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September 4, 2009

Via Electronic Mail and U.S. Mail

Mr. Kent Larson, Vice President
Martifer Renewables Solar Thermal LLC
12555 High Bluff Drive, Suite 100
San Diego, CA 92130

Re: San Joaquin Solar 1 and 2 Hybrid Project (08-AFC-12)
CURE Data Requests Set Five (Nos. 206-278)

Dear Mr. Larson:

California Unions for Reliable Energy (CURE) submits this fifth set of data requests to Martifer Renewables Solar Thermal LLC for the San Joaquin Solar 1 and 2 Hybrid Project, pursuant to Title 20, section 1716(b), of the California Code of Regulations. The requested information is necessary to: (1) more fully understand the project; (2) assess whether the project will be constructed and operated in compliance with all laws, ordinances, regulations and standards; (3) assess whether the project will result in significant environmental impacts; (4) assess whether the project will be constructed and operated in a safe, efficient and reliable manner; and (5) assess potential mitigation measures.

Pursuant to section 1716(f) of the Energy Commission's regulations, written responses to these requests are due within 30 days. If you are unable to provide or object to providing the requested information by the due date, you must send a written notice of your objection(s) and/or inability to respond to Commissioners Levin and Boyd and to CURE within 20 days.

Please contact us if you have any questions. Thank you for your cooperation with these requests.

Sincerely,

/s/

Tanya A. Gulesserian

TAG:bh

Enclosure

STATE OF CALIFORNIA
California Energy Commission

In the Matter of: The Application for Certification for the San Joaquin Solar 1 and 2 Hybrid Power Plant Project	Docket No. 08-AFC-12

CALIFORNIA UNIONS FOR RELIABLE ENERGY DATA REQUESTS, SET FIVE

September 4, 2009

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Attorneys for the CALIFORNIA
UNIONS FOR RELIABLE ENERGY

The following data requests are submitted by California Unions for Reliable Energy. Please provide your responses as soon as possible, but no later than October 5, 2009, to each of the following people:

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Please identify the person who prepared your responses to each data request. If you have any questions concerning the meaning of any data requests, please let us know.

San Joaquin Solar ("SJS") 1 & 2

CURE Data Requests Set #5

PROJECT DESCRIPTION

Background: SPECIFICATIONS FOR FLUIDIZED BED COMBUSTORS

It appears that the Project would use bubbling fluidized bed combustors ("BFBs") manufactured by EPI.[1] The Applicant has not yet provided vendor specifications for the Project's BFBs.

Data Requests:

206. Please provide EPI vendor specifications for the fluidized bed combustors that will be installed at the Project.

Background: BIOMASS FUEL SUPPLY

The Applicant's Response to Data Request Workshop Action Items claims that 135,000 acres of orchards and vineyards along the I-5 corridor within 50 miles of the proposed Project would potentially produce an average of 5 million bone dry tons of biomass waste annually. According to the Applicant, this amount would be more than ten times the total fuel requirements of the Project, which would support the Applicant's expectation that the average one-way delivery distance of agricultural biomass will be 35 miles. This information is inconsistent with the Biomass Fuel Supply Review for the Project provided in the AFC, Appendix A-4, which determined that agriculture-sourced biomass material within and tributary to the Fuel Supply Area amounts to only 645,188 bone dry tons per year (without cow manure).[2] Furthermore, the Fuel Supply Area represents a 75-mile radius of the Coalinga site and the tributary sources may originate from as far away as San Francisco, San Mateo, Santa Clara, Santa Cruz, Alameda, Contra Costa, and Sacramento counties.[3]

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[1] 08-AFC-12, San Joaquin Solar 1 & 2 Hybrid Project, 3rd Response to CEC Data Request Set #1, July 13, 2009, Attachment AQ-2, Operational Emission Calculations, July 10, 2009, "Combustor Startup Emission Estimations, Table 1587 (from EPI), BFB Cold Start-up Sequence."

[2] AFC, Appx. A-4, Table 5, p. 12.

[3] AFC, Appx. A-4, p. 6.

Data Requests:

207. Please demonstrate how the 5 million bone dry tons annually of biomass waste from orchards and vineyards in the Applicant's Response to Data Request Workshop Action Items was derived.

208. Please discuss the discrepancy between the supply estimate of 5 million bone dry tons of agriculture-sourced biomass provided in the Applicant's Response to Data Request Workshop Action Items and the supply estimate of 645,188 bone dry tons per year of agriculture-sourced biomass (without cow manure) determined by the Biomass Fuel Supply Review for the Project provided in the AFC, Appendix A-4.

Background: BIOMASS FUEL MIX

The Applicant indicated that the anticipated fuel mix for the Project to be at least 50 percent agricultural wood waste and up to 50 percent municipal green waste.[4] The Applicant did not specify whether this 50/50 fuel mix is anticipated on an annual average basis or on a continuous basis. Because emissions of criteria air pollutants and toxic air contaminants vary depending on the composition of the fuel mix, it is important to maintain the fuel mix for which emission calculations have been prepared.

Data Requests:

209. Please specify whether the proposed fuel mix of "at least 50 percent agricultural wood waste and up to 50 percent municipal green waste" is anticipated on an annual average basis or on a continuous basis.

210. Please indicate whether the Applicant would accept a Condition of Certification requiring no less than 50 percent agricultural wood waste in the biomass fuel for the Project at any given time on a continuous basis.

Background: BIOMASS FUEL DELIVERY DISTANCE

The AFC states that SJS 1 & 2 are expected to utilize approximately 450,000 bone dry tons per year ("BDT/year") of biomass fuels in the biomass combustors with an anticipated mix of locally available fuels of 50 percent

[4] Applicant's 3rd Response to CEC Data Request Set #1, July 13, 2009, Response to Data Request #80.

agricultural wood waste and 50 percent municipal green wastes.[5] The AFC predicts that there are sufficient fuel supplies to meet the proposed Project's needs based on the assumption that 2.2 million tons of biomass fuel are available annually within, and tributary to, the San Joaquin Fuel Study Area.[6]

According to the Biomass Fuel Supply Review provided with the AFC, the majority of available municipal green wastes sources from metropolitan areas are tributary to the San Joaquin Fuel Study Area (364,350 BDT/year tree trimmings and 835,030 BDT/year urban wood waste) rather than locally available within the San Joaquin Fuel Study Area, *i.e.* within a 75-mile radius of Coalinga (59,000 BDT/year tree trimmings and 208,000 BDT/year urban wood waste).[7] Based on the location of the metropolitan centers discussed in the Biomass Fuel Supply Review, the average one-way delivery distance for urban wood waste originating from metropolitan areas tributary to the San Joaquin Fuel Study Area is approximately 184 miles.[8] Yet, the Applicant assumes only an average one-way distance of 60 miles for urban wood waste.[9]

Data Requests:

211. Please state whether the Project will rely on urban wood waste sourcing from metropolitan centers tributary to the San Joaquin Fuel Study Area. Please document your assumptions.

212. If the Project will rely on urban wood waste sourcing from metropolitan areas tributary to the San Joaquin Fuel Study Area, please provide what percentage of the Project's fuel demand would be met by non-local sources, *i.e.* sources located farther than 60 miles from Coalinga.

213. Please demonstrate the basis for assuming that the average one way delivery distance for urban wood waste is 60 miles.

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[5] AFC, p. 3-5.

[6] AFC, pp. 3-5 – 3-6.

[7] AFC, Appendix A-4, Tables 3 and 4, pp. 8-9.

[8] *See* AFC, Appendix A-4, p. 9. Santa Clara is approximately 180 miles from Coalinga; Santa Cruz is approximately 183 miles from Coalinga; San Francisco is approximately 200 miles from Coalinga; San José is approximately 150 miles from Coalinga; Alameda is approximately 186 miles from Coalinga; Contra Costa is approximately 180 miles from Coalinga; Sacramento is approximately 199 miles from Coalinga; San Mateo is approximately 192 miles from Coalinga. (183+200+150+186+180+199+192+180)/8 =183.75.

[9] 08-AFC-12, San Joaquin Solar 1 & 2 Hybrid Project, 3rd Response to CEC Data Request Set #1, July 13, 2009, p. AIR-15.

Background: BIOMASS COMBUSTOR FEED RATE

The Applicant's emissions estimates are based on a biomass feed rate of 46,360 pounds per hour ("lb/hr") per combustor and 75 percent capacity.[10] Elsewhere, the Applicant indicates that the maximum wood firing rate for each combustor is 53,847 lb/hr.[11]

Data Requests:

214. Please specify the maximum feed rate for the Project's biomass combustors.

215. Please discuss why emissions estimates were based on a biomass feed rate of 46,360 lb/hr for each combustor and 75 percent capacity rather than the maximum firing rate for the combustors of 53,847 lb/hr and 75 percent capacity. If necessary, please revise the emissions estimates for the biomass combustors based on the correct biomass feed rate and 75 percent capacity.

Background: ANNUAL BIOMASS FUEL REQUIREMENT

The Applicant repeatedly indicates that annual biomass fuel requirements for the facility would be approximately 450,000 BDT/year based on 75 percent capacity.[12] However, information provided elsewhere suggests that the annual biomass fuel requirements may be considerably higher.

In response to CURE's Data Request #12 the Applicant indicated a biomass feed rate for the combustors of 46,350 lb/hr. Based on this combustor feed rate and the average as-fired moisture content of a 50/50 mix of urban wood waste and agricultural wood waste of 19.25 percent,[13] the Project would require approximately 492,000 BDT/year at 75 percent capacity.[14]

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[10] *See*, for example, AFC p. 3-5 or 08-AFC-12, San Joaquin Solar 1 & 2 Hybrid Project 3rd Response to CEC Data Request Set #1, July 13, 2009, Response to CEC Data Request #82.

[11] 08-AFC-12, San Joaquin Solar 1 & 2 Hybrid Project, 3rd Response to CEC Data Request Set #1, July 13, 2009, Attachment AQ-2, Operational Emission Calculations, July 10, 2009, "Combustor Startup Emission Estimations, Table 1587 (from EPI), BFB Cold Start-up Sequence."

[12] *See*, for example, AFC p. 3-5 or 08-AFC-12, San Joaquin Solar 1 & 2 Hybrid Project 3rd Response to CEC Data Request Set #1, July 13, 2009, Response to CEC Data Request #82.

