From: Russell, Meg [mailto:Meg.Russell@fpl.com]
Sent: Friday, March 20, 2009 2:59 PM
To: Eric Solorio
Cc: Stein, Kenneth; Head, Sara; McCloud, Duane; Busa, Scott; Luckhardt, Jane
Subject: Beacon Solar Energy Project - Evaporation Calculation follow-up

Good afternoon Eric,

Attached is a memo regarding the evaporation pond size calculations, documenting what Kenny and I previously discussed with you on the phone. We have decided to use the larger pond size for the project, and have submitted our revised ROWD application with this information. You were copied on the submittal of the ROWD application (you should have received it this morning) and we will also file and serve this application to dockets and the POS list next week. Have a good weekend.

Best Regards,
Meg

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DATE: March 4, 2009

TO: Duane McCloud

FROM: Jared Foster

CC: Mike Tietze

SUBJECT: Response to the California Energy Commission Comments and Questions Regarding Evaporation Ponds

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In response to various comments and questions from Commission Staff regarding the evaporation pond sizing for the Beacon Solar Energy Project, WorleyParsons presents the following clarifications, review of our sizing methodology, and alternative calculation and pond sizing.

The evaporation ponds proposed for the Beacon Solar Energy Project in the Application for Certification (AFC) were sized based on a preliminary calculation appropriate for a permitting-level analysis. The basis of the calculation was the reported evaporation rate for saline water in Koehn Lake (114 inches per year, Weir et al., 1965; Bloyd, 1967). The data used for the evaporation input to the calculation is consistent with the information submitted in the AFC. Use of lake evaporation data can address such factors as pan thermal effects, lake effects, edge effects and, in the case of Koehn Lake, salinity effects. Applying reservoir and lake evaporation characteristics as the input data to pond sizing evaluation also has precedent in the literature, see for example *Design Characteristics for Evaporation Ponds in Wyoming* (Pochop, et al, 1985); and, *Review and Discussion on the Evaporation Rate of Brine* (Joshi and Bhatt, 1983).

However, WorleyParsons acknowledges that the use of lake evaporation data is not a commonly used approach for sizing evaporation ponds. The most commonly used approach involves the use of reported evaporation rates from a Class A Evaporation Pan and correcting the rates for lake and salinity effects (Bureau of Reclamation, 2006). We are also aware that the use of this approach would result in a more conservative (larger) evaporation pond design when nearby pan evaporation data are compared to the reported evaporation for Koehn Lake. We have therefore conducted an alternative pond sizing calculation and design to reflect this more conservative approach, and propose to incorporate this approach into the project.

Class A pan evaporation data from Western Regional Climate Center weather stations within a reasonable vicinity to the site were used as the basis for the alternative pond sizing calculation attached hereto. Precipitation rates were accounted for and were taken from the Cantil Station, located approximately 1 mile from the site; Average monthly Class A Evaporation Pan rates were taken from the Backus Ranch Station, located approximately 20 miles from the site. (Precipitation rates for the Backus Ranch are not published, however the average measurements from Cantil Station are consistent with average precipitation for measured locations within the Mojave area, as well as the recorded measurements from the Koehn Lake data, as published in the reference listed above.) Class A Pan Evaporation was adjusted by using a commonly accepted factor of 0.7 to account for pan thermal effects. In addition, the evaporation was adjusted downward to account for a potential pond water salinity of 200,000 parts per million of total dissolved solids, based on monitoring data from the evaporation ponds at the Harper Lake Solar Energy Generating Station (SEGS). As shown on the attached calculation sheet and pond conceptual layout, the resulting total pond area is 40 acres at the berm crest and 34.2 acres at the pond bottom. The revised location and configuration of the ponds is shown on the attached General Arrangement drawing.

