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September 24, 2009

Ms. Melissa Jones
Executive Director
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814

Dear Ms. Jones,

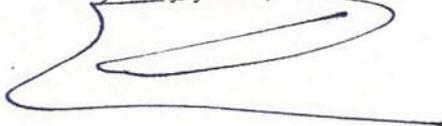
Pursuant to the provisions of Title 20, California Code of Regulations, Mojave Solar LLC., a Delaware limited liability company, hereby submits a document titled "Mojave Solar Project Application for Certification, Volume 4, Data Adequacy Supplement" to complete the Application for Certification of the Mojave Solar Project, a nominal 250 MW solar electric generating facility to be located near Harper Dry Lake in unincorporated San Bernardino County, California.

This Data Adequacy Supplement addresses Staff's data adequacy recommendation dated September 8, 2009 and provides additional information in the areas of Air Quality, Biological Resources, Land Use, Project Overview, Public Health, Soils, Transmission System Engineering, Visual Resources, and Water Resources. For each topic area, the Data Adequacy Supplement lists the applicable CEC regulation section, the CEC staff information request, and the Project Applicant's response.

Abengoa Solar Inc., a Delaware corporation, is the sole member of Mojave Solar project LLC. As General Manager of Abengoa Solar Inc., I hereby attest, under penalty of perjury, that the contents of this "Mojave Solar Project Application for Certification, Volume 4, Data Adequacy Supplement" are true and accurate to the best of my knowledge.

If you have any questions, please contact Mr. Frederick Redell (949-701-8249) or me.

Very truly yours,



Emiliano Garcia Sanz
General Manager

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Data Adequacy Supplement Attachments:

Attachment A : Water Resources Industrial Storm Water Pollution Prevention Plan (Addendum)	
Attachment B: Water Resources Report of Waste Discharge	
Attachment C: Soils Erosion Calculation Records	
Attachment D: Biological Resources Part 1: Wetlands Delineation Maps Part 2: California Natural Diversity Database	
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Attachment G: Water Resources Part 1: Annual Report Part 2: 9,380 AFY Water Rights <i>(A portion of this attachment is submitted under separate confidential cover.)</i> Part 3: 224 AFY Water Rights <i>(A portion of this attachment is submitted under separate confidential cover.)</i> Part 4: 874 AFY Water Rights <i>(A portion of this attachment is submitted under separate confidential cover.)</i>	

Air Quality

Air Quality: Appendix B (g)(1)

Information Required:

Please provide a discussion of the proposed mitigation measures and monitoring required to mitigate the potentially adverse impacts from operation and maintenance emissions of NO_x, VOC, PM₁₀ and PM_{2.5}.

Response:

AFC Section 5.2.3 presents a discussion of the control technologies proposed for use on the site equipment and processes (AFC pp. 5.2-17 through 5.2-19). AFC Appendix C.1 presents detailed information on the proposed site operational equipment and emissions with the proposed BACT control systems. AFC Appendix C.6 presents data on the evaluation of Best Available Control Technology for each of the proposed operational systems, i.e., IC engines, boilers, cooling towers, HTF systems, etc.

Operational emissions from maintenance activities are minimal and detailed in Appendix C.1 of the AFC. Estimated exhaust emissions and are achieved by the meeting CARB/EPA motor vehicle standards. Additionally, fugitive dust emissions are controlled by using dust suppression methods and limiting onsite vehicle speeds.

The Project's operational emissions are less than the offset thresholds of the Mojave Desert Air Quality Management District (MDAQMD) offset trigger levels for NO_x, VOC, PM₁₀/PM_{2.5} and SO₂. Thus, offsets for these pollutants are not proposed for mitigation. The Project proposes to mitigate the operational and construction emissions through use of some of the following methods:

- The Project's operational emissions will employ the Best Available Control Technology (BACT) which will limit emissions of all non-attainment pollutants and their precursors.
- Fugitive sources of PM₁₀/2.5 will be further mitigated through the use of wind erosion operational practices such as windbreaks, water, and dust suppressants in areas disturbed by vehicles or wind. Additionally, limiting vehicle speeds is also proposed.
- Providing funding to the Carl Moyer program on a dollar/ton basis. The Carl Moyer program provides incentive grants for cleaner-than-required engines, equipment and other sources of pollution providing early or extra emission reductions. Eligible projects include cleaner on-road, off-road, marine, locomotive and stationary agricultural pump engines. The program achieves near-term reductions in emissions of NO_x, PM₁₀/2.5, and reactive organic gas (ROG). Funding could be provided on a dollar per ton basis at a rate that is similar to the current ERC market rates.

The applicant will work with the CEC to identify a mitigation strategy that best suites the needs of the Project for all phases and aspects.

Monitoring of the operational emissions will be incorporated in the MDAQMD permit and may include fuel use monitors, record keeping, and conductivity monitoring for cooling tower emissions of PM. Additionally, VOC leak detection and repair activities may be incorporated for the HTF processes at the site in order to minimize fugitive leaks of VOCs.

Air Quality: Appendix B (g)(8)(C)

Information Required:

Please provide a discussion of the proposed mitigation measures and monitoring needed to limit the criteria pollutant emissions of NO_x, VOC, PM₁₀ and PM_{2.5} from operation and maintenance activities. Response to this item can be combined with that for item B (g)(1) above.

Response:

Please see above response for Appendix B (g)(1).

Air Quality: Appendix B (g)(8)(K)

Information Required:

Please provide a detailed discussion of the mitigation measures that will be proposed to mitigate operations and maintenance air emissions of pollutants that currently exceed ambient air quality standards (NO_x and VOC as ozone precursors, PM₁₀, and PM_{2.5}), but are not subject to offset requirements under the district's new source review rule.

Response:

Please see above response for Appendix B (g)(1).

Biological Resources

Biological Resources: Appendix B (g)(13)(B)(iii)

Information Required:

Please provide aerial photos or wetland delineation maps at a scale of 1:2,400 showing any potential jurisdictional and non-jurisdictional wetlands and Waters of the U.S. and State delineated out to at least 250 feet from the edge of disturbance.

Response:

Please see Data Adequacy Supplement Attachment D, Part 1: Wetlands Delineation Maps.

Biological Resources: Appendix B (g)(13)(D)

Information Required:

Please provide copies of the California Natural Diversity Database records completed by the applicant's biologist(s).

Response:

Please see Data Adequacy Supplement Attachment D, Part 2, California Natural Diversity Database.

Land Use

Land Use: Appendix B (g)(3)(C)

Information Required:

The AFC Land Use Section (5.7) provides no discussion of parcel legality for the proposed project. The AFC Executive Summary (Section 1.0) states (on pg. 1.0-3), “[s]ite control of the following parcels was established to develop the site: APN 0490-121-42; APN 0490-131-06; APN 0490-131-07; APN 0490-131-08; APN 0490-131-11; APN 0490-131-12; APN 0490-131-15; APN 0490-131-16; APN 0490-161-08; APN 0490-161-09; APN 0490-161-10; APN 0490-161-11; APN 0490-161-12; APN 0490-161-13.” However, there is no discussion of the method and timetable for merging or otherwise combining these parcels so that the proposed project will be located on a single legal parcel.

Response:

Currently the Project site contains 14 separate and contiguous parcels as referenced above and wholly located within San Bernardino County. The property would be developed as a Solar Electrical Generating Plant which is exempt from the Map Act process (parcel map) under Section 66412(l) of the California Subdivision Map Act. Since all parcels are contiguous and will be under one ownership, the Applicant would file, and San Bernardino County would process a Lot Merger application per Section 66449.20.3/4 of the Map Act, as referenced in the San Bernardino County Code of Ordinances Chapter 87.04 Additional Subdivision Procedures.

The timing to complete the parcel merger can range from four to six weeks but every application is handled separately and the time frame may vary.

Project Overview

Project Overview: Appendix B (a)(3)(C)

Information Required:

Please provide the legal relationship between the power plant owners and the electrical transmission system owners.

Response:

Abengoa Solar Inc, the owner of Mojave Solar LLC, the power plant owner (PPO), are distinct and separate companies from Southern California Edison, the Transmission System Owner (TSO). There are no shared interests between the Project Owner and the Transmission Owner or common board members.

The legal relationship between the PPO and TSO exist through the Large Generator Interconnection Procedures process. The PPO has entered into interconnection studies to establish interconnection for transmission of the Project's energy to the statewide transmission grid. A Large Generator Interconnection Agreement is expected to be entered into by the end of 2009.

Public Health

Public Health: Appendix B (g)(9)(D)

Information Required:

Please provide a figure showing all sensitive receptors within a 3-mile radius, including the type of receptor and its number as identified in Table C.4-4.

Response:

No sensitive receptors were identified within a 6 mile radius of the Project location. AFC Appendix C.4, Figure C.4-2 presents a 6 mile radius around the Project site identifying no sensitive receptors. Additionally, AFC Appendix C.4, Table C.4-4 presents a list of receptors which includes a number of "residential-farm" sites, i.e., receptors 14 through 22. Although these receptors are included on the receptor listing, it should be noted that "residential" receptors are not technically "sensitive receptors" per the OEHHA Air Toxics Hot Spots Program Risk Assessment Guidelines (August 2003), Section 4.6.4 and 4.7.1. AFC Appendix C.4, Table C.4-4 has been revised to clearly indicate that the "residential-farm" receptors are not sensitive receptors (see attached revised table below).

Since no qualifying "sensitive receptors" are within a 6-mile radius to map, Figure C.4-2 in AFC Appendix C.4 shows no locations.