[13] (46,360 lb/hr biomass feed rate) × (8,760 hr/year) × (0.75 capacity factor) × (4 boilers) / (2,000 lbs/ton) × (1 – 19.25% moisture content of 50/50 mix of urban wood waste and agricultural wood waste) = 491,905 BDT/year.

[14](46,360 lb/hr biomass feed rate) × (8,760 hr/year) × (0.75 capacity factor) × (4 boilers) / (2,000 lbs/ton) × (1 – 19.25% moisture content of 50/50 mix of urban wood waste and agricultural wood waste) = 491,905 BDT/year.

Elsewhere, the Applicant indicates that the maximum wood firing rate for each combustor is 53,847 lb/hr.[15] Based on this combustor feed rate and the average as-fired moisture content of a 50/50 mix of urban wood waste and agricultural wood waste of 19.25 percent,[16] the Project would require approximately 571,000 BDT/year at 75 percent capacity.[17]

Data Requests:

216. Please demonstrate the annual biomass fuel requirements for the Project at 75 percent capacity (450,000 vs. 492,000 vs. 572,000 bone dry tons per year) using the appropriate combustor feed rate determined in response to Data Requests Nos. 214 and 215. Please be specific regarding the assumed fuel mixture and average moisture content of the biomass fuel.

ALTERNATIVES

Background: COMBUSTION TECHNOLOGY ALTERNATIVES

It appears that the Project would use bubbling fluidized bed combustors ("BFBs").[18] The AFC's Alternatives Analysis does not contain a discussion of alternative combustion technologies for biomass such as the use of circulating fluidized bed combustors ("CFBs") or two-state combustion with gasifiers.

Data Requests:

217. Please provide a discussion of alternative combustion technologies including circulating fluidized bed combustors ("CFBs") or biomass gasifiers.

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[15] 08-AFC-12, San Joaquin Solar 1 & 2 Hybrid Project, 3rd Response to CEC Data Request Set #1, July 13, 2009, Attachment AQ-2, Operational Emission Calculations, July 10, 2009, "Combustor Startup Emission Estimations, Table 1587 (from EPI), BFB Cold Start-up Sequence."

[16] (46,360 lb/hr biomass feed rate) × (8,760 hr/year) × (0.75 capacity factor) × (4 boilers) / (2,000 lbs/ton) × (1 – 19.25% moisture content of 50/50 mix of urban wood waste and agricultural wood waste) = 491,905 BDT/year.

[17](53,847 lb/hr biomass feed rate) × (8,760 hr/year) × (0.75 capacity factor) × (4 boilers) / (2,000 lbs/ton) × (1 – 19.25% moisture content of 50/50 mix of urban wood waste and agricultural wood waste) = 571,346 BDT/year.

[18] 08-AFC-12, San Joaquin Solar 1 & 2 Hybrid Project, 3rd Response to CEC Data Request Set #1, July 13, 2009, Attachment AQ-2, Operational Emission Calculations, July 10, 2009, "Combustor Startup Emission Estimations, Table 1587 (from EPI), BFB Cold Start-up Sequence."

Background: ALTERNATIVE FUELS

The Applicant stated in response to CURE Data Requests Nos. 44 and 45 that the Project has no intention of ever using rail ties, tires, or municipal solid waste as fuel and that the municipal green waste fuel may include construction/demolition wood, pallets, or "miscellaneous residential and commercial wood waste."[19] The response did not indicate what kind of waste materials could be contained in "miscellaneous residential and commercial wood waste."

Data Requests:

218. Please indicate whether the Applicant would be willing to accept a Condition of Certification prohibiting the use of rail ties, tires, and municipal solid waste as fuel.

219. Please discuss the potential waste materials contained in "miscellaneous residential and commercial wood waste." Please indicate whether these could potentially include pre-separated paper or cardboard as fuel.

220. Please indicate whether the Applicant would be willing to accept a Condition of Certification prohibiting the use of pre-separated paper and cardboard as fuel.

AIR QUALITY

Background: BIOMASS DELIVERY EMISSIONS

In its July 13, 2009 response to California Energy Commission Staff Data Request Set #1, the Applicant included a discussion of baseline conditions for determining emissions from the current use of biomass in San Joaquin Valley. Baseline conditions include emissions from the trucks that deliver biomass to existing power plants and from the common practice of open burning of agricultural waste.[20] Agricultural waste may include rice stubble and straw, chaff, prunings from a variety of fruit and nut trees, vine canes, and materials from removal of orchards and vineyards. The Applicant also provided an estimate of net project

[19] 08-AFC-12, San Joaquin Solar 1 & 2 Hybrid Project, Supplemental Information in Response to CURE Data Request Set #3, August 26, 2009, Responses to Data Requests #44 and #45.

[20] 08-AFC-12, San Joaquin Solar 1 & 2 Hybrid Project, 3rd Response to CEC Data Request Set #1, July 13, 2009, p. AIR-14.

impacts on emissions in the San Joaquin Valley Air Pollution Control District, based in part on the Project's impact on the average distance of one-way truck deliveries of biomass under continued open burning practices, and net project impacts on such distances if open burning practices are to be discontinued following implementation of San Joaquin Valley Air Pollution Control District, Rule 4103.[21]

Data Requests:

221. Please explain how the addition of the Project would impact total miles traveled for delivery of fuel for biomass within the San Joaquin Valley Air Pollution Control District.

222. Given that Rule 4103 applies only to agricultural waste, please substantiate your conclusion that the 60 miles average driving distance for urban wood waste truck deliveries would remain unchanged with the addition of this Project.

Background: EMISSIONS OF NITROUS OXIDE AND METHANE FROM BIOMASS COMBUSTORS

Fluidized bed combustion is well known to produce considerable emissions of nitrous oxide ("N_2O") and methane ("CH_4") both potent greenhouse gases. Emissions of N_2O and CH_4 depend mainly on the type of fuel, type of fluidized bed combustors (bubbling vs. circulating), combustion temperature, and control equipment configuration (SCR, SNCR, aqueous ammonia vs. urea, etc.). Combustion temperature has the largest effect on N_2O emissions and shows an opposite effect to emissions of NOx. Numerous investigations have demonstrated that while lower bed temperatures reduce NOx emissions, they result in increasing N_2O emissions.[22]

The Applicant's revised greenhouse gas emission estimates in Appendix AQ-2 to the 3rd Response to CEC Data Requests Set #1 ("San Joaquin 1&2 Solar Hybrid Project Total Operational Emissions") do not account for emissions of N_2O and CH_4 from the fluidized bed combustors. The California Climate Action Registry General Reporting Protocol indicates that typical emission factors for electric power generation from wood are on the order of 0.009 and 0.07 pounds per million BTU ("lb/MMBtu") for N_2O and CH_4, respectively.[23] N_2O and CH_4 emission factors for the

[21] *Id*.

[22] *For example*, Simon N. Oka, Fluidized Bed Combustion, Marcel Dekker, Inc., New York, 2004, pp. 556-557.

[23] California Climate Action Registry, General Reporting Protocol, Version 3.1, January 2009, Table C.8, p. 103.

Project may be higher due to the fluctuating combustion temperatures when the biomass combustors are shut off during the day or ramp up in the evening.

Data Requests:

223. Please provide N_2O and CH_4 emission factors for the Project's biomass combustors for the various types of fuel mixes and combustion temperatures. Please document all your assumptions.

224. Please provide estimates of annual carbon dioxide-equivalent emissions of N_2O and CH_4 for the Project biomass combustors. Please document all your assumptions.

Background: FUGITIVE DUST EMISSIONS FROM VEHICLE TRAVEL ON PAVED ROADS

The Applicant provided revised construction emission estimates with the 3rd Response to CEC Data Requests Set #1 including entrained road dust emissions from vehicle travel on off-site paved roads. The revised emissions estimates for entrained road dust from vehicle travel on on-site and off-site paved roads are based on an empirical predictive emission factor equation contained in the U.S. EPA's Compilation of Air Pollutant Emission Factors ("AP-42"), Section 13.2.1 "Paved Roads." This predictive emission factor equation, Equation 1, is based on a number of factors including the average vehicle weight of all vehicles traveling the road and the silt loading value of the roads traveled.

The Applicant's emissions estimates incorrectly calculated separate emission factors for three vehicles classes (heavy truck, medium truck, and personal commuting vehicle) rather than one emission factor for the entire fleet of vehicles traveling specific roads. AP-42 states explicitly: "It is important to note that Equation 1 calls for the average weight of all vehicles traveling the road. For example, if 99 percent of traffic on the road are 2 ton cars/trucks while the remaining 1 percent consists of 20 ton trucks, then the mean weight "W" is 2.2 tons. More specifically, *Equation 1 is not intended to be used to calculate a separate emission factor for each vehicle weight class. Instead, only one emission factor should be calculated to represent the "fleet" average weight of all vehicles traveling the road.*[24]

Emissions estimated with Equation 1 are directly proportional to the fleet-average vehicle weight traveling on a road and the number of miles traveled. Because the Applicant's entrained road dust emissions estimates are based on a

[24] AP-42, Section 13.2.1, Paved Roads, November 2006, p. 13.2.1-4, *emphasis* added.

considerably higher percentage of annual vehicle miles traveled by light-weight automobiles (89.3 percent) and a lower percentage of annual vehicle miles traveled by medium- and heavy-weight trucks (4.5 percent and 6.2 percent, respectively) than is typically found on the roads and freeways tributary to the Project site, these emissions are considerably underestimated.[25] For example, the percentage of annual vehicle miles traveled by trucks on Interstate 5 at the Route 198 junction is 30.94 percent of the total annual vehicle miles traveled.[26] The Applicant's emission calculations attribute only 10.7 percent of vehicle miles traveled to medium and heavy trucks.

Furthermore, the Applicant's emission estimates for off-site paved roads are based on one silt loading value only, 0.035 grams per square meter ("g/m^2") for major roads (arterials). The silt loading value for rural roads, such as the tributary roads to the Project site, is considerably higher at 1.6 g/m^2.[27] Thus, the revised emissions estimated for entrained road dust from vehicle travel on local roads are underestimated.

Data Requests:

225. Please revise the entrained road dust emissions estimates for vehicle travel on off-site paved roads based on emission factors for the fleet-average weight of all vehicles traveling the respective roads tributary to the Project site (rather than based on emissions factors for each vehicle class) and the appropriate silt loading factors. Please calculate emissions for vehicle travel for each road type, *i.e.*, freeway, major arterials, collector, local, and rural roads tributary to the Project site.