The sizing calculation assures that the ponds will have sufficient evaporative capacity (surface area) to meet the project objectives presented in the AFC, which are (1) to fully evaporate the discharged wastewater, (2) accumulate evaporation residuals for the 30-year design life of the ponds, and (3) allow one pond to be taken out of service for a period of up to one year without having to curtail plant operation. To achieve this result, the calculation was performed iteratively with increasing surface area until the calculation showed that the ponds would be dry for a portion of the year, thus assuring that annual evaporative capacity exceeds annual discharge by a significant amount. In the final calculation, the ponds were calculated to be dry for two months of years 2 through 30, and to contain water at depths ranging from less than 1 to approximately 4 inches during the remainder of the year. It is important to understand that though the ponds were sized in this fashion, they will actually be managed to maintain higher water levels (minimum 2-foot depths) during operation to discourage pond use by wading birds. As discussed in the Supplemental Response to Data Request 14, the ponds will initially be filled to a depth of at least 2 feet. During periods when the full evaporative capacity of all three ponds is not needed and water levels fall below 2 feet in the ponds, one pond will be taken out of service and all discharge will be routed to the remaining two ponds to maintain 2 foot minimum water levels. During periods when two ponds do not provide sufficient evaporative capacity and water levels rise, discharge will be routed to all three ponds so that water levels at no time exceed the minimum freeboard requirement of 2 feet.

ATTACHMENT 1 – Beacon Solar Energy Project Evaporation Calculation
ATTACHMENT 2 – Beacon Solar Energy Project Evaporation and Landfarm Site Plan

ATTACHMENT 1 – Beacon Solar Energy Project
Evaporation Calculation

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Project Beacon
Evaporation Pond Sizing Calculation
By: Richard C. Antoline
Cked: Joal Borggard
Date: 3/1/2009

DESCRIPTION SHEET

General
1) The purpose of this calculation is to estimate the required evaporation pond acreage.
2) Site weather data are based on Cantil, CA. Dry bulb temperature data are from www.wrcc.dri.edu. Monthly average utility and wind speed data are from almanac data found on www.myforecast.com.
3) Site evaporation data are based on Backus Ranch, CA pan evaporation data as found at www.wrcc.dri.edu.
4) Blowdown TDS is based on the site specific mass balance.
5) Blowdown flow rates are based on the site specific water balance.
6) Pond TDS assumed to be 200,000 ppm (20%) based on data from SEGS Harper Lake facility.

Calculations
Solids
1) Solids were calculated by converting the estimated pond inlet TDS from concentration to total solids through the life of the plant. The concentration is provided in ppm, which is the equivalent to mg/L.
2) The concentration must first be converted into the units of lb/gal.
3) Next the concentration is multiplied by the Spring/Fall Blowdown flow rate thus resulting in the average lb/min entering the ponds.
4) This average value is then multiplied by the estimated Annual Operation hours of the plant and then by the Total Operating Duration (design years of plant) giving the total lbs of TDS generated through the life of the plant.
5) The total mass of solids is converted to volume by using the assumed Dry TDS Solids Density.
6) The final 30 year depth of dry solids is calculated by dividing the volume of solids produced by the Average Bottom of Pond Area. This results in a conservative depth estimate as it does not account for the slope of the pond sides.
7 To determine the depth of solids for a given year the total depth over the life of the pond is scaled per year.
8) A factor of 2X is applied to the dry solids depth in the pond sizing calculations to account for the additional space required for storage of wet solids verse dry solids.

Monthly Blowdown
1) Design blowdown rates are obtained from a water balance for Summer, Spring/Fall and Winter ambient conditions. The flow rate for each season is the equivalent for 100% net electricity production for that given season. The blowdown flow rate will reduce linearly with the electricity production in times when 100% plant capacity is not attainable (i.e. Summer = 572 gpm design for 250 MW, therefore flow rate would be 286 gpm for 125 MW during summer conditions).
2) The 24x12 net electricity generation for the facility gives an hourly average for each hour of the year thus enabling the estimation of the average blowdown flow rate for each hour of the year. May, June, July and August were chosen for the Summer months; September, October, March and April were chosen for the Spring/Fall months; and November, December, January and February were chosen for the Winter months. Net plant power generation data is estimated by use of Solar Advisor Model (SAM) as released by NREL.
3) The estimated blowdown rate for each season (in gallons per hour) was multiplied by the total electricity (MWh) produced in each appropriate month and divided by 250 MW thus resulting in the total gallons of blowdown entering the evaporation ponds for each month.