Table C.4-4 Identified Sensitive Receptors and Distances from Site

Receptor ID		Google Earth Data				Dist. From		Receptor #	UTM Em		Elev., ft.
		UTM Em	UTM Nm	Elev., ft.	Site, m.	Site, ft.	UTM Em		UTM Nm		
Site		470569	3874265	2062	na	na		470696	NAD27 UTM Nm	Elev., ft.	
Kramer Junction		450560	3872148	2522	20120.7	66016.0	1	450687	3874280	2013	
worker (non-sensitive)		468349	3876627	2068	3241.5	10635.4	2	468476	3872163	2473	
worker (non-sensitive)		450580	3872334	2491	20082.1	65889.2	3	450707	3876642	2019	
res (non-sensitive)		450971	3872223	2478	19704.1	64649.1	4	451098	3872349	2442	
worker (non-sensitive)		449883	3874649	2471	20689.6	67882.5	5	450010	3872238	2429	
res (non-sensitive)		447224	3881891	2848	24559.0	80578.1	6	447351	3874664	2422	
res (non-sensitive)		442195	3873904	2469	28376.3	93102.6	7	442322	3881906	2799	
sch		436634	3873603	2411	33941.5	111361.9	8	436761	3873919	2420	
pre-sch		436622	3873505	2413	33955.5	111408.0	9	436749	3873618	2362	
worker (non-sensitive)		436184	3877180	2414	34508.3	113221.9	10	436311	3873520	2364	
res (non-sensitive)		481797	3865786	2165	14069.9	46163.3	11	481924	3877195	2365	
sch-Barstow		490882	3861107	2188	24202.3	79407.7	12	491009	3865801	2116	
hosp-Barstow		498280	3861300	2255	30594.0	100378.8	13	498407	3861122	2139	
Other Residential (non-Sensitive Receptors) included in the modeling analysis.											
unk (res-farm)		470768	3874297	2062	201.6	661.3	14	470895	3874312	2013	
unk (res-farm)		469724	3874694	2067	947.7	3109.3	15	469851	3874709	2018	
unk (res-farm)		468687	3875860	2070	2467.0	8094.1	16	468814	3875875	2021	
unk (res-farm)		470358	3873999	2072	339.5	1114.0	17	470485	3874014	2023	
unk (res-farm)		469629	3874082	2079	957.6	3142.0	18	469756	3874097	2030	
unk (res-farm)		469823	3873849	2077	854.1	2802.5	19	469950	3873864	2028	
unk (res-farm)		469753	3872435	2129	2003.7	6574.1	20	469880	3872450	2080	
unk (res-farm)		469693	3872161	2140	2279.1	7477.7	21	469820	3872176	2091	
unk (res-farm)		471622	3874305	2047	1053.8	3457.4	22	471749	3874320	1998	

Soils

Soils: Appendix B (g)(15)(B)(i)

Information Required:

The AFC did not quantify and provide supporting information and calculations for all potential soil loss scenarios.

1. Please quantify the annual soil loss due to wind erosion under a no-project scenario, during construction of the proposed project, and during operation of the proposed project.
2. Please quantify the annual soil loss due to water erosion during operation of the proposed project.
3. For all soil loss estimates (annual loss of soil due to wind and water erosion under a no-project scenario, during construction, and during operation), please provide supporting information and calculations.

The volume of soil loss due to accelerated wind and water erosion must be numerically quantified using the Revised Universal Soil Loss Equation (RUSLE2 model) and the Wind Erosion Prediction System (WEPS model) or similarly accepted methods.

Response:

The assessment of the Project's effects to soil resources is based upon the Soil Survey of San Bernardino County, California, Mojave River Area (USDA 1986), as well as the United States Department of Agriculture, Web Soil Survey (2009). The assessment also considers the Project-implemented mitigation measures. The Project area soil conditions include slightly sloping topography and primarily fallow agricultural conditions. The use of erosion control best management practices (BMPs) to control water and wind erosion during construction activities, and placement of impervious surfaces and/or BMPs on disturbed areas within the Project area will effectively control soil loss after construction. Quantitative calculations of potential soil loss using the Universal Soil Loss Equation and the Wind Erosion prediction system were performed and the results are presented below. The Project's potential effects on soil resources can be categorized into those involving construction activities and those related to Project operation.

The average annual soil erosion rates caused by rainfall runoff for the soil associated with the Project are provided in the table below, Soil Erosion Rates. Based upon the calculations, the existing condition erosion rates would increase slightly during construction without the use of erosion and sediment control best management practices (BMPs). The Project will implement construction and operation phase erosion and sediment control BMPs, and final stabilization to reduce soil erosion rates to at or below existing levels. The RUSLE2 soil loss calculations are included in Data Adequacy Supplement Attachment C: Erosion Calculation Record.

The Wind Erosion Prediction System (WEPS) model was used to estimate soil loss due to wind erosion. Wind erosion rates are an order of magnitude higher than soil erosion by rainfall runoff at this location due to the relatively low annual rainfall amount. The

estimated wind erosion rates for the existing condition and construction condition were greater than 100 tons per acre per year (Ton/Ac/Yr), indicating that the WEPS parameters do not as reliable to model the management conditions. The wind erosion rate for the operation condition was 1 Ton/Ac/Yr. Wind erosion control BMPs will be used to maintain or reduce existing wind erosion rates during construction and operation. The Wind Erosion Prediction System soil loss calculations are also included in Data Adequacy Supplement Attachment C: Erosion Calculation Record.

Soil Erosion Rates

Erosion Type	Existing (Ton/Ac/Yr)	Construction with BMPs (Tons/Ac/Yr)	Operations with BMPs (Tons/Ac/Yr)
Water (RUSLE2)	0.58	0.61	0.066
Wind (WEPS)	>100*	>100*	1.0

* Estimated erosion rates greater than 100 Ton/Ac/Yr indicate that WEPS may not accurately model conditions and may not be applicable.

Transmission System Design

Transmission System Design: Appendix B (h)(2)(B)

Information Required:

Provide a physical layout drawing showing distinctly the routes of the proposed 230 kV overhead generator tie lines in and out of the plant site between the proposed Mojave Solar Project (MSP) Alpha and Beta Generator 230 kV switchyards and proposed new SCE Hinkley 230 kV substation including Right of Way (ROW) widths. Describe whether the ROW would be through private and/or public lands.

Response:

The Project does not have an offsite component to interconnect the generators to the Hinkley 230 kV substation (gen-tie lines). The gen-tie lines are within the site boundary and are shown on Figure 2-3a. Routes are distinct in the detail drawings included in the AFC to amplify Figure 2-3a which was indicated as reviewed. A discussion of these routes follows.

Figure 2-3(c) is a detail view showing the Alpha gen-tie line leaving the Alpha switchyard south to a point just north of an onsite drainage channel then continuing east. Once the Alpha gen-tie line is due north of the Hinkley substation and aligned with a north-south running, onsite drainage channel it turns and follows south to terminate at the Hinkley substation. This detail is included on Figure 2-3(d). Typical clearances and spacing for the Alpha gen-tie lines are included in Section A-A on Figure 2-3(g), Section D-D on Figure 2-3(h) and Section K-K on Figure 2-3(j). The gen-tie line runs in parallel with the plant maintenance roads to provide maintenance and repair access.

Figure 2-3(d) is a detail view showing the Beta gen-tie line leaving the Beta switchyard south to a point just north of an onsite drainage channel then continuing west to terminate at the Hinkley substation. Typical clearances and spacing for the Beta gen-tie lines are included in Section J-J on Figure 2-3(j). The gen-tie line runs in parallel with the plant maintenance roads to provide maintenance and repair access.

No easement or ROW will be provided for the gen-tie lines since the Project will own and operate the gen-tie lines which are located on the Project site.

As shown in Section I-I on Figure 2-3(i) and Figure J-J on Figure 2-3(j) the Project is immediately adjacent to the transmission corridor where interconnection will be made by looping in the #1 Kramer-Cool Water 230 kV transmission line to the Hinkley substation. This loop-in interconnection of the Hinkley substation occurs on the Project site and within the transmission corridor, as such, no other properties will be crossed.

The Alpha gen-tie line crosses Lockhart Ranch Road, a dedicated road easement within the Project site, at a 90 degree angle. An encroachment easement will be required for this road crossing. The loop-in lines will cross a to-be-dedicated by the Project road ROW and will also require an encroachment easement.

All the figures mentioned in the response for Appendix B (h)(2)(B) above are located in the AFC Section 2.0 – Project Description.

Transmission System Design: Appendix B (b)(2)(C)

Information Required:

Submit a Pole design diagram for dead-end structures of the generator overhead 230 kV tie lines showing configuration of insulators and conductors (with sizes, type and ampere rating) with their respective position measurements on the pole. Provide lengths of the generator 230 kV tie lines and their conductor sizes & types.

Resubmit Figures 2-7(d) and 2-7(e) with sizes and/or ratings of the short overhead conductors and/or cables between the Generator step-up transformer and the 230 kV switchyard.

Response:

The requested information is included in the Data Adequacy Supplement Attachment E, Part 1 as Figure 2-DA-1, including sizes, type and ampere rating. The gen-tie length for the Alpha and Beta interconnections is 11,460 feet and 4,430 feet, respectively.

The resubmitted figures are included as Figures 2-7(d)-DA and 2-7(e)-DA in the Data Adequacy Supplement Attachment E, Part 1.

Additionally, supporting reference for the above referenced figures is included in the Data Adequacy Supplement Attachment E, Part 2.