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[25] From 08-AFC-12, San Joaquin Solar 1 & 2 Hybrid Project, 3rd Response to CEC Data Request Set #1, July 13, 2009, Attachment AQ-1, Construction Emission Calculations, June 29, 2009, "Worker Delivery/Commuting Emissions, Travel on Paved Surfaces:"

Vehicle Type	VMT/year	Percentage
Heavy trucks	391,160	4.5%
Medium trucks	545,160	6.2%
Personal commuting vehicles	7,792,400	89.3%
Total	**8,728,720**	**100.0%**

[26] State of California, Department of Transportation, 2007 Annual Average Daily Truck Traffic on the California State Highway System, September 2008, p. 20; http://traffic-counts.dot.ca.gov/truck2007final.pdf.

[27] California Air Resources Board, Emission Inventory, Section 7.8 – SJV, Entrained Paved Road Dust, Paved Road Travel, June 2006; http://www.arb.ca.gov/ei/areasrc/PMSJVPavedRoadMethod2003.pdf.

Background: PARTICULATE MATTER EMISSIONS FROM WET SURFACE AIR COOLERS

The Applicant's Response to Data Request Workshop Action Items dated August 26, 2009 provides revised estimates for particulate matter drift emissions from the wet surface air coolers ("WSACs").[28] The Applicant's response does not clarify whether the estimated particulate matter emissions, indicated as "PM," are PM10 or total PM. The Applicant's response further does not clarify whether the revised emission estimates for particulate matter drift were accounted for in the ERC offset package submitted to the SJVAPCD on August 21, 2009.

The most recent (August 26, 2009) revision of WSAC drift emissions is based on a drift eliminator control of 0.0005 percent. The prior (August 21, 2009) revision of WSAC drift emissions is based on a considerably lower drift eliminator control of 0.0002 percent. The Applicant did not provide an explanation why the drift eliminator control was revised from 0.0002 percent to 0.0005 percent.

Data Requests:

226. Please clarify whether the estimates of particulate matter ("PM") emissions from the WSACs provided with the Applicant's Response to Data Request Workshop Action Items dated August 26, 2009 are PM10 or total PM.

227. Please provide an updated summary of on-site operational emissions from the SJS 1&2 Project that accounts for the revised WSAC drift emissions of PM10 based on a 0.0005 percent drift eliminator control provided with the Applicant's Response to Data Request Workshop Action Items dated August 26, 2009.

228. Please disclose whether the revised particulate matter drift emissions from the WSACs provided with Applicant's Response to Data Request Workshop Action Items dated August 26, 2009 are accounted for in the ERC offset package provided to SJVAPCD on August 21, 2009.

229. Please discuss why the WSAC drift eliminator control was revised from 0.0002 percent (WSAC emission estimate dated August 21, 2009) to 0.0005 percent (WSAC emission estimate dated August 26, 2009).

[28] Applicant's Response to Data Request Workshop Action Items, August 26, 2009, "Revised WSAC Drift Calculation."

Background: HEAT TRANSFER FLUID SYSTEM FUGITIVE VOC EMISSIONS

In response to CURE Data Request No. 86, the Applicant estimated fugitive emissions of VOCs from the heat transfer fluid ("HTF") system at approximately 1.7 tons per year.[29] The Applicant did not specify whether this estimate accounted for fugitive VOC emissions of HTF from one or from both plants of the SJS 1&2 Project.

Data Requests:

230. Please clarify whether the emissions estimate of 1.7 tons per year of fugitive VOC from the heat transfer fluid system provided by the Applicant in response to CURE Data Request No. 86 accounts for fugitive HTF emissions from one or both plants of the SJS 1&2 Project.

231. Please provide an updated summary of on-site operational emissions from the SJS 1&2 Project that accounts for fugitive VOC emissions from the heat transfer fluid system.

Background: MITIGATION FOR MOBILE SOURCE EMISSIONS

The CEC's AFC process for permitting of power plants is functionally equivalent to the process for other projects under the California Environmental Quality Act ("CEQA"). Under CEQA, many large stationary sources with considerable emissions attributable to mobile sources are required to implement stringent mitigation measures. For example, the proposed Liberty Quarry in Riverside County would be required to implement a number of mitigation measures to mitigate mobile source emissions. Emissions from off-site mobile sources at the proposed Liberty Quarry would amount to 58.1 tons/year NOx, 9.5 tons/year PM10, and 3.8 tons/year PM2.5. In comparison, the SJS 1&2 Project would generate emissions from off-site mobile sources of 20.25 NOx, 18.75 tons/year PM10, and 3.22 tons/year PM2.5.[30] To mitigate emissions from mobile sources, the Liberty Quarry would implement a Clean Air Truck program whereby the Applicant would either retrofit or replace 130 heavy-duty diesel-fueled truck engines when the

[29] Applicant's Supplemental Information in Response to CURE Data Request Set #3, August 26, 2009, Response to Data Request #86.

[30] 08-AFC-12, San Joaquin Solar 1 & 2 Hybrid Project, 3rd Response to CEC Data Request Set #1, July 13, 2009, Attachment AQ-2, Operational Emission Calculations, July 10, 2009, "San Joaquin 1&2 Solar Hybrid Project Total Operational Emissions."

proposed quarry first opens for operation. The Liberty Quarry Applicant would work with trucking firms to identify and retrofit these trucks prior to initiating permanent plant operations. The engine retrofits (diesel particulate filters and NOx catalysts) will reduce individual truck emissions of PM10 by about 85 percent and NOX emissions by up to 40 percent, depending on the technology used for the retrofit. The Liberty Quarry Applicant plans to replace some of the engines with model year 2007 or newer engines rather than retrofitting existing engines. Engine replacement results in emission reductions of PM10 by 90 to 96 percent (depending on the age of the replaced engine) and NOx by 95 percent or more from older engines.[31] Here, the Applicant for the SJS 1&2 Project does not propose any mitigation for the emissions from mobile sources. A Clean Air Truck program, as proposed for the Liberty Quarry, is equally feasible for the Project to mitigate the substantial mobile source emissions associated with transporting biomass to the Project site.

Data Requests:

232. Please discuss potential mitigation measures to mitigate the Project's mobile source emissions, including the feasibility of a "Clean Air Truck" program (retrofit and replacement of trucks owned by trucking firms delivering biomass) such as proposed by the Liberty Quarry Applicant.

PUBLIC HEALTH

Background: COMBUSTION OF CONSTRUCTION AND DEMOLITION WOOD

The Applicant indicated that the municipal green waste fraction of the biomass fuel used for the Project may contain construction/demolition ("C&D") wood.[32]

Construction waste originates from construction, repair, or remodeling of residential, commercial, and industrial buildings and typically consists of a variety of building products such as roofing, gypsum wallboard, and wood products. Construction waste wood typically consist of wood scraps from dimensional lumber, siding, laminates, flooring (potentially stained), laminated beams, and moldings

[31] County of Riverside, Draft Environmental Impact Report No. 475, Liberty Quarry, Surface Mining Permit No. 213, SCH No. 20077061104, July 2009, Mitigation Measure AQ-3j, p. 3.2-52.

[32] 08-AFC-12, San Joaquin Solar 1 & 2 Hybrid Project, Supplemental Information in Response to CURE Data Request Set #3, August 26, 2009, Response to Data Request #44.

(potentially painted). Demolition waste originates from the destruction of buildings or other structures. Typical constituents include aggregate, concrete, wood, paper, metal, insulation, glass, and other building materials, which are frequently contaminated with paints, including lead paints.

As a result, C&D wood waste may be contaminated with a variety of hazardous chemicals including heavy metals such as copper, chromium, arsenic, cadmium, lead, mercury, zinc, and beryllium, and organic contaminants such as creosote, pentachlorophenol, dioxin, polychlorinated biphenyls, polycyclic aromatic hydrocarbons, solvents, and volatile organic compounds.[33] Incineration results in volatilization of metals during combustion and accumulation of metals in ash, which may result in health and environmental impacts.[34] Inorganic arsenic compounds are mainly used to preserve wood. Copper-chromium-arsenic ("CCA") is a major arsenic-based treatment chemical used to preserve wood. Although no longer used in the U.S. for residential uses, it is still used in industrial applications. Wood preservatives, especially CCA, accounted for most of the arsenic consumption in U.S. until about 2004. As a result, a large quantity of arsenic-treated wood is currently in use and is present in significant amounts in C&D waste. Its presence in the disposal sector is predicted to increase heavily in the near future. Thus, a critical element in minimizing air emissions, especially toxic air contaminants, is the elimination of CCA-treated and pentachlorophenol-treated ("penta-treated") wood and the minimization of painted wood and fines in the C&D wood waste.[35]

The separation of wood products from C&D debris for beneficial uses depends on the type and origin of debris. Typically, construction debris is more easily separated than demolition debris. No statewide standards for the content of C&D waste exist and most waste management firms rely on their own standards and specifications to remove the majority of the contaminants and non-burnables from the C&D waste.

Due to concerns regarding the release of hazardous substances, several states have restricted or banned the use of C&D wood waste as fuel for biomass plants and other purposes. For example, New Hampshire has banned the use of C&D debris regardless of whether it is clean, unadulterated waste from construction sites or pressure-treated and painted wood, for example, from demolition activities. The

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[33] Ellen Moyer, Ph.D., P.E., Should Construction and Demolition Wood Be Burned? An Evaluation of NESCAUM's May 2006 Report, December 20, 2007; http://www.mass.gov/Eoeea/docs/doer/gca/aps/apsmoyer.pdf.

[34] Florida Center for Solid and Hazardous Waste Management, Final Report of Evaluation of Thermal Processes for CCA Wood Disposal in Existing Facilities, May 15, 2006; http://combustcca.ees.ufl.edu/FCSHWM%20Report-CCA%20Thermal%20Processes.pdf.

[35] Ellen Moyer, Ph.D., P.E., Should Construction and Demolition Wood Be Burned? An Evaluation of NESCAUM's May 2006 Report, December 20, 2007; http://www.mass.gov/Eoeea/docs/doer/gca/aps/apsmoyer.pdf.

State of Massachusetts has implemented a moratorium on use of C&D waste. The City of Portland, Oregon, prohibits any use, including combustion, of painted or pressure-treated woods except in "incidental" quantities.[36] The Maine Department of Environmental Protection has published detailed specifications limiting the permissible fraction of non-combustible materials, plastics, CCA-treated wood, fines, and asbestos in C&D wood waste and specifying fuel quality standards for arsenic, lead, and PCBs in blended biomass fuel.[37]

Data Requests:

233. Please indicate the maximum percentage of C&D wood waste anticipated in the municipal green waste used for fuel at the Project. Please indicate how this maximum percentage would be monitored.