Pond Evaporation Rate
1) Published Class "A" pan evaporation rates are used but must converted to pond evaporation rates by the use of the following equations:

$$\boxed{Evaporation = (PanEvaporationRate - \Pr ecipitation) * LakeFactor * SalinityFactor}$$

2) Published daily average precipitation for each month is used.
3) Lake Factor based on information from Membrane Concentrate Disposal: Practices and Regulation, Mikey & Associates, 98-FC-81-0054.
4) The Salinity Factor is calculated by the following equation:

$$\boxed{SalinityFactor = 1 - 0.0086 * \%TDS}$$

Reference: Review and Discussion on Evaporation Rate of Brines, December 2000, actis Environmental Services.
5) The Pan Evaporation Rate values are given monthly with a units of inches/acre-month. The pond acreage used to calculate the inches/month of evaporation is at the top of the solids storage section of the pond. This level can be easily maintained throughout the life of the pond and provides a conservative approach in that the water level will always be above the solids level and the smallest possible are for

evaporation is chosen by using the top of the solids storage area.

Spray Nozzle Evaporation

1) Evaporation from spray nozzles is based on the following equation as published in the Journal of Applied Sciences 9 (3): 597-600, 2009:

$$\boxed{E = 4.375 \exp^{0.106u} (e_s - e_o)^{-0.0092} T^{-0.102}}$$

where, E = Evaporation Losses (% of nozzle discharge)
u = Wind Speed (mph)
T = Ambient Dry Bulb (°C)
$(e_s - e_o)$ = Vapor Pressure Deficit (mbar)

The Vapor Pressure Deficit is calculated by the following equation:

$$\boxed{(e_s - e_o) = 0.611 \exp^{\left(\frac{17.27T}{237.3+T}\right)} \left(1 - \frac{RH}{100}\right)}$$

where, $(e_s - e_o)$ = Vapor Pressure Deficit (mbar)
T = Ambient Dry Bulb (°C)
RH = Relative Humidity

2) The above equations do not account for drift losses. However, since the nozzles will be centrally located on the evaporation pond with > 100 ft to the nearest pond edge, drift losses are expected to be minimal.
3) Nozzle discharge is the blowdown for each given month.

Pond Sizing

1) The monthly average blowdown (pond inflow), pond evaporation (pond outflow) and spray nozzle evaporation (when chosen) are calculated and the blowdown is subtracted by the pond and spray nozzle evaporation values. In some months this value will result in a negative value showing that more water evaporated. for that month than what has entered the evaporation pond.
2) When the value is greater than zero, the remaining water level is carried over the next month. At no time is overall water volume in the pond permitted to go below zero or greater than the maximum capacity of the designated pond depth for water.
3) The maximum capacity for water is calculated based solely on the depth permitted for water and does not take into account the area below it for solids. This provides a conservative approach in the early years of operation but becomes more accurate in later years of operation.
4) The data is extrapolated over 30 yrs and listed on the Summary Table.

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Project Beacon
Evaporation Pond Sizing Calculation
By: Richard C. Antoline
Cked: Joal Borggard
Date: 3/1/2009

INPUT SHEET

Pond Design

1) Top of Pond Area	**40**	**acres**	(Rounded up to nearest acre)
2) Pond Top/Bottom Ratio	87%		(Based on pond design with 3:1 side slopes)
3) Avg Bottom of Pond Area	34.2	acres	
4) Pond Depth for Solids	2	ft	(to account for solids over life of pond)
5) Pond Depth for Water	3	ft	
6) Pond Freeboard	2	ft	
7) Total Pond Depth	**7**	**ft**	
8) Annual Operation	3,200	hrs/yr	From Solar Advisor Model Hourly Data
9) Total Operating Duration	30	yrs	

Make-up/Blowdown Water Parameters

10) Make-up Water TDS Conc.	550	ppm	(from table 5.17.10 from the AFC)
11) Cycles of Concentration	15		
12) Blowdown TDS Conc. (calc.)	1590	ppm	(from table 5.17.10 from the AFC)
13) Blowdown TDS Conc. (man.)	5,579	ppm	(from table 5.17.10 from the AFC)
14) Dry TDS Solids Density	90	lb/ft^3	(estimate for wet sludge)
15) Summer Blowdown	572	gpm	(from Figure 2-12 in the AFC)
16) Spring/Fall Blowdown	471	gpm	(from Figure 2-13 in the AFC)
17) Winter Blowdown	370	gpm	(calculated from Summer and Spring/Fall flowrates)