Transmission System Design: Appendix B (b)(2)(D)

Information Required:

Submit a drawing showing the alternate routes of the proposed 230 kV Alpha and Beta generator tie lines and describe how the preferred routes are selected by comparing with alternate routes and their environmental effects.

Response:

The Project chose to locate the gen-tie lines within the site boundary to avoid any offsite impacts. As such the only logical route was those shown on Figures 2-3a in the AFC Section 2.0 - Project Description and the associated details. These routes were the least impactful environmentally since they are located on the Project site and least costly since they are the shortest distance from the generator to the interconnection point at the Hinkley substation.

Transmission System Design: Appendix B (i)(1)(A)

Information Required:

Provide a list of federal, state, regional or local laws, ordinances, regulations and standards applicable for transmission and describe in short their applicability/purpose during planning, construction and operation of the proposed MSP.

Response:

Laws, ordinances, regulations and standards (LORS) applicable for transmission system engineering are included with AFC Section 5.14, Transmission System Safety and Nuisance. Please refer to pages 5.14-1 to 5.14-8 for tables of LORS followed by a description of the LORS and their applicability to the planning, construction and operation of the Project included from pages 5.14-8 to 5.14-15.

Transmission System Design: Appendix B (i)(1)(B)**Information Required:**

Provide a list of agencies other than the Energy Commission in a Table who will provide necessary permits, leases and approvals to enforce the identified laws, regulations, standards and for land use or other plans for transmission.

Response:

The Project's transmission gen-tie lines are located on the Project site. The following table lists the contacts for the Project's transmission gen-tie line permitting.

Agency	Contact	Responsibility
California Independent System Operator	Judy Brown (916) 608-7062 151 Blue Ravine Road Folsom, CA 95630 jbrown@caiso.com	Project Manager for Interconnection Applications
Southern California Edison	John Tucker (626) 302-8623 2244 Walnut Grove Ave Rosemead, CA 91770 john.tucker@sce.com	Contract Manager, Grid Interconnection & Contract Development
County of San Bernardino – Land Development Division	Sammeh Basta (760) 843-4366 825 E. 3rd St. Room 108 San Bernardino, CA 92415 sbasta@dpw.sbcounty.gov	Review of encroachment easement for transmission crossings.

Transmission System Engineering: Appendix B (i)(2)

Information Required:

Provide the names, phone number, address and email address of the official contact person of each agency.

Response:

Please see response to Transmission System Engineering: Appendix B: (i)(1)(B) above.

Transmission System Engineering: Appendix B (i)(3)

Information Required:

Provide a schedule when transmission related permits/study reports (The California ISO Facilities study) would be obtained.

Response:

The Interconnection Facilities Study (IFS) Agreement was executed on October 15, 2008. The current estimated date of completion is October 17, 2009. It is expected that the Project will enter into a Large Generator Interconnection Agreement prior to the end of 2009 provided the IFS is completed and negotiations are timely.

Visual Resources

Visual Resources: (g)(6)(A)(i)

Information Required:

Please provide labeled KOP figures 5.15-1 and 5.15-2.

Figures 5.15-1 and –2 depict KOP locations, but do not identify the KOPs by name or number, making interpretation of the text difficult.

Response:

As submitted, AFC Figures 5.15-1 and 5.15-2 were incorrectly listed in Section 5.15, Visual Resources, Table of Contents, but correctly labeled on the actual figures and correctly referenced to in the document. In the table of contents, Figure 5.15-1 should be Figure 5.15-1(a), and Figure 5.15-2 should be Figure 5.15-1(b).

The figures with labeled KOPs were omitted due to an error during assembly and printing. Included as “Attachment F” are the Key Observation Points Maps (with labeled KOPs). These maps are listed below:

Figure 5.15-2a, Key Observation Points Map

Figure 5.15-2b, Key Observation Points Map

Water Resources

Water Resources: Appendix B (g)(14)(A)(i)

Information Required:

Please provide an Industrial Storm Water Pollution Prevention Plan (SWPPP) in compliance with the Lahontan Regional Water Quality Control Board requirements.

The Hydrology Study included in the AFC evaluated how storm water from a 100-year storm event would impact the proposed project site, but did not provide Best Management Practices (BMPs) for the management and mitigation of that storm water.

Response:

SWPPP was included for construction as a part of AFC Appendix K.2. However, the Industrial SWPPP for operations is included and attached as part of this submittal (Data Adequacy Supplement Attachment A).

Water Resources: Appendix B (g)(14)(A)(ii)

Information Required:

Please provide all information needed to complete a draft Report of Waste Discharge (ROWD) for the proposed evaporation ponds (surface impoundments) and bioremediation/HTF land treatment units. The draft ROWD should also be submitted to the Lahontan Regional Water Quality Control Board for review and comment. The draft ROWD should include a complete characterization of the discharge, including but not limited to design and actual flows, a list of constituents and the discharge concentration of each constituent, a list of other appropriate waste discharge characteristics, a description and schematic drawing of all treatment processes, a description of any Best Management Practices used, and a description of disposal methods.

Response:

An initial meeting with the Lahontan Regional Water Quality Control Board was held on June 4, 2009 between the Project staff and engineers and Lahontan Staff Patrice Copeland, PG, Senior Engineering Geologist and Joseph Koutsky, PE, Water Resources Control Engineer. The characterization of the Project's discharge, surface impound design, flows and constituents concentrations were discussed regarding the Project's approach to the acceptable design parameters for the Waste Discharge Requirements for permitting purposes and the filing of a Report of Waste Discharge (ROWD). The Project's understanding after this initial meeting was that once the AFC was submitted to the CEC for review and approval, the Project would then work with the Regional Water Quality Control Board to obtain approval of the ROWD as final plans and specifications are developed.

A follow up conference call was also held on July 4, 2009 with Richard Booth of the Lahontan Regional Water Quality Control Board who assumed the assignment of review of

the Project. The Project’s initial approach and understanding was confirmed and further details were discussed.

The ROWD is attached as Data Adequacy Supplement Attachment B to this submittal consistent with our understandings from previous conferences with the SWRCB. The Project will continue to work with the Lahontan Regional Water Quality Control Board as required to gain their concurrence with the Project.

Water Resources: Appendix B (g)(14)(C)(iii)

Information Required:

The AFC did not provide all of the required water use and wastewater discharge volume estimates.

1. Please provide a table showing the daily (average and maximum) and annual (average and maximum) water requirement and wastewater discharge volume for construction and plant operation. Include:

- Construction potable water.
- Piping hydrostatic test water.
- Dust suppression water.
- all other construction water (specify use).
- Operations potable water.
- Operations process water.
- Construction and operations wastewater discharge (process and sanitary wastewater).

2. Also specify the source of the water (e.g., source of the potable water).

Response:

As discussed in AFC Section 5.17.2.1, the water usage for the construction period is expected to proceed along the following schedule:

- Month 1 through 6 – 1,766,050 gallons per day (gpd)
- Month 7 through 26 – 59,800 to 61,750 gpd.

Details of the construction water use are included in the following table and presented in gallons. The Daily Average represents the average for the identified usage over the entire construction period. The Daily Maximum represents the peak usage for the identified use during the construction period. The Annual Average represents the total water usage during construction distributed evenly over the construction period. The Annual Maximum represents the maximum 12-month usage for the identified use.

(units = gallons)	Daily Average	Daily Maximum	Annual Average	Annual Maximum
Mass Grading	396,000	1,716,000	104,544,000	226,512,000

Sub-Grade Stabilization/Finish Grading	7,500	9,750	1,980,000	2,574,000
General Dust Suppression	19,500	19,500	5,148,000	5,148,000
Potable Water	6,500	26,000	1,716,000	1,716,000
Sanitary Purposes	19,500	19,500	5,148,000	5,148,000
Hydrostatic Testing	600	1,950	158,400	343,200
Fire Protection	1,300	1,300	343,200	343,200
General Use	3,325	3,900	877,000	900,900

The source of water during construction will be existing onsite wells until final production wells are installed. Potable water will be delivered by truck until such time that the potable water treatment system is installed and qualified for use in accordance with applicable laws.

During construction sanitary waste will be removed by truck and disposed of in accordance with applicable laws. During construction process water (hydrostatic testing water and general use water) would be reused to the maximum extent possible then removed by truck and disposed of in accordance with applicable laws or discharged to the onsite evaporation ponds once qualified for use in accordance with applicable laws. Volumes are not expected to exceed usage.

As shown in AFC Table 2-2, detailed in AFC Table 5.17-9, and detailed in AFC Figure 2-8, the operations water usage has been reformatted as requested and is shown in the following table. Please note that the Annual Average and Annual Maximum water usages are expected to be similar since the Project is expected to perform similarly year-after-year. The data is presented in acre-feet (AF) and in gallons (gal) and is displayed for the entire Project (both plants combined). Also included in the following table are waste discharges. Sanitary waste is not expected to exceed usage and is estimated as such. Process waste was estimated in AFC Figure 2-8 and presented below.