234. Please provide specifications for C&D wood waste that fuel suppliers must meet to ensure that the majority of contaminants and non-burnables are removed from the C&D waste.

235. Please describe the testing and sampling procedures for the fuel at both the C&D processing facility and at the Project to assure that the fuel quality will be maintained.

Background: TOXIC AIR CONTAMINANT EMISSIONS FROM BIOMASS COMBUSTION

Toxic air contaminant emissions from biomass combustion in fluidized bed boilers are dependent on the fuel type and the type of combustor (bubbling vs. circulating fluidized bed combustors). The Applicant estimated toxic air contaminant emissions from biomass combustors using emission factors provided by the equipment vendor, EPI, and emission factors provided by the SJVAPCD for a similar biomass facility, the Mendota Biomass Power Plant.[38] The Applicant did not provide information for the conditions under which these emission factors were derived (*e.g.*, load, combustion temperature, control equipment, fuel mix including C&D wood, etc.). Further, emission factors determined at the Mendota Biomass

[36] Ron Kotrba, The Politics of 'Dirty' Wood, Biomass Magazine, April 2009; http://www.biomassmagazine.com/article.jsp?article_id=2539&q=&page=all, accessed September 1, 2009.

[37] Maine Department of Environmental Protection, Maine Solid Waste Management Rules: Chapter 418, Beneficial Use of Solid Wastes, June 16, 2006, pp. 13-14.

[38] Applicant's 3rd Response to CEC Data Request Set #1, July 13, 2009, Response to Data Request #80.

Power Plant which uses circulating fluidized bed combustors ("CFBs")[39] are likely not applicable to the Project's bubbling fluidized bed combustors ("BFBs").[40] CFBs and BFBs operate over different temperature ranges resulting in considerably different emissions of air pollutants.

Data Requests:

236. Please provide vendor specifications for the fluidized bed combustors that will be installed at the Project including toxic air contaminant emission factors.

237. Please provide source tests for the Mendota Biomass Power Plant for toxic air contaminant emissions including a description under which these emissions were measured (load, fuel mix including specification of the fraction of C&D wood, combustion temperature, control equipment, etc.).

238. Please discuss how the toxic air contaminant emission factors measured at the Mendota Biomass Power Plant are applicable for the Project given that the Mendota Biomass Power Plant uses circulating fluidized bed combustors and the Project would use bubbling fluidized bed combustors.

239. Please provide emission factors for toxic air contaminant emissions measured at a plant with bubbling fluidized bed combustors and under similar conditions (load, fuel mix, combustion temperature, control equipment, etc.) as proposed for the Project.

240. Please indicate whether the Applicant would be willing to install a continuous dioxin/furan emission monitoring device at the Project.

Background: TOTAL PETROLEUM HYDROCARBONS DIESEL

TPH-d concentration in soil at the Project site significantly exceeds agency screening levels for protection of workers under industrial and construction scenarios. A Phase II Environmental Investigation,[41] was prepared in June 2009 in response to CEC Data Request No. 146. The Phase II report, included as Appendix B to the applicant's response to Data Requests Set No. 1, states:

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[39] *See*, AFC, Appendix A-4, p. 18.

[40] *See*, 08-AFC-12, San Joaquin Solar 1 & 2 Hybrid Project, 3rd Response to CEC Data Request Set #1, July 13, 2009, Attachment AQ-2, Operational Emission Calculations, July 10, 2009, "Combustor Startup Emission Estimations, Table 1587 (from EPI), BFB Cold Start-up Sequence."

[41] Report of Phase II Environmental Investigation. Response to DATA Request #146, Data Set #1, San Joaquin Solar Hybrid Power Stations 1 & 2 (08-AFC-12), Coalinga, California. URS Corporation. June 1, 2009.

> four soil samples (SJS-11A through SJS-11D) were collected from the ground surface (0 to 1 foot bgs) near the diesel-fuel AST and pesticide mixing ASTs on the southwest corner of the site. The four samples were composited by the laboratory in accordance with standard methods.[42]

In reporting the lab results of this sampling location, the Phase II states that in the AST area "TPH-d were detected in the composite sample at a concentration of 23,000 ug/kg."[43] The Phase II concludes that "[t]he concentration of TPH in the composite sample (23,000 ug/kg) is not considered a health concern under any property use scenario."[44]

The Analytical Report, which was attached to the Phase II report as Attachment A (Laboratory Analytical Report and Chain-of-Custody Form), indicates the following detection of TPHd[45]:

Client Sample Number: SJS-11-A-D (composite)

Parameter	Result	RL	DF	Qual	Units
TPH as Diesel	23000	100	20		mg/kg

The citation in the Phase II report is in error. As shown above, the TPH-d concentration in soil was reported by the laboratory in the units of milligrams per kilogram (mg/kg), not micrograms per kilogram (ug/kg). The result cited in the Phase II report (23,000 ug/kg) is 1000 times less than the actual lab result of 23,000,000 ug/kg (23,000 mg/kg) for the sample analyzed (SJS-11-A-D). Therefore, the conclusion made in the Phase II report, that TPH is not a health hazard, is erroneous.

In fact, TPH-d at 23,000 mg/kg (23,000,000 ug/kg) greatly exceeds California Regional Water Quality Control Board (RWQCB) Environmental Screening Levels (ESLs) for TPH-d as summarized in the table below[46]:

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[42] *Id.*, pp. 2-3.

[43] *Id.*, p. 3.

[44] *Id.*, p. 4.

[45] *Id.*, Attachment A, p. 2 of 16.

[46] *Id.*, Attachment A (sampling locations and analytical results).

Exposure Scenario for TPH – middle distillates (TPHd)[47]	**ESL (mg/kg)**
Commercial/Industrial Land Use (Shallow Soils, <3m bgs; Groundwater is Current or Potential Source of Drinking Water)	83
Commercial/Industrial Land Use (Shallow Soils, <3m bgs; Groundwater is Not Current or Potential Source of Drinking Water)	180
Commercial/Industrial Worker Exposure	450
Construction/Trench Worker Exposure	4,200
TPHd concentration in soil sample composite SJS-11-A-D	**23,000**

The TPH-d soil concentration of 23,000 mg/kg is nearly 5.5 times greater than the ESL for construction/trench worker exposure of 4,200 mg/kg and is more than 50 times greater than the ESL for commercial/industrial worker exposure of 450 mg/kg. The Commercial/Industrial Worker Exposure scenario refers to the exposure level expected to be encountered by future employees at the Site. The Construction/Trench Worker Exposure refers to exposure level encountered by construction workers or utility trench workers who are expected to come into periodic contact with contaminants in deep soils.[48]

The laboratory-reported TPH-d soil concentration of 23,000 mg/kg is clearly a significant source of potential hazard to construction workers upon site preparation which will involve land disturbance, including grading and excavation, of 640 acres.[49] The composite sample that returned the 23,000 mg/kg TPH-d result was collected in an area of numerous visible stains around the ASTs.

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[47] Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater. California Regional Water Quality Control Board. San Francisco Bay Region. Interim Final – November 2007 (Revised May 2008). Tables A, K-2, and K-3. http://www.swrcb.ca.gov/rwqcb2/water_issues/available_documents/ESL_May_2008.pdf

[48] Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater. California Regional Water Quality Control Board. San Francisco Bay Region. Interim Final – November 2007 (Revised May 2008). P. 6-10. http://www.swrcb.ca.gov/rwqcb2/water_issues/available_documents/ESL_May_2008.pdf

[49] San Joaquin Solar 1 & 2 Hybrid Project. Application for Certification 08-AFC-12. Prepared for Martifer Renewables Solar Thermal LLC by URS Corporation. November 2008. p. 5.4-12. http://www.energy.ca.gov/sitingcases/sjsolar/documents/applicant/afc/index.php

Please note that the AFC made no mention of the TPH-d soil contamination in Sections 5.4, Soils, 5.15, Hazardous Materials Handling, 5.16, Public Health and Safety, 5.17, Worker Safety, or elsewhere. In fact, the AFC made this erroneous statement:[50]

> While there is no documented contamination at the site, site preparation and Project construction may potentially involve excavation of contaminated soils.[51]

Data Requests:

241. Please explain whether the TPH-d detected was at a concentration of 23,000 mg/kg or 23,000 ug/kg. In other words, please confirm the correct concentration for TPH-d.

242. Please provide a comparison of the TPH-d sample concentrations to regulatory agency screening levels.

Background: TOXAPHENE

Toxaphene concentrations in soil at the Project site exceed regulatory screening levels for industrial land use and construction scenarios. The Phase II Environmental Investigation states,

> The following OCPs [organochlorine pesticides] were detected in the surface soil samples collected from the area identified as being used historically for agriculture: […] Toxaphene was detected in each of the ten samples analyzed at concentrations ranging from 600 to 3,100 ug/kg.[52]

The Phase II report acknowledges that "Toxaphene detected in three samples was present at concentrations above the commercial/industrial CHHSL of 1,800 ug/kg."[53] However, the report concludes,

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[50] San Joaquin Solar 1 & 2 Hybrid Project. Application for Certification 08-AFC-12. Prepared for Martifer Renewables Solar Thermal LLC by URS Corporation. November 2008. http://www.energy.ca.gov/sitingcases/sjsolar/documents/applicant/afc/index.php

[51] AFC, p. 5.4-12.

[52] Report of Phase II Environmental Investigation. Response to Data Request #146, Data Set #1, San Joaquin Solar Hybrid Power Stations 1 & 2 (08-AFC-12), Coalinga, California. URS Corporation. June 1, 2009, p. 3.

[53] *Id.*, p. 4.