Site Weather Data

Source Data Location Cantil, CA

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max Dry Bulb (^oF)	58.9	65.6	71.5	76.2	86.5	97.7	104.3	102.1	93.1	80.2	64.1	58.0	80.1
Average Min Dry Bulb (^oF)	28.9	33.9	40.8	46.1	55.0	53.8	69.2	67.1	57.1	44.1	34.7	28.2	47.5
Average Dry Bulb (^oF)	43.9	49.8	56.2	61.2	70.8	75.8	86.8	84.6	75.1	62.2	49.4	43.1	63.8
Average RH (morning)	70.0	66.0	66.0	53.0	48.0	39.0	37.0	41.0	49.0	50.0	59.0	63.0	53.0
Average RH (afternoon)	40.0	36.0	36.0	25.0	22.0	17.0	17.0	20.0	22.0	24.0	32.0	40.0	28.0
Average RH (total)	55.0	51.0	51.0	39.0	35.0	28.0	27.0	30.5	35.5	37.0	45.5	51.5	40.5
Average Windspeed (mph)	8.7	10.1	11.1	13.1	13.7	13.8	12.0	10.8	9.6	9.2	8.3	8.2	10.8

Evaporation Table

Source Data Location Backus Ranch, CA (Evaporation) and Cantil, CA (Precipitation)

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Published Evaporation (in)	2.85	3.86	6.77	9.80	12.69	15.93	16.92	15.95	12.19	8.01	4.25	2.98	112.20
Lake Evaporation Factor	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Pond TDS Conc. (ppm)	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000
Salinity Factor	0.983	0.983	0.983	0.983	0.983	0.983	0.983	0.983	0.983	0.983	0.983	0.983	0.983
Monthly Precipitation (in)	0.71	0.48	0.30	0.09	0.15	0.05	0.10	0.12	0.05	0.03	0.43	0.54	3.05
Monthly Evaporation (in)	1.47	2.33	4.45	6.68	8.63	10.92	11.57	10.89	8.35	5.49	2.63	1.68	75.09
Operate Spray Nozzles (Y/N)	No	No	No	No	No	No	No	No	No	No	No	No	No

Net Plant Power Generation Table

NET OUTPUT TABLE FOR 250 MW SOLAR PROJECT

Hour Starting	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
0	-	-	-	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-	-	-	-
7	-	-	24	15	62	94	56	19	2	-	-	-	23
8	20	20	128	123	207	250	220	219	137	14	12	0	112
9	46	60	172	215	250	250	250	250	244	110	62	10	160
10	57	74	164	235	250	250	250	250	250	159	69	10	168
11	52	73	149	231	250	250	250	250	249	157	58	10	165
12	43	69	133	211	250	250	250	250	250	142	50	10	159
13	44	74	134	218	250	250	250	250	250	139	58	10	161
14	58	80	141	207	250	250	250	250	250	149	77	10	164
15	60	86	150	192	250	250	250	250	250	165	79	-	165
16	20	40	115	173	250	250	227	246	250	165	10	-	146
17	-	-	16	139	213	236	193	216	185	95	-	-	108
18	-	-	-	43	119	162	122	100	38	13	-	-	50
19	-	-	-	-	10	19	10	0	-	-	-	-	3
20	-	-	-	-	-	-	-	-	-	-	-	-	-
21	-	-	-	-	-	-	-	-	-	-	-	-	-
22	-	-	-	-	-	-	-	-	-	-	-	-	-
23	-	-	-	-	-	-	-	-	-	-	-	-	-
Total (MWhr)	401	575	1,326	2,003	2,611	2,761	2,578	2,551	2,356	1,308	475	60	
Days/month	31	28	31	30	31	30	31	31	30	31	30	31	
Monthly Totals (MWhr)	12,442	16,104	41,112	60,094	80,940	82,840	79,904	79,086	70,675	40,560	14,244	1,869	
												Total Annual Energy Generation	579,869