	Daily Average	Daily Maximum	Annual Average	Annual Maximum
Plant Operations (Process Water)	1,920,960 gal	3,147,840 gal	2,154 AF	2,154 AF
Potable Water	8,928 gal	8,928 gal	10 AF	10 AF
Process Waste	69,120 gal	94,040 gal	78 AF	78 AF
Sanitary Waste	8,928 gal	8,928 gal	10 AF	10 AF

Water Resources: Appendix B (g)(14)(C)(vi)

Information Required:

Please provide a copy of all groundwater ownership rights (grant deeds and all deed restrictions), transfer agreements, and purchase option contracts for the 10,478 AFY of groundwater the AFC states the applicant has rights to. Information in these records of ownership rights and purchase option contracts must include documentation sufficiently describing the following:

1. Any restrictions to the access or use of the groundwater associated with the ownership right or purchase option contract;
2. Identification of groundwater well(s) and property parcel(s) associated with the ownership right or purchase option contract; and
3. The quantity of groundwater associated with the ownership right or purchase option contract.

Response:

As stated in the Water Resources section of the AFC, the Project has rights to 10,478 AFY of groundwater in the Centro Subarea of the Mojave Basin (AFC, p. 5.17-15). These water rights consist of 9,380 AFY, transferred from Harper Lake LLC, 224 AFY transferred in December 2008 from Jennie Most, trustee of the Most Family Trust, and an option to purchase 874 AFY from the Desert View Dairy. The documentation describing these groundwater rights is attached to this submittal in Data Adequacy Supplement Attachment G: Water Rights Documents, as listed below and also including relevant pages from AFC Appendix L to the Annual Report for the 2007-2008 Water Year reporting the groundwater wells and verified Base Annual Production Rights owned by Abengoa Solar Inc. (See Attachment G, Part 1: Annual Report). Additionally, the water rights are documented as follows:

1. For the 9,380 AFY owned by Abengoa Solar Inc., transferred from Harper Lake LLC to Solucar Inc¹ (See Attachment G, Part 2: 9,380 AFY Water Rights):
 - Grant deed;
 - Purchase and Sale Agreement and Joint Escrow Instructions between Harper Lake LLC and Solucar Inc (submitted under confidential cover);
 - Permanent Transfer of Base Annual Production Right filed with the Watermaster;
 - Stipulation for Intervention After Entry of Judgment filed with the Watermaster.
2. For the 224 AFY² owned by Abengoa Solar, Inc., transferred from Jennie Most (See Attachment G, Part 3: 224 AFY Water Rights):
 - Grant deed;

¹ Any references in the attached documentation to Solucar Inc. is in reference to the original corporate name of Abenoga Solar Inc. The name was officially changed to Abengoa Solar Inc. on September 28, 2007.

² Only 224 of 280 AFY of Jennie Most's rights were acquired by purchase.

- Purchase and Sale Agreement and Joint Escrow Instructions between Jennie Most and Harper Dry Lake Land Company³ (submitted under confidential cover);
 - Permanent Transfer of Base Annual Production Right filed with the Watermaster;
 - Stipulation for Intervention After Entry of Judgment filed with the Watermaster.
3. For the option to purchase 874 AFY from the Desert View Dairy (See Attachment G, Part 4: 874 AFY Water Rights):
- Option Agreement between Desert View Dairy and Harper Lake LLC (submitted under confidential cover);
 - Memorandum of Option Agreement between Desert View Dairy and Harper Lake LLC recorded in the Official Records of San Bernardino County;
 - Assignment of Option to Solucar Inc. recorded in the Official Records of San Bernardino County;
 - Option extension dated August 14, 2009.

The documents attached to this submittal describe the quantity of groundwater associated with the groundwater ownership rights equal to the quantities listed above. In addition, the documents identify the wells and parcel numbers associated with the purchase and option agreements.

There are no restrictions to the access of the groundwater. The groundwater supply will be produced by onsite groundwater wells until final production wells are installed. Potential restrictions on the use of the groundwater result from the administration of the Judgment entered in the comprehensive adjudication of water rights in the Mojave Basin Area.⁴ The court appointed a Watermaster, a division of the Mojave Water Agency, to administer the terms of the Judgment. Copies of the Judgment and the Rules and Regulations of the Mojave Basin Area Watermaster may be downloaded from the Mojave Water Agency website at <http://www.mojavewater.org/home/watermaster/documents/Judgment.pdf>. Below is a summary of the Judgment's terms and the Watermaster regulations that may restrict the Project's groundwater use.

The Judgment determined that the Mojave Basin Area consists of five Subareas and established Subarea obligations, or an average annual amount of water that a Subarea is obligated to provide to an adjoining downstream Subarea. Each Subarea was allocated a Free Production Allowance, or the amount that may be produced free of any makeup water obligation. The Subarea's Free Production Allowance was then allocated among the groundwater producers in the Subarea. Each producer's share is their Base Annual Production Right. A producer may pump and use groundwater up to the amount of their Base Annual Production Right free of any replacement water obligation. All water

³ Abengoa Solar Inc is the sole member of Harper Dry Lake Land Company.

⁴ *City of Barstow et al. v. City of Adelanto et al*, Riverside County Superior Court Case No. 208568 (Jan. 10, 1996)("Judgment").

produced in excess of this amount must be replaced by the producer, either by repayment to the Watermaster of funds sufficient to purchase replacement water or by transfer of unused production from another producer. Any amount that is not produced will be carried over and accumulated for one year, called a Carryover Right.

Under the Judgment, any Base Annual Production Right or any portion thereof may generally be sold, transferred, licensed or leased.⁵ No transfer becomes operable until the parties to the transfer notify the Watermaster of the terms and conditions of the transfer, the price to be paid by the transferee, the name of the responsible party and the name of the person who will pay any applicable assessments.⁶ The transferee must be or become a party to the Judgment.⁷ The attached documentation shows that Abengoa Solar Inc. complied with these requirements. The Watermaster keeps record of and reports any transfer of Base Annual Production Rights in its Annual Report.⁸ The attached documentation includes Appendix L to the 2007-2008 Annual Report that lists Abengoa Solar Inc.'s verified Base Annual Production Right.⁹

Each producer must have an accurate method for quantifying production, report the total production, purpose of use, and place of use quarterly to the Watermaster, and provide copies of all records used to quantify water production.¹⁰ Any change in purpose of use must be reported in advance to the Watermaster.¹¹ The Project will comply with these reporting requirements. If the Watermaster determines that a new purpose of use for any year has resulted in a higher rate of consumption than the rate applicable to the original purpose of use, the Watermaster shall use a multiplier to adjust upward such production for the purpose of determining the producer's replacement water assessment and to adjust upward the Free Production Allowance portion of such production for the purpose of determining the producer's makeup water assessment.¹² The multiplier is determined by dividing the number of acre-feet of consumption under the new purpose of use by the number of acre-feet of consumption that would have occurred under the original purpose of use. The Judgment specifies a 50% consumptive use rate for irrigation and case-by-case rates for industrial uses.¹³ The Project anticipates an approximate 2:1 set aside to accommodate the transfer from irrigation to industrial use.

The Watermaster may recommend in the Annual Report an adjustment, if needed, to the Free Production Allowance for any Subarea.¹⁴ The Project's proposed groundwater use would be affected by any future adjustments, if any, to the Free Production Allowance for the Centro Subarea.

Any potential future transfer of the Project's groundwater rights would be restricted by their location in the Harper Lake Basin of the Centro Subarea. The Judgment provides that

⁵ Judgment at ¶ 34.

⁶ Exhibit F to the Judgment at ¶ 3.

⁷ Rules and Regulations of the Mojave Basin Area Watermaster (Adopted June 30, 1994, Revised October 29, 2008) ("Watermaster Regulations"), at ¶ 12(A).

⁸ Judgment at ¶ 24(k), (n).

⁹ The 224 AFY transferred from Jennie Most is not included in this Appendix L because it was not executed until December 2008, after the 2007-2008 Water Year reported on in the most recent Annual Report.

¹⁰ Judgment at ¶ 24(p); Watermaster Regulations at ¶¶ 11, 17.

¹¹ Watermaster Regulations at ¶ 25.

¹² Judgment at ¶ 24(q); Watermaster Regulations at ¶ 25.

¹³ Exhibit F to the Judgment at ¶ 2.

¹⁴ Judgment at ¶ 24(o); Watermaster Regulations at ¶ 15.

no producer in the Harper Lake Basin may transfer any Base Annual Production Right to producers outside the Harper Lake Basin except by physically conveying the water.¹⁵

Water Resources: Appendix B (g)(14)(E)(i)

Information Required:

Please provide a description of all potential changes in the physical or chemical condition of existing water supplies that would develop as a result of the plant's water use.

Response:

No identifiable changes to the physical or chemical condition of existing water supplies are expected as a result of the plant's water use. This is discussed in sections 5.17.2 and 5.17.3 of the AFC. Specifically, "LGS anticipates no significant changes to groundwater quality beneath the site as a result of hydraulic interference caused by groundwater pumping during the operation period. Because of the high transmissivity of the uQal aquifer, prolonged extraction for MSP facility supply water should not cause an increase in TDS concentration or deterioration in quality by drawing in water of higher salinity from an expanded pumping depression reaching below Harper Lake. Similarly, the proposed pumping of groundwater to supply the MSP facility during construction is not expected to induce additional migration of Mojave River underflow. About 6,500 to 18,000 AFY of groundwater have been used for historical agriculture production in the vicinity of the existing FP&L solar energy facility and the proposed MSP facility, as compared to the 2,163 AFY needed during operation of the MSP facility." (from AFC sections 5.17.2.7, 5.17.2.12, and 5.17.3.1).