> If the average concentration of toxaphene detected in the samples collected from the area of historical agricultural use is considered (1,432 ug/kg), it is below the commercial/industrial CHHSL for this compound.[54]

The soil concentrations in three of the 10 samples collected range from 2.4 mg/kg (Sample SJS-08 and SJS-10) to 3.1 mg/kg (Sample SJS-09) and exceed the ESL and California Human Health Screening Levels (CHHSL) for commercial/industrial land use as well as the ESL under the commercial/industrial worker exposure scenario. The RWQCB ESLs and the CHHSLs for toxaphene are summarized in the table below:[55]

Exposure Scenario for Toxaphene[56]	**ESL (mg/kg)**
Commercial/Industrial Land Use (Shallow Soils, <3m bgs; Groundwater is Current or Potential Source of Drinking Water/ Groundwater is Not Current or Potential Source of Drinking Water)	0.00042
Commercial/Industrial Worker Exposure	1.8
Construction/Trench Worker Exposure	22
California Soil Human Health Screening Levels for Toxaphene[57]	**CHHSL (mg/kg)**
Commercial/Industrial Land Use	1.8
Toxaphene concentration in soil samples	**2.4 – 3.1**

The Commercial/Industrial Worker Exposure scenario refers to the exposure level expected to be encountered by future employees at the Site. The Construction/Trench Worker Exposure refers to exposure level encountered by construction workers or utility trench workers who are expected to come into periodic contact with contaminants in deep soils.[58]

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[54] *Id.*

[55] *Id.*, Attachment A.

[56] Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater. California Regional Water Quality Control Board. San Francisco Bay Region. Interim Final – November 2007 (Revised May 2008). Tables A, K-2, and K-3. http://www.swrcb.ca.gov/rwqcb2/water_issues/available_documents/ESL_May_2008.pdf

[57] Use of California Human Health Screening Levels (CHHSLs) in Evaluation of Contaminated Properties. California Environmental Protection Agency. January 2005. http://www.calepa.ca.gov/brownfields/documents/2005/CHHSLsGuide.pdf

[58] Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater. California Regional Water Quality Control Board. San Francisco Bay Region. Interim Final –

In reporting the toxaphene data, the Phase II investigation averaged the ten toxaphene soil sample results and concluded that the toxaphene did not pose a risk. Use of average is generally only allowed under agency oversight where a sufficient number of samples has been collected under an approved work plan. In this case, only ten samples were collected at the 80-acre site, significantly less than Department of Toxic Substances Control ("DTSC") guidance which states that for an area between 61 and 100 acres, a minimum of 25 composite samples are needed.[59] Therefore, use of an averaging technique would not likely be accepted by an agency based on the density of the sample data.

The error in the use of an average for soil concentrations of toxaphene is further illustrated by examining the data collected. As shown in Attachment A, Samples SJS-08, SJS-09, and SJS-10 which exceed the ESLs and CHHSLs, are located between 1,000 and 4,000 feet from samples which do not exceed the ESLs. For example, sample SJS-09 with the highest concentration of toxaphene, 3,100 mg/kg, is 4,000 feet away from sample SJS-03 with the lowest concentration, 600 mg/kg. From a practical standpoint, workers that would excavate or otherwise come into contact with soil at these locations would not be subject to average concentrations. They would be exposed to the actual concentrations that were detected. Typically, these areas of elevated soil concentrations are known as hotspots and would require excavation of contaminated soil and confirmatory sampling to document complete removal of the contaminated soil.

Data Requests:

243. Please evaluate individual, rather than average, toxaphene soil exceedences of ESLs and CHHSLs in determining whether they would pose a risk to site workers and if they would constitute hotspots that would require excavation, removal, and confirmatory sampling.

Background: VOLUNTARY CLEANUP AGREEMENT

Site-wide investigation and risk assessment is needed for the Project site under a voluntary cleanup agreement. Given the ESL and CHHSL exceedences of TPH-d and toxaphene in the soil, regulatory agency notification is required to ensure proper response and protection of human health. The CHHSL guidelines state:

November 2007 (Revised May 2008). P. 6-10.
http://www.swrcb.ca.gov/rwqcb2/water_issues/available_documents/ESL_May_2008.pdf

[59] Interim Guidance for Sampling Agricultural Fields for School Sites (Second Revision). California Department of Toxic Substances Control, California Environmental Protection Agency. August 26, 2002. http://www.dtsc.ca.gov/Schools/upload/interim-ag-soils-guidance.pdf

> comparison [of available site data] to CHHSLs may show that a site does not pose an unacceptable health risk to residential users, or it may show that additional investigation is warranted.[60]

The guidelines further state:

> Decisions for or against additional actions should always be made in coordination with the overseeing regulatory agency.[61]

Notification of regulatory agencies is also necessary to ensure that sampling is conducted appropriately and to ensure proper analysis of the data, including the use of statistical techniques and comparison to screening levels.

The AFC does not explain whether the Applicant plans to submit an application to the voluntary cleanup program to ensure the identification of cleanup goals that are protective of construction workers and future employees safety and to provide for the oversight of safe excavation of the Project site. Fresno County, Department of Public Health, Division of Environmental Health is the local Certified Unified Program Agency (CUPA) responsible for implementing a unified hazardous materials and hazardous waste management regulatory program.[62] The agency provides oversight of businesses that

- Require Hazardous Materials Business Plans;
- Require California Accidental Release Prevention Plans or Federal Risk Management Plans;
- Operate Underground Storage Tanks;
- Operate Aboveground Storage Tanks;
- Generate Hazardous Waste(s);
- Have Onsite Treatment of Hazardous Waste(s)/Tiered Permits.[63]

Fresno County Hazardous Materials Business Plan Program indicates that a Business Plan must be submitted by businesses that handle a hazardous material, or a mixture containing a hazardous material, in quantities equal to or greater

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[60] Use of California Human Health Screening Levels (CHHSLs) in Evaluation of Contaminated Properties. California Environmental Protection Agency. January 2005. p. 2-5. http://www.calepa.ca.gov/brownfields/documents/2005/CHHSLsGuide.pdf

[61] Use of California Human Health Screening Levels (CHHSLs) in Evaluation of Contaminated Properties. California Environmental Protection Agency. January 2005. p. 2-5. http://www.calepa.ca.gov/brownfields/documents/2005/CHHSLsGuide.pdf

[62] Fresno County, Environmental Health, Certified Unified Program Agency (CUPA). http://www.fresnocountycupa.com/

[63] Fresno County, Environmental Health, Certified Unified Program Agency (CUPA). Hazardous Materials Business Plan Program. http://www.fresnocountycupa.com/

than, among others, 55 gallons of a liquid.[64] Current conditions at the Project site fulfill this condition since there are five ASTs at the Site, each with a capacity of 500 gallons or more.

According to the Phase I Environmental Site Assessment,[65] five Aboveground Storage Tanks (ASTs) are located near the southwestern corner of the Site:

Number of ASTs	Capacity	Material	Comments
2	2000 gal	Poly	Used for storage of groundwater and mixing with fertilizer and/or pesticides prior to pumping into the irrigation system. Reportedly installed between 2005 and 2006.
2	500 gal	Poly	Used for storage of groundwater and mixing with fertilizer and/or pesticides prior to pumping into the irrigation system. Reportedly installed between 2005 and 2006.
1	2000 gal	Steel	Used to store diesel fuel for the irrigation pumps. Reportedly installed in 2006.

As discussed above, the Fresno County CUPA is responsible for regulating businesses that operate aboveground storage tanks.[66] According to Fresno County, Hazardous Material Business Plans have not been submitted, as required for these tanks.[67]

[64] Fresno County, Environmental Health, Certified Unified Program Agency (CUPA). Hazardous Materials Business Plan Program. http://www.fresnocountycupa.com/

[65] Phase I Environmental Site Assessment: San Joaquin Solar Hybrid Power, Stations 1&2, Assessor's Parcel Nos. 85-030-57s and 85-030-58s, West Jayne Avenue, Coalinga, California. Prepared For Spinnaker Energy, Inc. by URS Corporation. June 12, 2008, p. 5-2. Included in the AFC as Appendix M.

[66] Fresno County, Environmental Health, Certified Unified Program Agency (CUPA). http://www.fresnocountycupa.com/

[67] Cindy Sauls, R.E.H.S., Environmental Health Specialist III, Fresno County Department of Public Health, Environmental Health Division – CUPA Program. Personal communication. August 27, 2009.

Additionally, the Aboveground Petroleum Storage Act requires the preparation of a Spill Prevention Control and Countermeasure Plan (SPCC).[68] A SPCC Plan is required when an owner or facility have ASTs with an aggregate storage capacity equal to or greater than 1,320 gallons of petroleum. The Site has a 2,000-gallon diesel storage tank, which would require the preparation of a SPCC.

Generally, pesticide contamination is addressed by DTSC. Further investigation is necessary to investigate and remove soil in excess of ESLs and CHHSLs at the Site under an agreement with DTSC. The AFC does not explain whether the Applicant will submit an application for a Voluntary Cleanup Agreement with DTSC to ensure that the Project will meet regulatory approval for the intended development. Without such an agreement, the Project could be subject to delay due to regulatory inquiries. A Voluntary Cleanup Agreement for further Site assessment and cleanup should include consideration of the following in a work plan for further sampling under agency oversight:

- Sample density – sample locations and an appropriate sample density in the former agricultural areas and the area of the ASTs should be determined in consultation with the oversight agency;
- Sample depth – samples were only collected at one depth interval (1 foot bgs); further sampling should be conducted at intervals approved by the oversight agency;
- Data analysis methods – statistical methods used to evaluate the data should be approved by the oversight agency; and
- Cleanup goals and method of cleanup for soil contaminants should be established by the oversight agency.

A soil management plan should be prepared to ensure protection of construction workers and nearby sensitive receptors from dust that may be generated during excavation and grading, including for patients at the Coalinga State Hospital, located at 24511 West Jayne Avenue, adjacent to the western site boundary.

Data Requests:

244. Please document if notification of Fresno County or the Regional Water Quality Control Board (RWQCB) is required under the Aboveground Storage Tank program requirements.

245. Please explain whether the Applicant intends to seek a Voluntary Cleanup Agreement with DTSC.

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[68] California Environmental Protection Agency Unified Program Fact Sheet. December 2007. Aboveground Petroleum Storage Act, Assembly Bill 1130 (Laird), Chaptered October 13, 2007. http://www.calepa.ca.gov/CUPA/Aboveground/FactSheetAPSA.pdf

246. Please provide any agency communication regarding whether site assessment is conducted to regulatory standards.

247. Please provide records of communication with Fresno County CUPA program to document regulation of the ASTs by the County.

248. Please provide the Applicant's Soil Management Plan to ensure protection of nearby sensitive receptors from inhalation of dust-borne contaminants.

