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**DOCKET**

**09-AFC-8**

DATE DEC 15 2009

RECD. DEC 15 2009

December 15, 2009

California Energy Commission  
Docket Unit  
1516 Ninth Street  
Sacramento, CA 95814-5512

Subject: **Groundwater Model Sensitivity Analysis for Genesis Solar Power Project, Riverside County, CA  
Docket No. (09-AFC-8)**

Enclosed for filing with the California Energy Commission is the original of **Groundwater Model Sensitivity Analysis for Genesis Solar Power Project, Riverside County, CA**, for the Genesis Solar Energy Project Docket No. (09-AFC-8).

Sincerely,

Robert A. Gladden



**WorleyParsons**

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December 9, 2009

52004617

**Genesis Solar LLC**

700 Universe Blvd.

Juno Beach, FL 33408

*Attn: Mike Pappalardo, Environmental Manager*

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**Re: Groundwater Model Sensitivity Analysis for Genesis Solar Power Project, Riverside County, CA**

Dear Mr. Pappalardo:

As follow-up to Data Response Workshop with the California Energy Commission (CEC) last Friday, we are providing a work plan to perform sensitivity analyses of the groundwater flow model that is being constructed for the Genesis Solar Energy Project. The purpose of the sensitivity analysis is to quantify the uncertainty in the model caused by uncertainties in the estimates of aquifer parameters and boundary conditions. A sensitivity analysis involves systematically changing estimated values, within a previously established plausible range, to measure the sensitivity of the model to variations in a particular parameter. We are providing a list of model parameters, range of parameter values to be tested, and a list of locations where sensitivity results will be compared to the calibrated (and validated) groundwater flow model.

**MODEL PARAMETERS INCLUDED IN SENSITIVITY ANALYSIS**

We propose the following model parameters be included as part of the model sensitivity analysis:

- Horizontal hydraulic conductivity ( $K_h$ ) of aquifer layers. Analysis will include adjustment of  $K_h$  for model layers containing primarily permeable aquifer materials (relatively more sandy and gravelly strata). Model layers to be included in this analysis include layers 1, 2, and 7-13.
- Vertical hydraulic conductivity ( $K_z$ ) of aquifer layers. Analysis will include adjustment of  $K_z$  for model layers containing primarily permeable aquifer materials (relatively more sandy and gravelly strata). Model layers to be included in this analysis include layers 1, 2, and 7-13.
- Vertical hydraulic conductivity ( $K_z$ ) of aquitard layers. Analysis will include adjustment of  $K_z$  for model layers containing primarily relatively lower permeability materials (clays and silts) between the pumped interval and the water table aquifer. Model layers to be included in this analysis include layers 3-6.
- Conductance of General Head Boundaries (GHBs). The hydraulic conductance of General Head Boundaries will be adjusted in all model layers. Hydraulic conductance is a function of hydraulic conductivity ( $K_h$ ), hydraulic head at a desired distance from the model boundary, and cross-sectional area of the model grid cell containing the boundary condition. As the area of the model grid cell and hydraulic head are constant in an impact model, this analysis can be conveniently viewed as an adjustment of  $K_h$  at the model boundary, although it could also reflect a change in the gradient outside the boundary. In the real world, these changes could represent the presence of no flow boundaries or flow impedances, or a general lowering of the water table, in the portions of the basin that are outside the model boundaries. An analysis of



the GHB Conductance value will allow us to determine the sensitivity the estimated value has on change in flow across the boundary.

We have not included an assessment of groundwater recharge in our sensitivity analysis. As currently constructed, the impact model does not possess recharge from infiltration of precipitation. This is a conservative construct from the standpoint of a long-term project impact assessment – equivalent to the simulation of a 33-year drought with zero precipitation.

## RANGE OF MODEL PARAMETER VALUES TO BE TESTED

The following range of values will be used to evaluate the sensitivity of model parameters:

- $K_h$  of aquifer layers – 25% and 150% of the calibrated model value (approximately 3.5 feet/day and 21 feet/day)
- $K_z$  of aquifer layers - one order of magnitude (10x) increase and decrease from calibrated model values, which are currently approximately one order of magnitude less than  $K_h$ .
- $K_z$  of aquitard layers – one order of magnitude (10x) and two orders of magnitude (100x) increase and one order of magnitude (1/10x) decrease from calibrated model values, which are currently approximately 0.0005 feet/day.
- Conductance of General Head Boundaries – one order of magnitude (10x) increase and decrease from calibrated model values for each layer.

Note that some of the calibrated model values above are still being evaluated as part of our ongoing work to construct the model, and may change somewhat.

## PRESENTATION OF RESULTS OF SENSITIVITY ANALYSIS

Results of sensitivity analyses will be tabulated and compared to the results of the calibrated impact model. Results of individual model sensitivity analyses (e.g. increase of  $K_z$  by 10x) will be presented in terms of the simulated drawdown (decline in water level due to pumping) at key nearby locations, and increase or decrease in boundary inflow/outflow after 3, 5, and 33 years of project pumping. Results of model sensitivity analyses will be compared at the following locations: McCoy Spring, Palen Lake, the Production well pumping interval and water table, Well WP-4, Well WP-14, and Well WP-22.

We are hopeful this work plan meets with your approval.

Sincerely,  
**WorleyParsons**

Robert Lewis, PG  
Principal Hydrogeologist

Michael Tietze  
Infrastructure & Environment Location Manager





BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT  
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1-800-822-6228 – [WWW.ENERGY.CA.GOV](http://WWW.ENERGY.CA.GOV)

**APPLICATION FOR CERTIFICATION FOR THE  
GENESIS SOLAR ENERGY PROJECT**

**Docket No. 09-AFC-8**

**PROOF OF SERVICE  
(Est. 12/15/09)**

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**DECLARATION OF SERVICE**

I, Robert A. Gladden, declare that on December 15, 2009, I served and filed copies of the attached **Groundwater Model Sensitivity Analysis for Genesis Solar Power Project, Riverside County, CA** dated **December 9, 2009**. The original document, filed with the Docket Unit, is accompanied by a copy of the most recent Proof of Service list, located on the web page for this project at:  
**[[http://www.energy.ca.gov/sitingcases/genesis\\_solar](http://www.energy.ca.gov/sitingcases/genesis_solar)].**

The document has been sent to both the other parties in this proceeding (as shown on the Proof of Service list) and to the Commission's Docket Unit, in the following manner:

***(Check all that Apply)***

**For service to all other parties:**

sent electronically to all email addresses on the Proof of Service list;

by personal delivery or by depositing in the United States mail at Sacramento, California with first-class postage thereon fully prepaid and addressed as provided on the Proof of Service list above to those addresses **NOT** marked "email preferred."

**AND**

**For filing with the Energy Commission:**

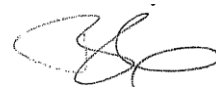
sending an original paper copy and one electronic copy, mailed and emailed respectively, to the address below (*preferred method*);

**OR**

depositing in the mail an original and 12 paper copies, as follows:

**CALIFORNIA ENERGY COMMISSION**  
Attn: Docket No. 09-AFC-8  
1516 Ninth Street, MS-4  
Sacramento, CA 95814-5512  
[docket@energy.state.ca.us](mailto:docket@energy.state.ca.us)

I declare under penalty of perjury that the foregoing is true and correct.



\_\_\_\_\_  
Robert A. Gladden