This concept is revisited and expanded several times in the AFC. Similarly, "because of the high transmissivity of the uQal aquifer, prolonged production of supply water for the MSP facility is not expected to increase TDS concentration. Drawing in groundwater of higher salinity from an expanded pumping depression reaching below Harper Dry Lake is not anticipated. Similarly, the proposed pumping ... is not expected to induce additional migration of Mojave River underflow." (from AFC section 5.17.2.9, 5.17.3.1, and 5.17.3.2). AFC section 5.17.2.12 continues, "groundwater quality stability was observed over a seven-day pumping period at the Ryken Well. LGS does not expect groundwater production during facility construction and operation to significantly impact groundwater quality."

Section 5.17.3.1 states, "Maximum estimated hydraulic interference at positions off the facility footprint and at a radial distance of 0.5 miles from production wells... is 1.4 feet. This interference to potential offsite wells located as close as 0.5 miles from the MSP supply wells is insignificant. LGS does not expect groundwater production during facility construction to significantly impact water levels at neighboring wells. Based on interpretations of 2D modeling simulations, the uQal aquifer shows minimal sensitivity (with regard to hydraulic head) to relatively small changes in the discharge rate (+/- 20 AFY).", as well as "No significant changes to groundwater quality beneath the site are foreseen as a result of limited hydraulic interference caused by groundwater pumping during the construction period.... Additionally, LGS does not expect groundwater

¹⁵ Exhibit F to the Judgment at ¶ 8.

production during facility construction to significantly impact water levels at neighboring wells.”

Cumulative impacts are not expected to be significant (section 5.17.3.3). The cumulative effects of both the FP&L and MSP facilities were considered in the modeling prepared for the AFC.

Water Resources: Appendix B (g)(14)(E)(ii)

Information Required:

Please provide a description of all potential changes in the physical or chemical condition of any contaminants in the groundwater that would develop as a result of the plant’s groundwater use.

This evaluation may require a subsurface investigation in areas of potential contamination as recommended by the Phase 1 environmental site assessment.

Response:

Section 5.17.2.11 addresses the potential MSP impact on the Hinkley-area groundwater plume of hexavalent chromium. Specifically, “LGS interpreted aquifer pumping-test data collected from the MSP facility area near Harper Lake. The distance from the proposed MSP ... production wells to the northern, leading edge of the ... plume... is about 10 miles. This distance is too large for future water production by the proposed MSP facility to influence contaminated groundwater in the Hinkley Valley.

Other impacts, e.g., from releases of chemicals used during construction, will be mitigated as described in the SWPPP and DESCP to “ensure that construction-related water-quality impacts are not significant.” (AFC sections 5.17.3.1 and 5.17.3.2)

The Phase I environmental assessment did not recommend a subsurface investigation; in fact, no evidence of groundwater contamination or potential contamination was identified by the assessment. No realistic threat to groundwater has been identified and contamination reaching the water table (about 150 feet deep) from surface soils at this location is likely an unrealistic scenario.

As demonstrated in the AFC, test results for benzene, ethylbenzene, toluene, xylenes, and MTBE at the Ryken Well (AFC Appendix A, Tables 4-4 and 4-5 of BCM Appendix C) were reported by the lab as below the reporting limit. The Ryken well produces a large amount of water, about 874 AF/Y, and is on the Project site. We have heard no reports indicating contamination in the SEGS wells, which are also only a short distance away from the proposed MSP site. In the unlikely event of contamination of groundwater at the site from any source, the contamination will be detected by the monitoring program which Abengoa will have in place as a condition of certification. If required by the CEC, additional investigation during discovery could further prove that no issue exists.

Data Adequacy Supplement

Attachment A

Water Resources

Industrial Storm Water Pollution Prevention Plan (Addendum)

Industrial Storm Water Pollution Prevention Plan (Addendum)

for:

Mojave Solar Project
Intersection of Harper Lake Road and Lockhart Ranch Road

SWPPP Contact(s):

Mojave Solar LLC
Emiliano Garcia
13911 Park Avenue, Suite 206
Victorville, CA 92392
(760) 962-9200

SWPPP Preparation Date:

09/09/2009

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SECTION 1: FACILITY DESCRIPTION AND CONTACT INFORMATION

1.1 Facility Information

Facility Information

Name of Facility: Mojave Solar Project

Street: Intersection of Harper Lake Road and Lockhart Ranch Road

City: Unincorporated County State: CA ZIP Code: 92347

County or Similar Subdivision: San Bernardino County

Permit Tracking Number: _____ (if covered under a previous permit)

Latitude/Longitude (Use **one** of three possible formats, and specify method)

Latitude:

Longitude:

1. ___ ° ___ ' ___ " N (degrees, minutes, seconds)

1. ___ ° ___ ' ___ " W (degrees, minutes, seconds)

2. ___ ° ___ . ___ ' N (degrees, minutes, decimal)

2. ___ ° ___ . ___ ' W (degrees, minutes, decimal)

3. 35.009 ° N (decimal)

3. 117.316 ° W (decimal)

Method for determining latitude/longitude (check one):

USGS topographic map (specify scale: _____)

EPA Web site

GPS

Other (please specify): _____

Is the facility located in Indian Country? Yes No

If yes, name of Reservation, or if not part of a Reservation, indicate "not applicable." _____

Is this facility considered a Federal Facility? Yes No

Estimated area of industrial activity at site exposed to stormwater: 38 (acres)

Discharge Information

Does this facility discharge stormwater into an MS4? Yes No

If yes, name of MS4 operator: _____

Name(s) of water(s) that receive stormwater from your facility _____

Are any of your discharges directly into any segment of an "impaired" water? Yes No

If Yes, identify name of the impaired water (and segment, if applicable): _____

Identify the pollutant(s) causing the impairment: _____

For pollutants identified, which do you have reason to believe will be present in your discharge? _____

For pollutants identified, which have a completed TMDL? _____

Do you discharge into a receiving water designated as a Tier 2 (or Tier 2.5) water? Yes No

Are any of your stormwater discharges subject to effluent guidelines? Yes No

If Yes, which guidelines apply? _____

Primary SIC Code or 2-letter Activity Code: 9911
(refer to Appendix D of the 2008 MSGP)

Identify your applicable sector and subsector: 211121

1.2 Contact Information/Responsible Parties

Facility Operator (s):

Name: Eliliano Garcia

Address: 13911 Park Avenue, Suite 206

City, State, Zip Code: Victorville, CA 92392

Telephone Number: (760) 962.9200

Email address:

Fax number:

Facility Owner (s):

Name: Mojave Solar LLC

Address: 13911 Park Avenue, Suite 206

City, State, Zip Code: Victorville, CA 92392

Telephone Number: (760) 962-9200

Email address:

Fax number:

SWPPP Contact:

Name: Emiliano Garcia

Telephone number: (760) 962-9200

Email address:

Fax number:

1.3 Storm water Pollution Prevention Team

Staff Names	Individual Responsibilities
(tba)	

1.4 Activities at this Facility

This project is located along the south and west shores of Harper Dry Lake in an unincorporated area near the community of Lockhart, in San Bernardino County. Property includes Section 33, portions of Sections 28, 29, 30, and 32 of Township 11N, Range 4W, SBBM. Project has been sectioned into three areas; Alpha West, Alpha East and Beta.

Improvements include removal of abandoned one story buildings and structures to replace with parabolic solar collectors, foundations and pipings aligned on a north-south direction. Site will also include cooling plants with wet cooling tower, generator and evaporative ponds. See civil plans for details.

Existing Harper Lake Road is currently paved. Improvements include widening road as shown on civil plans.

Stormwater runoff at the site is predominantly sheet flow from the south and flows to the north. Drainage channels will capture and direct waters to protect power plants, solar panels, and maintenance roads. See civil plans for details.

1.5 General Location Map

Include a copy of the general location map for this facility in Attachment A.

1.6 Site Map

Include a copy of the site map for this facility in Attachment B.

SECTION 2: POTENTIAL POLLUTANT SOURCES

2.1 *Industrial Activity and Associated Pollutants*

Industrial Activity	Associated Pollutants

2.2 *Spills and Leaks*

As in any site, potential spills and leaks may occur; however, as specified in the Erosion Control Plan and SWPPP, such spills are contained in construction staging areas. Once construction/grading are completed a designated area for storage will be assigned. These areas will meet all requirements herein this document and permits concerning this site, which include and not limited to, “good housekeeping practices”, containment berms surrounding storage areas, training of employees, cleaning equipment and supplies, as well as, regularly scheduled inspections and documentations.

Following table shall be filled out by Project Manager as to phasing of site may change.

Areas of Site Where Potential Spills/Leaks Could Occur

Location	Outfalls

Description of Past Spills/Leaks

Date	Description	Outfalls

2.3 Non-Storm water Discharges Documentation

For Fire Hydrant locations refer to Civil Plans. The list of allowable non-storm water discharges from the 2008 MSGP (Part 1.1.3) includes: Discharges from fire-fighting activities; outside storage of refrigerated gases or liquids; with the approved labeling; materials have occurred (unless all spilled material has been removed); facility, but not intentional discharges from the cooling tower.

- Date of evaluation: _____
- Description of the evaluation criteria used: _____
- List of the outfalls or onsite drainage points that were directly observed during the evaluation: _____
- Different types of non-stormwater discharge(s) and source locations: _____
- Action(s) taken, such as a list of control measures used to eliminate unauthorized discharge(s), if any were identified. For example, a floor drain was sealed, a sink drain was re-routed to sanitary, or an NPDES permit application was submitted for an unauthorized cooling water discharge:

2.4 Salt Storage

Site Manager shall document the location of any storage piles containing salt used for deicing or other commercial or industrial purposes.

2.5 Sampling Data Summary

Site Manager shall Summarize all storm water discharge sampling data collected at your facility during the previous permit term.