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Project Beacon

Evaporation Pond Sizing Calculation

By: Richard C. Antoline
Cked: Joal Borggard
Date: 3/1/2009

SUMMARY SHEET

				Annual			
Year	**Pond Size (ac)**	**Depth of Solids (ft)**	**Available Pond Depth for Solids (ft)**	**Inflow - Plant (gal)**	**Outflow - Evap (gal)**	**Net (gal)**	**Margin**
1	40	0.06	1.94	72,289,857	72,289,857	0	0%
2	40	0.13	1.87	72,289,857	72,289,857	0	0%
3	40	0.19	1.81	72,289,857	72,289,857	0	0%
4	40	0.25	1.75	72,289,857	72,289,857	0	0%
5	40	0.31	1.69	72,289,857	72,289,857	0	0%
6	40	0.38	1.62	72,289,857	72,289,857	0	0%
7	40	0.44	1.56	72,289,857	72,289,857	0	0%
8	40	0.50	1.50	72,289,857	72,289,857	0	0%
9	40	0.57	1.43	72,289,857	72,289,857	0	0%
10	40	0.63	1.37	72,289,857	72,289,857	0	0%
11	40	0.69	1.31	72,289,857	72,289,857	0	0%
12	40	0.75	1.25	72,289,857	72,289,857	0	0%
13	40	0.82	1.18	72,289,857	72,289,857	0	0%
14	40	0.88	1.12	72,289,857	72,289,857	0	0%
15	40	0.94	1.06	72,289,857	72,289,857	0	0%
16	40	1.01	0.99	72,289,857	72,289,857	0	0%
17	40	1.07	0.93	72,289,857	72,289,857	0	0%
18	40	1.13	0.87	72,289,857	72,289,857	0	0%
19	40	1.19	0.81	72,289,857	72,289,857	0	0%
20	40	1.26	0.74	72,289,857	72,289,857	0	0%
21	40	1.32	0.68	72,289,857	72,289,857	0	0%
22	40	1.38	0.62	72,289,857	72,289,857	0	0%
23	40	1.45	0.55	72,289,857	72,289,857	0	0%
24	40	1.51	0.49	72,289,857	72,289,857	0	0%
25	40	1.57	0.43	72,289,857	72,289,857	0	0%
26	40	1.63	0.37	72,289,857	72,289,857	0	0%
27	40	1.70	0.30	72,289,857	72,289,857	0	0%
28	40	1.76	0.24	72,289,857	72,289,857	0	0%
29	40	1.82	0.18	72,289,857	72,289,857	0	0%
30	40	1.89	0.11	72,289,857	72,289,857	0	0%

Project Beacon
Evaporation Pond Sizing Calculation
By: Richard C. Antoline
Checked: Joal Borggard
Date: 3/1/2009

POND YEAR 1

Year	1													
Top of Pond Area, ac	40													
Solids Depth, ft	0.06													
Pond Depth for Water, ft	3													
Starting Pond Depth for Solids, ft	2													
Available Pond Depth for Solids, ft	1.94													
Year 10 Minus Year 1 Carry Over Volume	0	(Make 0 by changing "Avg Bottom of Pond Area" on "Inputs" page)												
Evaporation (inches/month)	11.6	10.9	8.4	5.5	2.6	1.7	1.5	2.3	4.5	6.7	8.6	10.9	75	Estimated Annual Average Evaporate
Average Dry Bulb (^oF)	86.8	84.6	75.1	62.2	49.4	43.1	43.9	49.8	56.2	61.2	70.8	75.8	63.8	
Average Dry Bulb (^oC)	30.4	29.2	23.9	16.8	9.7	6.2	6.6	9.9	13.4	16.2	21.5	24.3	17.7	
Average Relative Humidity	27.0	30.5	35.5	37.0	45.5	51.5	55.0	51.0	51.0	39.0	35.0	28.0	40.5	
Windspeed (mph)	12.0	10.8	9.6	9.2	8.3	8.2	8.7	10.1	11.1	13.1	13.7	13.8	10.8	