Background: PESTICIDES, EROSION AND SEDIMENT CONTROL, AND SWPPP

The Applicant prepared a Draft Erosion and Sediment Control Plan for the Project.[69] However, the plan makes no mention of past pesticide use at the Site and potential impacts on runoff due to pesticides. It also provides no consideration to the TPH-d found at the Site.

The Applicant also prepared a Storm Water Pollution Prevention Plan (SWPPP) for the Project.[70] While the SWPPP refers to the presence of pesticides at the Site, it does not mention that soil is contaminated with pesticides and does not offer Site-specific BMPs to address the contamination. It also does not make any reference to the TPH-d found at the Site and its potential impact on stormwater and receiving waters.

Data Requests:

249. Please provide a revised comprehensive and Site-specific Erosion and Sediment Control Plan that incorporates pesticide and TPH-d data.

250. Please explain the effectiveness of the construction and post-construction BMPs in mitigating erosion and runoff of TPH-d- and pesticide-contaminated soils. Please document any assumptions.

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[69] Draft Erosion And Sediment Control Plan for San Joaquin Solar 1 & 2 Hybrid Power Project, Fresno County. Prepared for Martifer Renewables Solar Thermal LLC, San Diego, CA by URS Corporation. June 30, 2009.

[70] Storm Water Pollution Prevention Plan for San Joaquin Solar 1 & 2 Hybrid Power Project, Fresno County. Prepared for Martifer Renewables Solar Thermal LLC, San Diego, CA by URS Corporation. July 14, 2009

HAZARDOUS WASTE

Background: HEAVY METALS IN SCRUBBER WASTE AND BAGHOUSE FILTER DUST

The Project would combust C&D wood waste, which may contain heavy metals such as copper, chromium, arsenic, cadmium, lead, mercury, zinc, and beryllium.[71] Heavy metals contained in the combustor exhaust gas would precipitate in the scrubbers and/or condense onto particles which are captured in the baghouse fabric filters. The resulting contamination of scrubber waste and baghouse filter dust with heavy metals may necessitate their disposal as hazardous wastes.

Data Requests:

251. Please estimate the Project's annual average quantity of scrubber waste and baghouse filter dust that would need to be disposed of as hazardous waste due to contamination with heavy metals such as copper, chromium, arsenic, cadmium, lead, mercury, zinc, and beryllium.

WATER RESOURCES

Background: WATER DEMAND FOR WET SURFACE AIR COOLERS

The Project's wet surface air coolers ("WSAC") would require an average annual water usage of 1,443 gallons per minute ("gpm") based on a maximum total dissolved solids ("TDS") content of 1,850 mg/liter and 5 cycles of concentration.[72]

Data Request:

252. Please discuss whether the TDS content in the WSAC makeup water could be reduced to permit an increase in the number of cycles of concentration, thereby reducing the Project's water demand for cooling.

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[71] Ellen Moyer, Ph.D., P.E., Should Construction and Demolition Wood Be Burned? An Evaluation of NESCAUM's May 2006 Report, December 20, 2007; http://www.mass.gov/Eoeea/docs/doer/gca/aps/apsmoyer.pdf.

[72] Applicant's Response to Data Request Workshop Action Items, August 12, 2009, Table 5.5-6 "Water Usage Rates."

Background: WATER SUPPLY AND WASTEWATER TREATMENT FACILITY ANNEXATION

The AFC states that the average daily water requirement for the Project operation is 1,330 gpm.[73] The AFC further provides that the future City of Coalinga Wastewater Treatment Facility ("WWTF"), proposed to be constructed on 477 acres at the intersection of West Jayne Avenue and Alpine Avenue, will provide the majority of the Project's water needs.[74] The AFC states that effluent from the WWTF is expected to be available by June 2011.[75]

At the Data Responses and Issues Resolution Workshop, the Applicant stated that it entered into a Letter of Intent with the City of Coalinga for the delivery of up to a million gallons of recycled water per day from the WWTF.[76] Staff requested further information regarding water supply reliability, including the proposed schedule of construction of the WWTF. In the Applicant's Data Request Workshop Action Items Response, the Applicant re-framed the issue of water supply reliability – i.e., is there any evidence that the WWTF will provide a reliable water supply to the Project and, if so, how much? – into the Applicant's phrasing of the issue – i.e., whether the Project will have a redundant water supply. The Applicant then claimed the request is irrelevant and provided a responses regarding "temporary" outages.[77] The Applicant did not provide a proposed construction schedule for the WWTF. However, this information is necessary to determine the Project's expected impacts on water resources, including whether the Project may have a potentially significant impact on groundwater resources.

The City of Coalinga published a Program Final Environmental Impact Report ("FEIR") for its Wastewater Treatment Plant Program in April 2006.[78] The Program FEIR considers the construction of the WWTF, in addition to several other components of the Wastewater Treatment Plant Program. According to the FEIR, before the WWTF can proceed, an application must be submitted to the Fresno Local Agency Formation Commission ("LAFCo") and the WWTF site must be annexed to the City of Coalinga.[79]

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[73] AFC, p. 5.5-12.

[74] AFC, p. 5.5-9-10.

[75] AFC, p. 5.5-10.

[76] *See also* AFC, Appendix E-1.

[77] Data Request Workshop Action Item Response (Aug. 26, 2009), p. 11.

[78] Final Program Environmental Impact Report, Coalinga Wastewater Treatment Plant (Apr. 2006), p. I-1.

[79] *Id*.

Data Requests:

253. Please provide the status of the WWTF annexation application to the Fresno LAFCo.

254. Please provide a schedule of construction for the proposed WWTF.

255. Please state whether the Applicant would agree to a Condition of Certification that limits the Project's reliance on groundwater.

Background: AQUIFER TESTING

Adequate aquifer testing is necessary for the California Energy Commission to adequately analyze whether the Project has a reliable water supply and the Project's impacts on local groundwater supplies. A 72-hour constant rate pumping (aquifer) test was performed by the Applicant in February 2009, using the existing on-site production well ("Anderson Test Well") as a pumping well, and two off-site production wells as observation wells (URS, February 19, 2009). This test was conducted to provide constraints on the suitability of the Anderson Test Well to supply groundwater to the Project, and to evaluate potential impacts of pumping from this well upon local groundwater supplies. The existing Anderson Test Well pump was used during the test. A pumping rate of 900 gallons per minute (gpm) was reported for the test.

Conventional measurements of water level drawdown and recovery were collected, and the resulting data (drawdown versus time elapsed) was analyzed using the Theis "recovery" method (1935). Only one of the two observation wells (located 230 feet west of the pumping well) produced measureable drawdown during the test; the second observation well, roughly one mile southeast of the test well, reportedly did not. The Applicant calculated aquifer transmissivity, hydraulic conductivity and storativity values from their data, and subsequently attempted to predict drawdown in nearby wells following three different scenario time periods of continuous pumping from the Anderson Test Well (1, 10 and 20 years); the Applicant identified 20 years as the total Project duration. Estimates of drawdown in neighboring wells were performed assuming both "ideal" Project groundwater pumping (683 gpm assuming new Coalinga WWTF recycled water supply is available) (as well as "maximum" predicted pumping (1,750 gpm)) to meet Project water demands.

Several uncertainties exist with the Applicant's testing and data analysis methodology, as follows:

1) The Theis (1935) analytical method was developed for use in <u>confined</u> aquifers using pumping and observation wells which fully penetrate the aquifer being tested. There is no data presented by the Applicant to

support classification of the tested aquifer as being confined; in fact, the reported screen interval for the test well is as shallow as 370 feet bgs, within a zone identified as an unconfined aquifer by the State Department of Water Resources in the Pleasant Valley groundwater basin (DWR web site, www.sjd.water.ca.gov/groundwater/basin_maps). Figure 5 within the Applicant's report suggests some evidence of delayed yield (gravity drainage), a characteristic of unconfined aquifers. Such patterns are often muted on standard Theis log-log data plots. Alternatively plotting the time-drawdown data on semi-log format would better elucidate this aquifer response. Alternative conventional analytical solutions other than the Theis method exist which are known to produce more reasonable estimates of unconfined aquifer yield and behavior (i.e., Neuman; Moench; others).

Drillers logs submitted as part of the "pre-aquifer test" document prepared by the Applicant dated January 23, 2009 (*"San Joaquin 1 & 2 – Anticipated Well Performance"*) indicate very long well screen intervals which probably screen multiple aquifers, and thus drawdown data reflects the "average behavior" of multiple saturated zones of different character (Bennett and Patten, 1962). The reported storativity value reported by the Applicant from the aquifer test (0.001) is actually greater than the range typically observed in confined aquifers (Domenico, 1972; Freeze and Cherry, 1979). Finally, within the *Response To CEC Data Adequacy Requests 08-AFC--12* (Water Resources: Data Adequacy Request #2), the Applicant responds that "the existing on-site <test> well (as currently screened) likely draws water from both the upper and lower water-bearing zones";

2) The Theis (1935) analytical method is recognized as providing best estimates of aquifer response nearer to the pumping well, since it was developed to analyze removal of water from storage and assumes non-steady-state aquifer response (e.g., the well capture zone continuously expands with continued pumping over time) (Domenico, 1972; Butler, 1990; Kruseman and deRidder, 1990); it is less meaningful in estimating aquifer response near the outer fringe of the capture zone, and thus the impact upon neighboring wells located at distance from the test well. The assumption of non-equilibrium behavior also tends to lead to overestimates of long-term aquifer yield, since a given applied pumping stress will yield water from an infinitely-expanding capture zone. Alternative methods, such as Cooper-Jacob, should provide more reasonable estimates of aquifer behavior for a "real-world" (steady-state) scenario;

3) The short distance (230 feet) between the test well and the only observation well with measured drawdown ("State Prison well") leaves

aquifer behavior at distances > 230 feet from the test well undefined; for example, data from this single well could not be used in a conventional Cooper-Jacob analysis of distance versus drawdown to obtain a meaningful capture zone radius for the test well under any pumping scenario. As such, the Theis "spreadsheet model" employed by the Applicant to predict water level drawdowns greater than 230 feet from the Test Well has large uncertainties.