SECTION 3: STORMWATER CONTROL MEASURES

3.1 Minimize Exposure

Site Manager shall document the location and types of control measures installed and implemented at this site to achieve the non-numeric effluent limits in 2008 MSGP, Part 2.1.2, and where applicable in Part 8. The effluent limitations guidelines-based limits in Part 2.1.3, the water quality-based effluent limits in Part 2.2, and any agreed-upon NEPA-related requirements in Parts 2.3 and 2.4, and describes how it will address the control measure selection and design considerations in Part 2.1.1. This documentation must describe how the control measures at this site address both the pollutant sources identified in Part 5.1.3, and any storm water run-on that commingles with any discharges necessary to achieve compliance with this general permit.

3.2 Good Housekeeping

Site Managers and employees shall practice "Good Housekeeping (See Part 2.1.2.2)", consisting of, but not limited to, a scheduled regular pickup and disposal of waste materials, along with routine inspections for leaks and conditions of drums, tanks and containers. Training of all personnel of leaks, spills, and reporting will be done on a regular basis. BMPs may include SC-11, SC-31, & SC-34, of CASQA, latest edition, and/or any type of pollution prevention and pollution control measure necessary to achieve full compliance.

3.3 Maintenance

Refer to 2008 MSGP, Part 2.1.2.3 – Preventative maintenance procedures, including regular inspections, testing, maintenance, and repair of all industrial equipment and systems, and control measures, to avoid situations that may result in leaks, spills, and other releases, and any back-up practices will be placed should a runoff event occur while a control measure is off-line. Additional information of BMPs may be found in CASQA, latest edition, Section 3 and Section 5.

3.4 Spill Prevention and Response

Procedures for preventing, responding to spills and leaks, additional documentation worksheets, may be found in the CASQA, latest edition, Sections 2, 3 and 5. Project manager and employees may reference the existence of other plans for Spill Prevention Control and Countermeasure (SPCC) developed for the facility under Section 311 of the CWA or BMP programs otherwise required by an NPDES permit for the facility, provided that you keep a copy of that other plan onsite and make it available for review consistent with Part 5.3; in addition to the Application for Certification, including the DESCP, and Construction-SWPPP for this site.

3.5 Erosion and Sediment Controls

Site employees and managers shall stabilize exposed areas and contain runoff using structural and/or non-structural control measures to minimize onsite erosion and sedimentation, and the resulting discharge of pollutants. As necessary, also place flow velocity dissipation devices at channel locations as necessary to reduce erosion and/or settle out pollutants. In selecting, designing, installing, and implementing appropriate control measures, consult with EPA's internet-based resources relating to BMPs for erosion and sedimentation, including the sector-specific.

3.6 Management of Runoff

Employees/Site managers shall divert, infiltrate, reuse, contain, or otherwise reduce storm water runoff, to minimize pollutants in your discharges. In selecting, designing, installing, and implementing appropriate control measures, consult with EPA's internet-based resources relating to runoff management, including the sector-specific. Additional information may be found in the CASQA, latest edition, Sections 3 and 5.

3.7 Salt Storage Piles or Piles Containing Salt

Enclose or cover storage piles of salt, or piles containing salt, used for deicing or other commercial or industrial purposes, including maintenance of paved surfaces. Appropriate measures (e.g., good housekeeping, diversions, containment) will be used to minimize exposure resulting from adding to or removing materials from the pile. Piles will not need to be enclosed or covered if storm water runoff from the piles is not discharged or if discharges from the piles are authorized under another NPDES permit.

3.8 MSGP Sector-Specific Non-Numeric Effluent Limits

An industrial category subject to one of the effluent limitations guidelines identified in Table 6-1 (see Part 6.2.2.1) of the 2008 MSGP, site must meet the effluent limits referenced in Table 2-1 and Table 6-1 below on following pages:

Table 2-1. Applicable Effluent Limitations Guidelines		
Regulated Activity	40 CFR Part/Subpart	Effluent Limit
Discharges resulting from spray down or intentional wetting of logs at wet deck storage areas	Part 429, Subpart I	See Part 8.A.7
Runoff from phosphate fertilizer manufacturing facilities that comes into contact with any raw materials, finished product, by-products or waste products (SIC 2874)	Part 418, Subpart A	See Part 8.C.4
Runoff from asphalt emulsion facilities	Part 443, Subpart A	See Part 8.D.4

Runoff from material storage piles at cement manufacturing facilities	Part 411, Subpart C	See Part 8.E.5
Mine dewatering discharges at crushed stone, construction sand and gravel, or industrial sand mining facilities	Part 436, Subparts B, C, or D	See Part 8.J.9
Runoff from hazardous waste landfills	Part 445, Subpart A	See Part 8.K.6
Runoff from non-hazardous waste landfills	Part 445, Subpart B	See Part 8.L.10
Runoff from coal storage piles at steam electric generating facilities	Part 423	See Part 8.O.8

Table 6-1. Required Monitoring for Effluent Limits Based on Effluent Limitations Guidelines

Regulated Activity	Effluent Limit	Monitoring Frequency	Sample Type
Discharges resulting from spray down or intentional wetting of logs at wet deck storage areas	See Part 8.A.7	1/year	Grab
Runoff from phosphate fertilizer manufacturing facilities that comes into contact with any raw materials, finished product, by-products or waste products (SIC 2874)	See Part 8.C.4	1/year	Grab
Runoff from asphalt emulsion facilities	See Part 8.D.4	1/year	Grab
Runoff from material storage piles at cement manufacturing facilities	See Part 8.E.5	1/year	Grab
Mine dewatering discharges at crushed stone, construction sand and gravel, or industrial sand mining facilities	See Part 8.J.9	1/year	Grab
Runoff from hazardous waste landfills	See Part 8.K.6	1/year	Grab
Runoff from non-hazardous waste landfills	See Part 8.L.10	/year	rab
Runoff from coal storage piles at steam electric generating facilities	S See Part 8.O.8	1 1/year	G Grab

3.9 Employee Training

Owners/Managers will train all employees who work in areas where industrial materials or activities are exposed to storm water, or who are responsible for implementing activities necessary to meet the conditions of this permit (e.g., inspectors, maintenance personnel), including all members of your Pollution Prevention Team. Training will cover both the specific control measures used to achieve the effluent limits in this Part, and monitoring, inspection, planning, reporting, and documentation requirements in other parts

of this permit. EPA recommends training will be conducted at least annually, and as a "new-hire" requirement for temporary, permanent, and sub-contractor personnel.

3.10 Non-Storm water Discharges

SHEET FLOW WITHIN THE SOLAR FIELD WILL BE MANAGED THROUGH THE CONSTRUCTION OF INTERNAL DRAINAGE FACILITIES DESIGNED TO CAPTURE STORM WATER AND ALLOW IT TO PERCOLATE AND EVAPORATE WITHIN THE FIELD. THE POWER ISLANDS WILL DRAIN AS SHEET FLOW AWAY FROM EQUIPMENT FOUNDATIONS. ON-SITE STORM RUN-OFF WITHIN THE POWER ISLANDS AREAS WILL BE INTERCEPTED, TREATED TO REMOVE POSSIBLE POLLUTANTS, AND RECYCLED AS PLANT COOLING WATER. LOCAL AREA CONTAINMENTS WILL BE PROVIDED AROUND CERTAIN LOCATIONS, SUCH AS OIL-FILLED TRANSFORMERS AND CHEMICAL STORAGE AREAS. THE WATER FROM THE POWER ISLANDS AND FROM OTHER PLANT DRAINS WILL BE SENT TO ON-SITE OIL-WATER SEPERATORS AND THEN ADDED TO THE PLANT COOLING WATER.

3.11 Waste, Garbage and Floatable Debris

All employees/ Managers will ensure that waste, garbage, and floatable debris ARE NOT DISCHARGED OFF-SITE by keeping exposed areas free of such materials or by intercepting them before they are discharged. BMPs used, but not limited to, include CASQA-Industrial Handbook, latest edition, SC-40, SC-41, SC-43. In addition, BMPs used during the SWPPP-Construction include and may continue to be implemented are found in CASQA-Construction Handbook, latest edition, WE-1, TC-1, TC-2, TC-3.

3.12 Dust Generation and Vehicle Tracking of Industrial Materials

All employees/ Managers will ensure that waste, garbage, and floatable debris ARE NOT DISCHARGED OFF SITE by keeping exposed areas free of such materials or by intercepting them before they are discharged. BMPs used, but not limited to, include CASQA-Industrial Handbook, latest edition, SC-40, SC-41, SC-43. In addition, BMPs used during the SWPPP-Construction include and may continue to be implemented are found in CASQA-Construction Handbook, latest edition, WE-1, TC-1, TC-2, TC-3.

SECTION 4: SCHEDULES AND PROCEDURES FOR MONITORING

Owners/Managers shall document in this SWPPP, or in equalievent records procedures for conducting the five types of analytical monitoring specified by this permit, where applicable to this site facility, including:

- Benchmark monitoring
- Effluent limitations guidelines monitoring
- State- or Tribal-specific monitoring
- Impaired waters monitoring and
- Other monitoring as required by EPA

The Worksheet shall include this format...