Hour starting	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total	July to June
Days/month	31	31	30	31	30	31	31	28	31	30	31	30	365	Days per year
gal/month Inflow from Plant	10,969,260	10,856,897	7,989,110	4,584,940	1,264,826	165,986	1,104,838	1,429,994	4,647,331	6,793,002	11,111,444	11,372,231	72,289,857	Inflow from Plant (gal)
Spray Evaporation (% of Inflow)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
gal/month Outflow (spray evap)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	Outflow - Spray Evap (gal)
gal/month Outflow (pond evap)	11,139,857	10,484,182	8,040,301	5,285,140	2,529,979	1,616,008	1,417,318	2,238,568	4,285,070	6,430,916	8,305,220	10,517,297	72,289,857	Outflow - Pond Evap (gal)
Net gal/month total	-170,597	372,715	-51,192	-700,200	-1,265,154	-1,450,022	-312,480	-808,574	362,261	362,085	2,806,223	854,934	0	Net (Inflow - Outflow)
Carry over Volume to next month gal	0	372,715	321,523	0	0	0	0	0	362,261	724,346	3,530,570	4,385,504		
Available Volume gal/month	36,257,724	35,885,009	35,936,201	36,257,724	36,257,724	36,257,724	36,257,724	36,257,724	35,895,463	35,533,378	32,727,154	31,872,220	31,872,000	Available Volume at end of calendar year
Maximum Capacity without freeboard	36,257,724	36,257,724	36,257,724	36,257,724	36,257,724	36,257,724	36,257,724	36,257,724	36,257,724	36,257,724	36,257,724	36,257,724	36,257,724	Maximum Capacity without freeboard

reference files:

B	Update Evaporation Rate, Add Spray Nozzles	RCA	02/20/09
A	Draft	GDM	10/26/07
Rev.	Description	By	Date

Checked By:

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Evaporation Pond Year 1

Project Beacon Rev. B

Project Beacon
Evaporation Pond Sizing Calculation
By: Richard C. Antoline
Checked: Joal Borggard
Date: 3/1/2009