The well log provided for the Anderson test well indicates the bottom of the well screen interval at 980 feet bgs. The State DWR Bulletin 118 Update (2003) indicates that the typical base of the fresh water aquifer system within the Pleasant Valley Groundwater Basin is 1,150 feet bgs. Thus, by definition, the test well is probably partially penetrating, which can produce deviation from radial flow during pumping and excess drawdown relative to the "ideal" fully-penetrating well scenario assumed by most conventional aquifer-test analysis techniques (Hantush, 1961; Neuman, 1974). Furthermore, the aquifer thickness used by the Applicant (February 19, 2009) to estimate hydraulic conductivity (530 feet) is total well screen length and not true saturated thickness; this artificially small thickness value yields erroneously elevated estimates of hydraulic conductivity, which could in turn lead to overestimates of the test well's ability to supply water to the proposed Project.

Data Requests:

256. Does the data from the drillers logs submitted as part of the "pre-aquifer test" screen multiple aquifers?

257. Please provide supporting evidence that any portion of the tested aquifer is truly confined.

258. Please provide justification that the Theis (1935) recovery method is suitable as a stand-alone analytical method for assessment of aquifer behavior during the lifetime of the proposed Project in light of DWR's identification of the aquifer as unconfined.

259. Please provide comparative analysis of the time-drawdown data using the conventional Cooper-Jacob ("steady-state") technique for a confined aquifer, Hantush ("leaky semi-confined aquifer") technique, and unconfined aquifer techniques (Neuman and Moench methods, at a minimum).

260. Please explain the effect of the Applicant's test well partial penetration on the estimates of aquifer behavior.

261. Please explain the resultant uncertainties introduced to estimates of long-term aquifer yield and drawdown as a result of the Applicant's test well partial penetration. Please provide all data that supports your answer.

Background: AQUIFER TESTING

The Applicant's groundwater analysis is inadequate to evaluate potentially significant impacts on the surrounding aquifer, as required by CEQA. The Applicant reports that "no pump setting depth was available" for the test well on the Project site, and no information regarding transducer depth placement in the test or observation wells was provided. Furthermore, no well construction details for the two observation wells were provided (URS, February 19, 2009). Vertical spacing of test pumps relative to water level measurement devices during aquifer tests (sounding tubes, pressure transducers, etc.) can significantly influence drawdown measurements due to head loss in large-diameter casings and filter packs, and due to differences in pumping efficiency caused by vertical variations in aquifer yield. This in turn can lead to inaccurate estimates of aquifer transmissivity and water management decisions (Kruseman and deRidder, 1990; Boggs, 2008).

Only two well logs (drillers logs) were provided for review by the Applicant (January 23, 2009 document), and only one of these logs (Anderson Test Well) was from a well involved in the aquifer test. Allowing for inaccuracies or skill differences between drillers preparing the logs, there still appear to be significant stratigraphic discontinuities between the logs, suggestive of aquifer heterogeneities

which may significantly affect groundwater flow and sustainability during long-term pumping. Because the two wells for which logs were provided are located "about a mile from each other," and absence of details for the two observation wells, there is limited data presented by the Applicant from this aquifer test to adequately evaluate the effects of the test well during proposed Project pumping beyond a distance of 230 feet. According to the AFC Figure 5.5-4, there are more than six additional wells within 1.5 miles of the on-site well.

Data Requests:

262. Please provide information regarding transducer depth placement in the test well.

263. Please provide information regarding transducer depth placement in each of the observation wells.

264. Please provide well construction details for the two observation wells.

265. Please provide any well logs, other than the two provided, that the Applicant used to support its analysis.

266. Please provide logs for a minimum of six additional nearby wells, spaced at distances greater than 230 feet from the Project site test well.

267. Please provide the Applicant's pump test (specific capacity) test data from each of the additional nearby wells.

268. Please use data requested in Data Request Nos. 259 to 261 to provide a revised conceptual model of the local aquifer system surrounding the proposed Project site (at least 1.5 miles from the on-site test well).

269. Please evaluate and comment on the impacts of the Applicant's revised conceptual model provided in response to Data Request 268 on the results of the aquifer test, and upon the predicted Theis drawdown estimates after 1, 10 and 20 years of continuous pumping from the test well.

Background: LOCAL WATER BUDGET AND SUSTAINABILITY

Within Section 5.5 of the original Application for Certification (AFC) for the Project (December 1, 2008), the Applicant describes a water balance (budget) for the Pleasant Valley Groundwater Basin (PVB). The Applicant's discussion of available water supply and groundwater extractions borrows heavily from the State DWR Bulletin 118 Update (2003), and is somewhat confusing in that it interleaves discussions of water balance and groundwater extractions from the PVB with those

of the adjacent Westside Groundwater Basin to the east. Both groundwater basins have a primary and historical agricultural water use; prior to 1968 the water supply was chiefly from groundwater, which led to severe overdraft of both basins. Following completion of salient local components of the combined federal Central Valley Project (CVP) and State Water Project (SWP), imported water became available to augment the depleted groundwater supply, leading to water level recovery within both basins from 1968 to 1986. Following 1986, an eight-year drought in California led to restricted CVP imports, increased groundwater pumping, and return to overdraft conditions. During this period, CVP-SWP imports were as low as 25% of full contract allocations. Despite local and temporary precipitation recharge of groundwater levels following heavy storm years in 1995, 1998, and 2004, groundwater levels within PVB have dropped once again, an average of 4 feet annually from 1988 to 2008. Water level maps posted on the State DWR web site[80] indicate significant pumping depressions in the vicinity of the proposed Project site. The Westland Water District, which provides management for the Westside Groundwater Basin, reports between 100 and 200 feet of groundwater level decline between 1994 – 2008 (*Deep Groundwater Conditions Report*, March 2009).

Explanations for the continued water level decline include a combination of extended drought conditions relative to scattered wet years, and legal/political restrictions to availability of CVP-SWP water imports from the embattled San Joaquin-Sacramento Rivers Bay-Delta area. Currently the region is approaching the fifth year of the latest drought period, and current CVP-SWP allocations of imported water are only 40% of full contract limits.[81] Because the EIR for the Bay-Delta Conservation Plan (BDCP) is still in preparation and draft review stages, no imminent solution to legal aspects of CVP-SWP water availability seems likely.

In light of past drought and imported water supply restrictions in the PVB, it should be useful and relatively simple to compare local groundwater levels in a number of wells of the PVB to historical groundwater extractions, for purposes of estimating a defensible perennial yield ("operational safe yield") for the PVB. This type of analysis has been performed by others for the Westside Groundwater Basin for the period between 1949 – 2008 (Westlands Water District *Deep Groundwater Conditions Report*, March 2009), and used to estimate a perennial yield of 200,000 acre-feet per year (AFY) for the Westside Basin. However, no such analysis was presented by the Applicant for the PVB. Furthermore, no perennial yield information for PVB is present within the State DWR Bulletin 118 Update (2003).

Because the size of the Westside Basin is roughly 640,000 acres and that of the PVB roughly one-fourth that size (146,000 acres), the inflow and recharge to the

[80] www.sjd.water.ca.gov/groundwater/basin_maps

[81] State DWR web site: www.water.ca.gov/swpao/deliveries.cfm

PVB is very likely less than the 200,000 AFY perennial yield of the Westside Basin. Nevertheless, State DWR (2003) reports that up to 104,530 AFY was extracted from the PVB in 1990, during a time of drought; the lion's share of this water (90,000 AFY) was from agricultural pumping. During the same period, aquifer recharge due to irrigation was estimated at 4,000 AFY over 146,000 acres (a fairly low value), for a net PVB groundwater output (withdrawal) of roughly 100,000 AFY. Since the proposed Project acreage is 640 acres, this will result in a net reduction of irrigation recharge of 19 AFY.

The proposed Project is designed as a "zero-discharge" facility, which the Applicant defines as having no direct discharge of system waste water that percolates into groundwater, and design-storm water runoff is equally minor. Limited information provided by the Applicant within the AFC and responses to CEC Data Requests suggest that groundwater extractions have not declined for irrigation use since 1990, and the Pleasant Valley Water District predicts continued similar or higher extractions in the future, owing in part to maturing crops with high consumptive use, such as pistachio trees. Because DWR has determined consistent groundwater level declines since the 1990 estimate, it cannot be stated that the 100,000 AFY figure is within the operational safe yield of the basin.

The proposed Project maximum water use requirement is stated as 2,057 AFY. In previous CEC Data Requests responses, the Applicant has stated that this maximum Project water demand is "*…within the normal range of agricultural irrigation usage for a 640-acre parcel in this area,*" or stated another way, the proposed Project groundwater pumping would be no more than historical agricultural-use pumping, and thus allegedly represent no impairment to the local groundwater basin storage or other groundwater pumpers in the area. This statement might be valid if the perennial yield of the PVB were known; since it is not, there is no comfort zone or baseline for the Applicant's conclusion. Stated another way, 2,057 AFY may be sustainable if existing imports, extractions and groundwater levels were indicative of a recoverable perennial yield value; the possibility of prolonged drought conditions and restricted CVP-SWP imports only increase this uncertainty. Given this uncertainty, both the "idealized" Project groundwater pumping (683 gpm, assuming new Coalinga WWTF recycled water supply is available) and the "maximum" pumping (1750 gpm, assuming no WWTF water available) may exceed basin tolerance limits (e.g. perennial yield).

Data Requests:

270. Please provide the Applicant's evaluation of perennial yield (operational safe yield) of the PVB that establishes the baseline for the Project's analysis of the proposed Project water demand impacts.

271. Please provide an evaluation of perennial yield (operational safe yield) of the PVB, in order to establish a defensible baseline for justifying proposed Project water demands, using the following:

    a. Data as far back as 1950, if possible; and
    b. Total basin groundwater extractions from as many pumpers as possible; and
    c. Water level data from a minimum of six (6) wells within a 1.5 mile radius of the proposed Project site.

    Historic pumping, CVP-SWP imports and groundwater level data should be readily available from the Pleasant Valley Water District, Westlands Water District, and San Joaquin district office of State DWR in Fresno to provide this required analysis.

272. Please explain the effects of foreseeable future continued drought and climate change conditions on availability and sustainability of future groundwater extractions in the PVB, and their bearing on availability of groundwater to meet proposed Project demands. Please provide as probability values and quantitative estimates of uncertainty in support of your answer. Data for this analysis may be found via the State DWR, AWWA, ACWA, US Geological Survey, academic research institutions and/or the National Resources Defense Council. Extrapolations of historic effects from the Westside Basin can be used for comparison.

273. Please provide the Applicant's evaluation of the potential effect of continued restricted imported water supplies to PVB via the CVP-SWP system, as a result of Bay-Delta legal decisions, CEQA process and uncertainties. Please assume that future restrictions may be even less than the prevailing 40% allocation. Extrapolations from the conditions in the adjacent Westside Basin may be useful, but should not form the sole basis for the evaluation.