For each type of monitoring, your SWPPP must include a description of:

1. **Sample Location(s).** Describe where samples will be collected, including any determination that two or more outfalls are substantially identical.
2. **Pollutant Parameters to be Sampled.** Include a list of the pollutant parameters that will be sampled and the frequency of sampling for each parameter.
3. **Monitoring Schedules.** Include the schedule you will follow for monitoring your stormwater discharge, including where applicable any alternate monitoring periods to be used for facilities in climates with irregular stormwater runoff (2008 MSGP, Part 6.1.6).
4. **Numeric Limitations.** List here any pollutant parameters subject to numeric limits (effluent limitations guidelines), and which outfalls are subject to such limits. Note that numeric limits are only included for Sectors A, C, D, E, J, K, L, and O.
5. **Procedures.** Describe procedures you will follow for collecting samples, including responsible staff who will be involved, logistics for taking and handling samples, laboratory to be used, etc.

Note: It may be helpful to create a table with columns corresponding to # 1 - 5 above for each type of monitoring you are required to conduct.

Inactive and Unstaffed sites exception (if applicable)

If you are invoking the exception for inactive and unstaffed sites for benchmark monitoring, include information to support this claim.

Substantially identical outfall exception (if applicable)

If you plan to use the substantially identical outfall exception for your benchmark monitoring and/or quarterly visual assessment requirements, include the following information here to substantiate your claim that these outfalls are substantially identical:

- Location of each of the substantially identical outfalls:
- Description of the general industrial activities conducted in the drainage area of each outfall:
- Description of the exposed materials located in the drainage area of each outfall that are likely to be significant contributors of pollutants to stormwater discharges:
- An estimate of the runoff coefficient of the drainage areas (low=under 40%; medium=40 to 65%; high =above 65%):
- Why the outfalls are expected to discharge substantially identical effluents:

SECTION 5: INSPECTIONS

Authorized and properly trained Pollution Prevention Team Members shall conduct routine site inspections of all areas of the site where industrial materials or activities are exposed to storm water, and of all storm water control measures used to comply with the effluent limits contained in this permit. Routine site inspections must be conducted at least quarterly (i.e., once each calendar quarter) although in many instances, more frequent inspection (e.g., monthly) may be appropriate for some types of equipment, processes, and control measures or areas of the site with significant activities and materials exposed to storm water. Perform these inspections during periods when the facility is in operation. Pollution Prevention Team Members will specify the relevant inspection schedules in the SWPPP document as required in Part 5.1.5., 2008 MSGP. These routine inspections will be performed by qualified personnel (for definition see Appendix A, 2008 MSGP) at least one member of your storm water pollution prevention team properly trained participating. At least once each calendar year, the routine facility inspection must be conducted during a period when a storm water discharge is occurring.

The Worksheet for routine facility inspections and the comprehensive site inspections to be performed shall follow, but not limited to this format::

- The names of the person(s), or the positions of the person(s), responsible for inspection:
- The schedules to be used for conducting inspections. Include here any tentative schedule that will be used for facilities in climates with irregular stormwater runoff discharges (2008 MSGP, Part 4.2.3):
_____ and _____
- Specific areas of the facility to be inspected, including schedules for specific outfalls:

For the quarterly visual assessments at this site, this format shall be followed, but not limited to:

The names of the person(s), or the positions of the person(s), responsible for inspection:

- The schedules to be used for conducting inspections. Include here any tentative schedule that will be used for facilities in climates with irregular stormwater runoff discharges (2008 MSGP, Part 4.2.3):
_____ and _____
- Specific areas of the facility to be inspected, including schedules for specific outfalls:

Inactive and Unstaffed sites exception (if applicable)

If you are invoking the exception for inactive and unstaffed sites for your routine facility inspections and quarterly visual assessments, include information to support this claim.

SECTION 6: DOCUMENTATION TO SUPPORT ELIGIBILITY CONSIDERATIONS UNDER OTHER FEDERAL LAWS

6.1 Documentation Regarding Endangered Species.

Refer to Application for Certification Document for Biological Study of this site and its findings.

6.2 Documentation Regarding Historic Properties

Refer to Application for Certification Document for Biological Study of this site and its findings.

6.3 Documentation Regarding NEPA Review (if applicable)

Refer to Application for Certification Document for Studies of this site and its findings.

SECTION 7: SWPPP CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name: _____ Title: _____

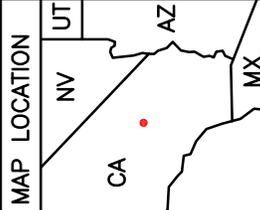
Signature: _____ Date: _____

SECTION 8: SWPPP MODIFICATIONS

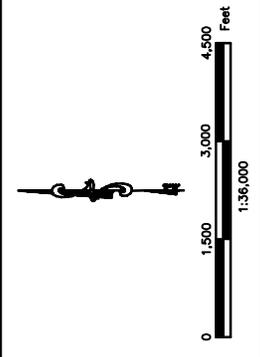
Owners/Managers shall modify this and any other Pollution Prevention Document referenced in the DESCOP whenever necessary to address any of the triggering conditions for corrective action as necessary to comply with all Environmental Agencies issuing permits for this site. This SWPPP-Industrial Conditions are found in Part 3.1, 2008 MSGP. This procedure will ensure that "upsets" as described in Appendix B.14.A, 2008 MSGP will not reoccur, and/or reflect changes implemented when a review following the triggering conditions in Part 3.2, 2008 MSGP indicates that there was intentional noncompliance by owners of this site. Control measures will be necessary throughout the facility and its operations to meet the effluent limits in this permit. Changes to this SWPPP-Industrial document will be made in accordance with the corrective action deadlines in Parts 3.3 and 3.4, 2008 MSGP and must be signed and dated in accordance with Appendix B, Subsection 11, 2008 MSGP.

Attachment A

Vicinity Map



Legend
 Plant Site Boundary



MOJAVE SOLAR PROJECT
Figure 5.3-1
Plant Site and
Survey Area

 Merrell-Johnson Engineering, Inc.	MOJAVE SOLAR LLC
PROJECT: _____ DATE: 04-20-2009	

Attachment B

Site Maps

Please refer to the
Mojave Solar Project
Application for Certification
Appendix "K", 2009

Attachment C

2008 MSGP
Multi-Sector General Permit
Please refer to the
Mojave Solar Project
Main Office for
Hard copy
Or

<http://cfpub.epa.gov/npdes/stormwater/msgp.cfm>

[2008 MSGP \(PDF\)](#)

Attachment D

2008 MSGP
Multi-Sector General Permit Worksheets
and various forms needed as referenced in Permit per
<http://cfpub.epa.gov/npdes/stormwater/msgp.cfm>
[2008 MSGP \(PDF\)](#)

POLLUTANT SOURCE IDENTIFICATION
(Section 2.2.6)

Worksheet #7
Completed by: _____
Title: _____
Date: _____

Instructions: List all identified storm water pollutant sources and describe existing management practices that address those sources. In the third column, list BMP options that can be incorporated into the plan to address remaining sources of pollutants.

Storm Water Pollutant Sources	Existing Management Practices	Description of New BMP Options
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

BMP IDENTIFICATION
(Section 2.3.1)

Worksheet #7a
Completed by: _____
Title: _____
Date: _____

Instructions: Describe the Best Management Practices that you have selected to include in your plan. For each of the baseline BMPs, describe actions that will be incorporated into facility operations. Also describe any additional BMPs (activity-specific (Chapter 3) and site-specific BMPs (Chapter 4)) that you have selected. Attach additional sheets if necessary.

BMPs	Brief Description of Activities
Good Housekeeping	
Preventive Maintenance	
Inspections	
Spill Prevention Response	
Sediment and Erosion Control	
Management of Runoff	
Additional BMPs (Activity-specific and Site-specific)	

IMPLEMENTATION (Section 2.4.1)

Worksheet #8
Completed by: _____
Title: _____
Date: _____

Instructions: Develop a schedule for implementing each BMP. Provide a brief description of each BMP, the steps necessary to implement the BMP (i.e., any construction or design), the schedule for completing those steps (list dates) and the person(s) responsible for implementation.

BMPs	Description of Action(s) Required for Implementation	Scheduled Completion Date(s) for Req'd. Action	Person Responsible for Action	Notes
Good Housekeeping	1.			
	2.			
	3.			
Preventive Maintenance	1.			
	2.			
	3.			
Inspections	1.			
	2.			
	3.			
Spill Prevention and Response	1.			
	2.			
	3.			
Sediment and Erosion Control	1.			
	2.			
	3.			
Management of Runoff	1.			
	2.			
	3.			
Additional BMPs (Actively-specific and site-specific)	1.			
	2.			
	3.			

EMPLOYEE TRAINING
(Section 2.4.2)

Worksheet #9
Completed by: _____
Title: _____
Date: _____

Instructions: Describe the employee training program for your facility below. The program should, at a minimum, address spill prevention and response, good housekeeping, and material management practices. Provide a schedule for the training program and list the employees who attend training sessions.