POND YEAR 2-30

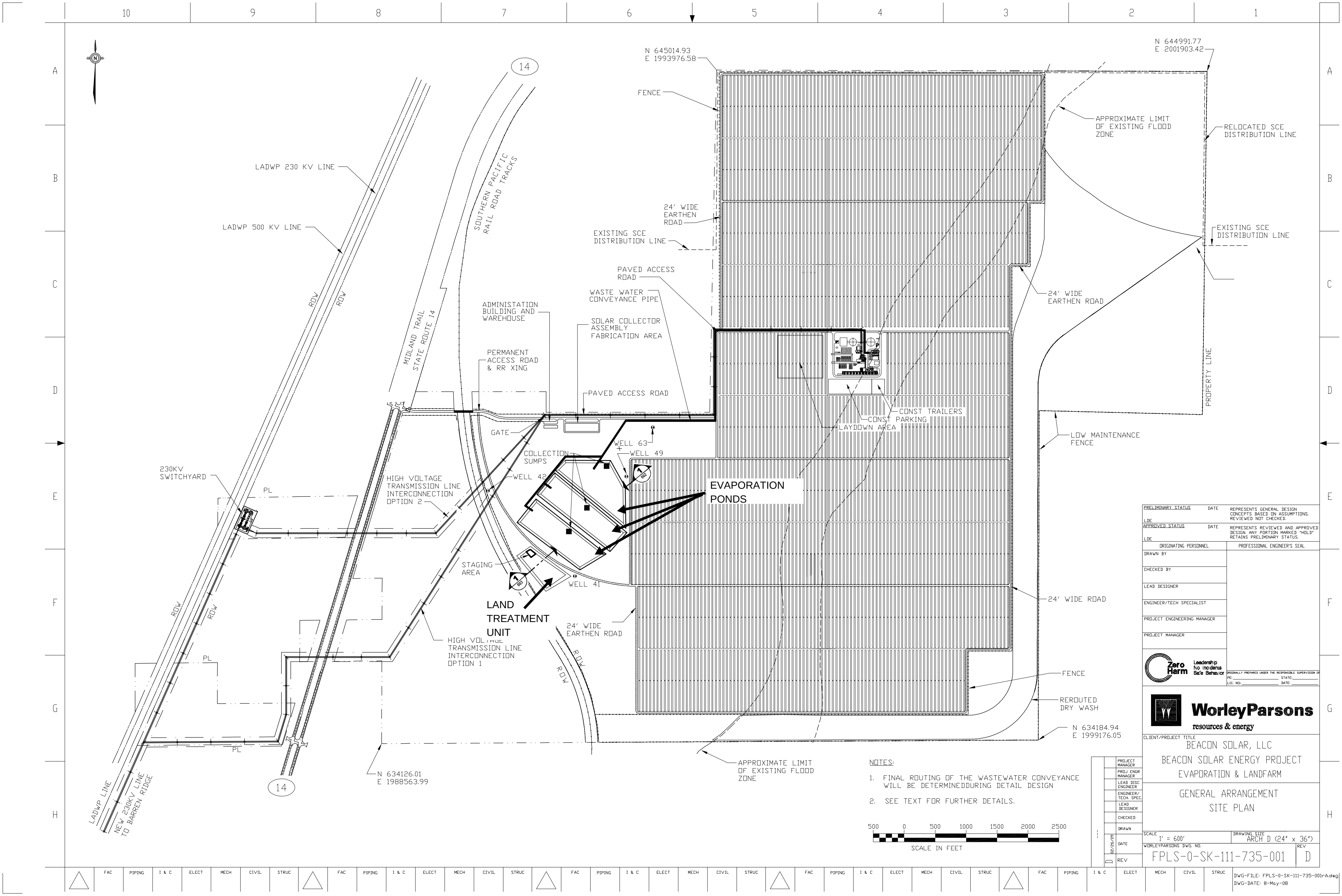
Year	2													
Top of Pond Area, ac	40													
Solids Depth, ft	See Summary Table													
Pond Depth, ft	3													
Pond Depth for Solids, ft	See Summary Table													
outflow (in/month)	11.6	10.9	8.4	5.5	2.6	1.7	1.5	2.3	4.5	6.7	8.6	10.9	75.1	Estimated Annual Average Evaporate
Average Dry Bulb (^{o}F)	86.8	84.6	75.1	62.2	49.4	43.1	43.9	49.8	56.2	61.2	70.8	75.8	63.8	
Average Dry Bulb (^{o}C)	30.4	29.2	23.9	16.8	9.7	6.2	6.6	9.9	13.4	16.2	21.5	24.3	17.7	
Average Relative Humidity	27.0	30.5	35.5	37.0	45.5	51.5	55.0	51.0	51.0	39.0	35.0	28.0	40.5	
Windspeed (mph)	12.0	10.8	9.6	9.2	8.3	8.2	8.7	10.1	11.1	13.1	13.7	13.8	10.8	
Hour starting	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total	July to June
Days/month	31	31	30	31	30	31	31	28	31	30	31	30	365	Days per year
gal/month Inflow from Plant	10,969,260	10,856,897	7,989,110	4,584,940	1,264,826	165,986	1,104,838	1,429,994	4,647,331	6,793,002	11,111,444	11,372,231	72,289,857	Inflow from Plant (gal)
Spray Evaporation (% of Inflow)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
gal/month Outflow (spray evap)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	Outflow - Spray Evap (gal)
gal/month Outflow (evap)	11,139,857	10,484,182	8,040,301	5,285,140	2,529,979	1,616,008	1,417,318	2,238,568	4,285,070	6,430,916	8,305,220	10,517,297	72,289,857	Outflow - Pond Evap (gal)
Net gal/month total	-170,597	372,715	-51,192	-700,200	-1,265,154	-1,450,022	-312,480	-808,574	362,261	362,085	2,806,223	854,934	0	Net (Inflow - Outflow)
Carry over Volume to next month gal	4,214,906	4,587,621	4,536,430	3,836,230	2,571,076	1,121,054	808,574	0	362,261	724,346	3,530,570	4,385,504		
Available Volume gal/month	32,042,818	31,670,103	31,721,294	32,421,494	33,686,648	35,136,670	35,449,150	36,257,724	35,895,463	35,533,378	32,727,154	31,872,220	31,872,220	Available Volume at end of calendar year
Maximum Capacity without freeboard	36,257,724	36,257,724	36,257,724	36,257,724	36,257,724	36,257,724	36,257,724	36,257,724	36,257,724	36,257,724	36,257,724	36,257,724	36,257,724	Maximum Capacity without freeboard

Carryover from previous year **31,872,000**

reference files:

Rev.	Description	By	Date	Checked By:	
B	Update Evaporation Rate, Add Spray Nozzles	RCA	02/20/09		WorleyParsons resources & energy
A	Draft	GDM	10/26/07		**Evaporation Pond Year 2-30**
					Project Beacon Rev. B

ATTACHMENT 2 – Beacon Solar Energy Project
Evaporation Pond and Land Treatment Unit Site Plan



