roads to access remote desert areas to camp, hike, and photograph natural subjects. I have visited the Nopah Range Wilderness Area, the South Nopah Range Wilderness Area, the Kingston Wilderness Area, the Pahrump Valley Wilderness Area, the Mt Charleston Wilderness Area and the Stump Spring Area of Critical Environmental Concern.

^Photo taken in April, 2010 of a "flash glare" event from the Nevada Solar One plant south of Boulder City, Nevada. Although the CSP technology is different for this facility, the heliostats could produce similar flash-glare from the Hidden Hills SEGS Project.

Resume of Kevin Emmerich
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EDUCATION:

Utah State University, Logan, Utah 1981-1982

University of Utah, Salt Lake City, Utah 1983-1985

Major: Physical Geography

WORK EXPERIENCE:

Park Ranger, Natural Bridges National Monument

Duties:

Visitor interpretation and information and emergency response, trail and road patrols, resource monitoring projects-wildlife and plants. Survey and monitoring of archeology sites, park entrance fee collection. 1985,1987 to 1988.

Park Ranger, Grand Canyon National Park

Duties:

Visitor interpretation and information and emergency response, park entrance fee collection, assistance in backcountry management. 1988, to 1990.

Park Ranger, Bandelier National Monument

Duties:

Visitor interpretation and information, park entrance fee collection.
Backcountry trail patrol. Archeology site surveys. 1989-1990

Park Ranger, Great Basin National Park

Duties:

Visitor interpretation and information, park entrance fee collection. 1990,1991

Park Ranger, Death Valley National Park

Duties:

Visitor interpretation and information, park entrance fee collection, environmental education outreach, museum display, emergency response, resources monitoring projects on wildlife including bighorn sheep, desert tortoise, western toads, Panamint alligator lizards and Mojave fringe-toed lizards.

Served on backcountry and wilderness committees, evaluated management plans, and NEPA documents development projects. Visual resources were always a part of the evaluation. 1991 to 2002.

Recreation Technician,
Bureau of Land Management
San Juan Resource Area
Duties:

Checked permits and equipment of people taking raft, kayak and canoe trips down the San Juan " River in Southern Utah. River Patrols. Reviewed visual impact analysis. 1986

Recreation Technician,
Bureau of Land Management
Grand Resource Area

Duties:

Checked permits and equipment of people taking raft, kayak and canoe trips down the Colorado River in Westwater Canyon in Southern Utah. River Patrols. Reviewed visual impact analysis.

1987

VOLUNTEER EXPEIDENCE

Park Volunteer
Arches National Park
Duties:
Visitor interpretation and information. 1987

Sunset Crater National Monument
Duties:

Visitor interpretation and information. 1985

OTHER:

Field Biologist for Chuckwalla Study in Death Valley National Park and region. Visual encounter surveys for repeat counts to estimate population trends over multi-year period, for the Timbisha Shoshone Tribe. Concerns about declines noted by the Tribe triggered a long-tenn study on Chuckwalla feeding behavior, habitat, breeding areas, Traditional Ecological

Knowledge, and potential threats. 2007-2009.

Volunteer in Desert tortoise study with Hal Avery, PhD, in southern Ivanaph Valley. Radiotelemetry of tortoises, habitat surveys for tortoise forage and interaction with cattle, rainfall measurement, X-ray of tortoises for egg counts. Spring and Fall 1999 and 2000. 400 hours

Field Biologist Assistant on Surveys for Tortoise on Blythe reservoir project. Initial surveys for
tortoise and sensitive species in Riverside County, California, for Edward LaRue. April 2000.

Volunteer Biology Survey: Desert Tortoise Natural Area. 50 hours, Spring, 1997

Field Biologist, Mojave fringe-toed lizard survey on OHV recreation areas. Work under David Morafka, PhD, for BLM study on affects of off-road recreation on lizard density, distribution, and population at Dumont Dunes and Rasor Dunes. Area-constrained surveys and habitat characterization. Presence-absence surveys on other habitats in region. 2002. Contributions to Morafka, David J. 2002. 1000 meter transect analyses of frequencies of Mojave fringed- toed lizards at ORV BLM sites at EI Mirage Dry Lake, Rasor Road, and Dumont Dunes, San Bernardino County, California, Summary Report for 2002 and recommendations for 2003. Prepared for Anteon Corporation.

Field Biologist, Mojave fringe·toed lizard surveys and genetic sampling. Work under David Morafka, PhD, at EI Mirage Dry Lake, Coyote Holes, Silver Lake, Rasor Dunes, Dunomt Dunes, Ibex Dunes. 2001-2002. Contributions to Murphy, Robert W., Tanya L. Trepanier, and David J. Morafka. 2006. Conservation genetics, evolution, biogeography and distinct population segments of the Mojave Fringe- toed Lizard, *U. scoparia.* Journal of Arid Environments

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APPLICATION FOR CERTIFICATION FOR THE HIDDEN HILLS SOLAR ELECTRIC GENERATING SYSTEM

Docket No. 11-AFC-02

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(Revised 9/20/12)

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DECLARATION OF SERVICE

I, *Cindy R. MacDonald* , declare that on *January 31, 2013*, I served and filed copies of the attached *Opening Testimony for HHSEGS*, dated *January 31, 1013*. This document is accompanied by the most recent Proof of Service list, located on the web page for this project at: **www.energy.ca.gov/sitingcases/hiddenhills/index.html**.

The document has been sent to the other parties in this proceeding (as shown on the Proof of Service list) and to the Commission's Docket Unit or Chief Counsel, as appropriate, in the following manner:

(*Check all that Apply*)

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___ Served electronically to all e-mail addresses on the Proof of Service list;

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OR, if filing a Petition for Reconsideration of Decision or Order pursuant to Title 20, § 1720:

____ Served by delivering on this date one electronic copy by e-mail, and an original paper copy to the Chief Counsel at the following address, either personally, or for mailing with the U.S. Postal Service with first class postage thereon fully prepaid:

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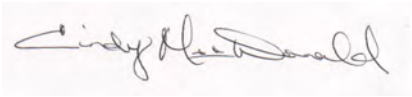
I declare under penalty of perjury that the foregoing is true and correct.



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