274. If the Applicant disagrees that future restrictions may be even less than the current 40% allocation, please demonstrate how the effect of continued restricted imported water supplies to the PVB will impact A) the Project and B) the groundwater basin, based on the Applicant's scenario of future CVP-SWP allocations during the proposed 20-year Project duration. Please justify your allocations based the Applicant's information and analysis of possible future drought and political scenarios.

Background: IMPACTS ON WATER BANKING FACILITY

In 2006, the San Luis & Delta-Mendota Water Authority developed the *Westside Integrated Water Resources Plan*, which is available from these agencies,

as well as the Westlands Water District. This is the most current comprehensive water management strategy document for the Westside Groundwater Basin, including potential impacts on agricultural groundwater pumping from drought- and Bay-Delta-imposed water supply restrictions. However, the Applicant apparently did not review nor use this document within their water supply assessment for the proposed Project.

In addition to containing useful background information for evaluation of the Data Request Nos. 272, 273 and 274 discussed above, this document also identifies that the Pleasant Valley Water District (PVWD) is planning a 5000 AFY water banking facility located along Chino-Zapato Creek one mile south of the proposed San Joaquin Solar Hybrid (SJS 1 & 2) Project. The banking project would ultimately involve negotiated contracts with several "water bankers" who would store their purchased water at this facility during wet years and/or years of increased CVP-SWP available allocations. The proposed SJS 1 & 2 Project groundwater extractions are proximal enough to this water banking site such that parties to the water banking agreement may potentially be impacted by proposed SJS 1 & 2 extractions, and vice-versa.

Data Request:

275. Please explain the Project's potential impacts on the PVWD water banking facility planned one mile south of the proposed Project.

276. Once a suitable perennial yield evaluation is completed for the PVB, augmented by probable uncertainties in water supply due to climate and Bay-Delta constraints, please perform an assessment of the potential impacts of SJS 1 & 2 groundwater extractions on the planned PVWD water banking facility.

Background: SIMULATIONS OF WELL PUMPING EFFECT

The Applicant responded to CEC Data Request No. 13 for a computer modeling study by stating that "Submission of the neighboring well aquifer test information should satisfy the data adequacy need for groundwater well yield/aquifer analysis." This response apparently pre-dated the submission of the Applicant's Aquifer Test report dated February 19, 2009.

Within its subsequent Aquifer Test report, the Applicant attempted to predict drawdown in nearby wells following three different scenario time periods of continuous pumping from the Test Well (1, 10 and 20 years); the Applicant identified 20 years as the total Project duration. Estimates of drawdown in neighboring wells were performed using a spreadsheet model based upon the Theis (1935) analytical solution, assuming both "ideal" Project groundwater pumping (680

gpm) as well as "maximum" pumping (1,750 gpm) to meet Project water demands. The "maximum" pumping scenario assumes that recycled wastewater from a planned new Coalinga treatment facility will not be available to the Project. These simulations are not adequate to address reliability of groundwater supply to meet Project demands for the following reasons:

1) The Theis (1935) analytical method was developed for use in confined aquifers using pumping and observation wells which fully penetrate (screen) the aquifer being tested. There is no data presented by the Applicant to support classification of the tested aquifer as being either partially or exclusively confined. Furthermore, data submitted by the applicant and within the public domain indicates that the test well only partially penetrates the saturated zone, and likely screens multiple saturated zones separated by aquitards.

2) No log nor construction details were provided for the single observation well used in the test; continuity of stratigraphic units and saturated zone(s) between the test well and observation well therefore cannot be accurately constrained. As such, reliability of the resultant drawdown data from the test does not justify selection of the Theis analytical method to simulate effects of future pumping from the test well.

3) Within its February 19, 2009 report, the Applicant provided a log of only one other agricultural supply well in the vicinity of the proposed Project area. This log exhibits significant differences from the aquifer test well, and suggests considerable heterogeneities within the aquifer materials, not atypical of alluvial sediments of the west-central San Joaquin Valley groundwater basin (Davis et al, 1959; Page, 1986; State DWR, 2003). Such heterogeneities are not accounted for within the Theis spreadsheet analytical model utilized for the simulations of drawdown.

4) The Theis (1935) analytical method is recognized as providing best estimates of aquifer response nearer to the pumping well, since it was developed to analyze removal of water from storage and assumes non-steady-state aquifer response (e.g., the well capture zone continuously expands with continued pumping over time) (Domenico, 1972; Butler, 1990; Kruseman and deRidder, 1990); it is less meaningful in estimating aquifer response near the outer fringe of the capture zone, and thus not an ideal tool to evaluate the potential impacts upon neighboring wells located at greater distances from the test well.

Because no more than one observation well was used in the Applicant's aquifer test, a conventional Cooper-Jacob steady-state analysis of drawdown vs. distance cannot be employed as an alternative to the Theis method for estimating

the test well capture zone radius, and its impact on nearby pumping wells. Furthermore, the Theis-method simulations do not account for potential interference due to groundwater pumping by other local parties, with which the Project pumping effects would obviously compete. This uncertainty is driven by the absence of a reliable estimate of perennial yield for the Pleasant Valley Groundwater Basin (PVB) (refer to Data Request Nos. 270 and 271).

On page 5.5-4 of the AFC, the applicant states that "the present-day groundwater flow system is in a transient state and is adjusting to the stresses placed upon it in the past and present." The AFC also identifies the "large downward hydraulic head gradient" due to excessive groundwater pumping in the Project area by other parties due to reduced CVP-SWP imports and drought, as exhibited by continually declining groundwater levels from 1988 through 2008. The very nature of these comments by the Applicant, coupled with the discussion above, strongly support the need for development and application of a more robust conceptual and numerical groundwater model for at least the northern portion of the PVB where the proposed Project is located.

Data Requests:

277. In light of the comments above, please explain why pumping simulations based upon only the simplified Theis analytical method were chosen to predict proposed Project impacts on local water supply.

278. Responses to Data Request No. 277 notwithstanding, as an alternative to the simple Theis analytical method, please develop a robust three-dimensional conceptual and numerical groundwater flow model for the northern portion of the PVB where the proposed SJS 1 & 2 Project is to be located, to simulate effects of Project groundwater withdrawals on neighboring pumpers and planned PVWD groundwater recharge facilities. Please use some form of conventional and reasonably available commercial software, such as WHI Visual Modflow© (version 3.1 or greater) or an equivalent. If an existing groundwater flow model has been developed for the Project area and is available and not subject to proprietary use restrictions, that may be considered for the simulations. The following conditions should be met by any such model used or developed:

    A. Please adhere to prevailing Standard Guides developed by the American Society for Testing and Materials (ASTM) for developing, calibrating, verifying and performing sensitivity analyses of groundwater flow models, as well as defining initial model conditions and boundary conditions.

B. A model domain of not less than six square miles, centered on the proposed Project extraction well(s), should be used.

C. In order to avoid "forced" boundary condition behavior, model boundaries should be set so as to not coincide with geologic or suspected hydrogeologic boundaries, such as the Guijarral Hills to the north, Kreyenhagen Hills to the west, or the subsurface Kettleman Hills anticline across Polvadero Gap east of the Project site.

D. Horizontal discretization (gridding) of the domain should be constructed so as to have as many grid-centered wells as possible. Grid dimensions need not be any finer than necessary to reasonably simulate heads produced by the number of pumping wells or recharge sites presently in the domain, and new wells or recharge sites reasonably expected to be installed within the domain within the expected duration of the proposed Project.

E. Vertical discretization should include as many discrete layers as are adequate for representation of the different physical properties and flow behavior of all significant aquifers and aquitards identified within the domain from review of local well logs. As many well logs as illustrated on Figure 5.5-4 of the AFC should be used as possible, in addition to an adequate number of wells east of Polverado Gap within the Westside Groundwater Basin to simulate the potential boundary condition in that area. The bottom layer of the discretized domain should include the base of the fresh water zone. Layer discretization should be able to lead to reasonable simulations of well capture zones developed due to preferential flow pathways in zones of higher hydraulic conductivity (something that a simplified Theis analysis cannot achieve).

F. Static (non-pumping) water-level data should be used from as many local wells as possible for steady-state model calibration. It is recommended that heads measured during historic periods of maximum CVP-SWP imported water to PVB (and minimal groundwater pumping) be considered for steady-state calibration.

G. Recovery data from the February 2009 aquifer test may be used for transient model calibration, but only if uncertainties with the "State Prison" test observation well can be resolved (e.g., aquifer stratigraphy and well construction details). Transient calibration should comparatively also involve heads measured from as many idle (non-pumping) wells as possible during historic periods of heavy groundwater pumping in other wells, although such a condition may

not have ever existed. Nevertheless, a comprehensive review of local area wells should be performed to evaluate whether or not this is feasible.

H. Assignment of "no-flow" and "constant head" boundary conditions in particular should only used with extreme prejudice, and be well-justified from suitable historic data.

I. Following a reasonable effort at model calibration, the model should initially be verified by pumping simulations of the Applicant's aquifer test well using rates and time periods similar to those used for the previous Theis simulations, with all other wells in the domain set for non-pumping conditions. Subsequent model verification should be performed using those same Project test well extraction rates, in addition to other wells in the domain set to achieve cumulative extractions comparable to historic maximum pumping periods recorded in the PVB.

J. If model calibration and verification efforts provide reasonable results, please use the model to verify PVB perennial yield.

K. Please perform conventional sensitivity and uncertainty analyses for the model.

Dated: September 4, 2009

Respectfully submitted,

_____/s/_____

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DECLARATION OF SERVICE

I, Bonnie Heeley, declare that on September 4, 2009, I served and filed copies of the attached California Unions for Reliable Energy Data Requests, Set Five. 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/sjsolar/SJSOLAR_POS.PDF. The document has been sent (1) electronically, and (2) via US Mail by depositing in the US Mail at South San Francisco, CA, with first-class postage thereon full prepaid and addressed as provided on the attached Proof of Service list to those addresses NOT marked "email preferred." It was sent for filing to the Energy Commission by sending an original paper copy and one electronic copy, mailed and emailed respectively, to the address shown on the attached Proof of Service list.

I declare under penalty of perjury that the foregoing is true and correct. Executed at South San Francisco, California, on September 4, 2009.

_____/s/_____
Bonnie Heeley

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