N 645014.93
E 1993976.58
N 644991.77
E 2001903.42
FENCE
APPROXIMATE LIMIT OF EXISTING FLOOD ZONE
RELOCATED SCE DISTRIBUTION LINE
LADWP 230 KV LINE
LADWP 500 KV LINE
SOUTHERN PACIFIC RAIL ROAD TRACKS
14
24' WIDE EARTHEN ROAD
EXISTING SCE DISTRIBUTION LINE
PAVED ACCESS ROAD
WASTE WATER CONVEYANCE PIPE
ADMINISTATION BUILDING AND WAREHOUSE
SOLAR COLLECTOR ASSEMBLY FABRICATION AREA
PERMANENT ACCESS ROAD & RR XING
MIDLAND TRAIL STATE ROUTE 14
ROW
PROPERTY LINE
CONST TRAILERS
CONST PARKING
LAYDOWN AREA
LOW MAINTENANCE FENCE
GATE
WELL 63
WELL 49
WELL 42
WELL 41
COLLECTION SUMPS
230KV SWITCHYARD
PL
HIGH VOLTAGE TRANSMISSION LINE INTERCONNECTION OPTION 2
EVAPORATION PONDS
STAGING AREA
LAND TREATMENT UNIT
24' WIDE ROAD
24' WIDE EARTHEN ROAD
HIGH VOLTAGE TRANSMISSION LINE INTERCONNECTION OPTION 1
FENCE
REROUTED DRY WASH
N 634184.94
E 1999176.05
N 634126.01
E 1988563.99
APPROXIMATE LIMIT OF EXISTING FLOOD ZONE
LADWP LINE
NEW 230KV LINE TO BARREN RIDGE
NOTES:
1. FINAL ROUTING OF THE WASTEWATER CONVEYANCE WILL BE DETERMINEDDURING DETAIL DESIGN
2. SEE TEXT FOR FURTHER DETAILS.
500 0 500 1000 1500 2000 2500
SCALE IN FEET
PRELIMINARY STATUS DATE REPRESENTS GENERAL DESIGN CONCEPTS BASED ON ASSUMPTIONS. REVIEWED NOT CHECKED.
APPROVED STATUS DATE REPRESENTS REVIEWED AND APPROVED DESIGN. ANY PORTION MARKED "HOLD" RETAINS PRELIMINARY STATUS.
ORIGINATING PERSONNEL
PROFESSIONAL ENGINEER'S SEAL
DRAWN BY
CHECKED BY
LEAD DESIGNER
ENGINEER/TECH SPECIALIST
PROJECT ENGINEERING MANAGER
PROJECT MANAGER
Zero Harm Leadership No Incidents Safe Behavior
WorleyParsons resources & energy
CLIENT/PROJECT TITLE
BEACON SOLAR, LLC
BEACON SOLAR ENERGY PROJECT
EVAPORATION & LANDFARM
GENERAL ARRANGEMENT
SITE PLAN
SCALE 1" = 600'
DRAWING SIZE ARCH D (24" x 36")
WORLEYPARSONS DWG. NO.
FPLS-0-SK-111-735-001
REV D
DWG-FILE: FPLS-0-SK-111-735-001rA.dwg
DWG-DATE: 8-May-08
FAC PIPING I & C ELECT MECH CIVIL STRUC

BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION OF THE STATE OF CALIFORNIA

APPLICATION FOR CERTIFICATION FOR THE BEACON SOLAR ENERGY PROJECT	DOCKET NO. 08-AFC-2 **PROOF OF SERVICE** (Revised 2/9/09)

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Declaration of Service

I, Lois Navarrot, declare that on March 30, 2009, I served and filed copies of the attached **E-Mail and Evaporation Calculation follow-up from Meg Russell at Beacon Solar to Eric Solorio at the California Energy Commission.** 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: www.energy.ca.gov/sitingcases/beacon. The document has been sent to both the other parties in this proceeding (as shown on the Proof of Service List) and to the Commission's Docket Unit, in the following manner:

(check all that apply)

For Service to All Other Parties

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

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

AND

For Filing with the Energy Commission

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

OR

_____ depositing in the mail an original and 12 paper copies as follow:

California Energy Commission
Attn: Docket No. 08-AFC-2
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512

docket@energy.state.ca.us

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

/s/
Lois Navarrot