Training Topics	Brief Description of Training Program/Materials (e.g., film, newsletter course)	Schedule for Training (list dates)	Attendees
Spill Prevention and Response			
Good Housekeeping			
Material Management Practices			
Other Topics			

Attachment E

Notice of Intent

NOTICE OF INTENT

TO COMPLY WITH THE TERMS OF THE
GENERAL PERMIT TO DISCHARGE STORM WATER
ASSOCIATED WITH INDUSTRIAL ACTIVITY (WQ ORDER No. 97-03-DWQ)
(Excluding Construction Activities)

SECTION I. NOI STATUS (please check only one box)

A. <input type="checkbox"/> New Permittee	B. <input type="checkbox"/> Change of Information	WDID # <input style="width: 100%;" type="text"/>
---	---	--

SECTION II. FACILITY OPERATOR INFORMATION (See instructions)

A. NAME: <input style="width: 100%;" type="text"/>		Phone: <input style="width: 100%;" type="text"/>
Mailing Address: <input style="width: 100%;" type="text"/>		
City: <input style="width: 100%;" type="text"/>	State: <input style="width: 100%;" type="text"/>	Zip Code: <input style="width: 100%;" type="text"/>
Contact Person: <input style="width: 100%;" type="text"/>		
B. OPERATOR TYPE: (check one) 1. <input type="checkbox"/> Private Individual 2. <input type="checkbox"/> Business 3. <input type="checkbox"/> Municipal 4. <input type="checkbox"/> State 5. <input type="checkbox"/> Federal 6. <input type="checkbox"/> Other		

SECTION III. FACILITY SITE INFORMATION

A. FACILITY NAME: <input style="width: 100%;" type="text"/>		Phone: <input style="width: 100%;" type="text"/>
Facility Location: <input style="width: 100%;" type="text"/>		County: <input style="width: 100%;" type="text"/>
City: <input style="width: 100%;" type="text"/>	State: <input style="width: 100%;" type="text"/>	Zip Code: <input style="width: 100%;" type="text"/>
B. MAILING ADDRESS: <input style="width: 100%;" type="text"/>		
City: <input style="width: 100%;" type="text"/>		State: <input style="width: 100%;" type="text"/>
Contact Person: <input style="width: 100%;" type="text"/>		Zip Code: <input style="width: 100%;" type="text"/>
C. FACILITY INFORMATION (check one) Total Size of Site: Acres Sq. Ft. <input style="width: 100%;" type="text"/> [] []		Percent of Site Impervious (including rooftops) <input style="width: 100%;" type="text"/> %
D. SIC CODE(S) OF REGULATED ACTIVITY: E. REGULATED ACTIVITY (describe each SIC code):		
1. <input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	
2. <input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	
3. <input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	

FOR STATE USE ONLY:

End of Report

Data Adequacy Supplement

Attachment B

Water Resources

Report of Waste Discharge



APPLICATION/REPORT OF WASTE DISCHARGE GENERAL INFORMATION FORM FOR WASTE DISCHARGE REQUIREMENTS OR NPDES PERMIT



I. FACILITY INFORMATION

A. Facility:

Name: MOJAVE SOLAR PROJECT			
Address: INTERSECTION OF HARPER LAKE ROAD AND LOCKHART RANCH ROAD			
City: UNINCORPORATED COUNTY	County: SBD	State: CA	Zip Code: 92347
Contact Person: EMILIANO GARCIA		Telephone Number: (760) 962-9200	

B. Facility Owner:

Name: MOJAVE SOLAR LLC			Owner Type (Check One)	
Address: 13911 PARK AVENUE, SUITE 206			1. <input type="checkbox"/> Individual	2. <input checked="" type="checkbox"/> Corporation
City: VICTORVILLE			3. <input type="checkbox"/> Governmental Agency	4. <input type="checkbox"/> Partnership
State: CA			5. <input type="checkbox"/> Other: _____	
Zip Code: 92392-2407				
Contact Person: EMILIANO GARCIA		Telephone Number: (760) 962-9200	Federal Tax ID: 87-0786696	

C. Facility Operator (The agency or business, not the person):

Name: MOJAVE SOLAR LLC			Operator Type (Check One)	
Address: 13911 PARK AVENUE, SUITE 206			1. <input type="checkbox"/> Individual	2. <input checked="" type="checkbox"/> Corporation
City: VICTORVILLE			3. <input type="checkbox"/> Governmental Agency	4. <input type="checkbox"/> Partnership
State: CA			5. <input type="checkbox"/> Other: _____	
Zip Code: 92392-2407				
Contact Person: EMILIANO GARCIA		Telephone Number: (760) 962-9200		

D. Owner of the Land:

Name: MOJAVE SOLAR LLC			Owner Type (Check One)	
Address: 13911 PARK AVENUE, SUITE 206			1. <input type="checkbox"/> Individual	2. <input checked="" type="checkbox"/> Corporation
City: VICTORVILLE			3. <input type="checkbox"/> Governmental Agency	4. <input type="checkbox"/> Partnership
State: CA			5. <input type="checkbox"/> Other: _____	
Zip Code: 92392-2407				
Contact Person: EMILIANO GARCIA		Telephone Number: (760) 962-9200		

E. Address Where Legal Notice May Be Served:

Address: 13911 PARK AVENUE, SUITE 206			
City: VICTORVILLE	State: CA	Zip Code: 92392-2407	
Contact Person: EMILIANO GARCIA		Telephone Number: (760) 962-9200	

F. Billing Address:

Address: 13911 PARK AVENUE, SUITE 206			
City: VICTORVILLE	State: CA	Zip Code: 92392-2407	
Contact Person: EMILIANO GARCIA		Telephone Number: (760) 962-9200	



APPLICATION/REPORT OF WASTE DISCHARGE GENERAL INFORMATION FORM FOR WASTE DISCHARGE REQUIREMENTS OR NPDES PERMIT



II. TYPE OF DISCHARGE

Check Type of Discharge(s) Described in this Application (A or B):

[X] A. WASTE DISCHARGE TO LAND

[] B. WASTE DISCHARGE TO SURFACE WATER

Check all that apply:

- Domestic/Municipal Wastewater Treatment and Disposal
Cooling Water
Mining
Waste Pile
Wastewater Reclamation
Other, please describe:

- Animal Waste Solids
Land Treatment Unit
Dredge Material Disposal
Surface Impoundment
Industrial Process Wastewater

- Animal or Aquacultural Wastewater
Biosolids/Residual
Hazardous Waste (see instructions)
Landfill (see instructions)
Storm Water

III. LOCATION OF THE FACILITY

Describe the physical location of the facility.

1. Assessor's Parcel Number(s)
Facility: See Attached List
Discharge Point: See Attached List

2. Latitude
Facility: See Attached List
Discharge Point: See Attached

3. Longitude
Facility: See Attached List
Discharge Point: See Attached

IV. REASON FOR FILING

- New Discharge or Facility
Change in Design or Operation
Change in Quantity/Type of Discharge
Changes in Ownership/Operator (see instructions)
Waste Discharge Requirements Update or NPDES Permit Reissuance
Other:

V. CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

Name of Lead Agency: CALIFORNIA ENERGY COMMISSION
Has a public agency determined that the proposed project is exempt from CEQA?
Basis for Exemption/Agency:
Has a "Notice of Determination" been filed under CEQA?
Expected CEQA Documents:
Expected CEQA Completion Date: OCTOBER 2010



APPLICATION/REPORT OF WASTE DISCHARGE GENERAL INFORMATION FORM FOR WASTE DISCHARGE REQUIREMENTS OR NPDES PERMIT



VI. OTHER REQUIRED INFORMATION

Please provide a COMPLETE characterization of your discharge. A complete characterization includes, but is not limited to, design and actual flows, a list of constituents and the discharge concentration of each constituent, a list of other appropriate waste discharge characteristics, a description and schematic drawing of all treatment processes, a description of any Best Management Practices (BMPs) used, and a description of disposal methods.

Also include a site map showing the location of the facility and, if you are submitting this application for an NPDES permit, identify the surface water to which you propose to discharge. Please try to limit your maps to a scale of 1:24,000 (7.5' USGS Quadrangle) or a street map, if more appropriate.

VII. OTHER

Attach additional sheets to explain any responses which need clarification. List attachments with titles and dates below:

Figure 1-1 Regional Map Figure 1-2 Vicinity Map Figure 1-3 Site Map Figure 2-3(c) Project Site Map Detail B

Water Treatment - AFC Section 2 4 4 4 to 2 4 4 6 Plant Water Balance Surface Impoundment Waste Stream

Latitude / Longitude List List of Assessor Parcel Numbers (APN's) Appendix I - MSDS - Heat Transfer Fluid

You will be notified by a representative of the RWQCB within 30 days of receipt of your application. The notice will state if your application is complete or if there is additional information you must submit to complete your Application/Report of Waste Discharge, pursuant to Division 7, Section 13260 of the California Water Code.

VIII. CERTIFICATION

"I certify under penalty of law that this document, including all attachments and supplemental information, were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

Print Name: _____

Title: _____

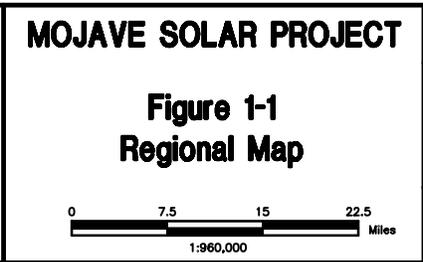
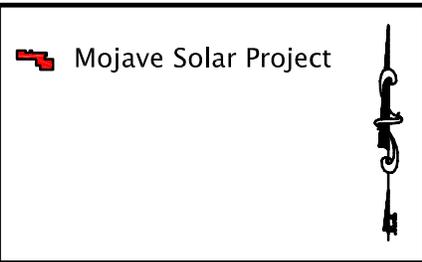
Signature: _____

Date: _____

FOR OFFICE USE ONLY

Table with 4 columns: Date Form 200 Received, Letter to Discharger, Fee Amount Received, Check #

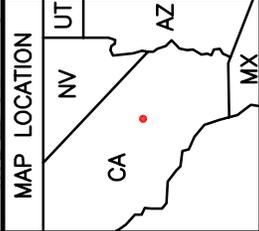
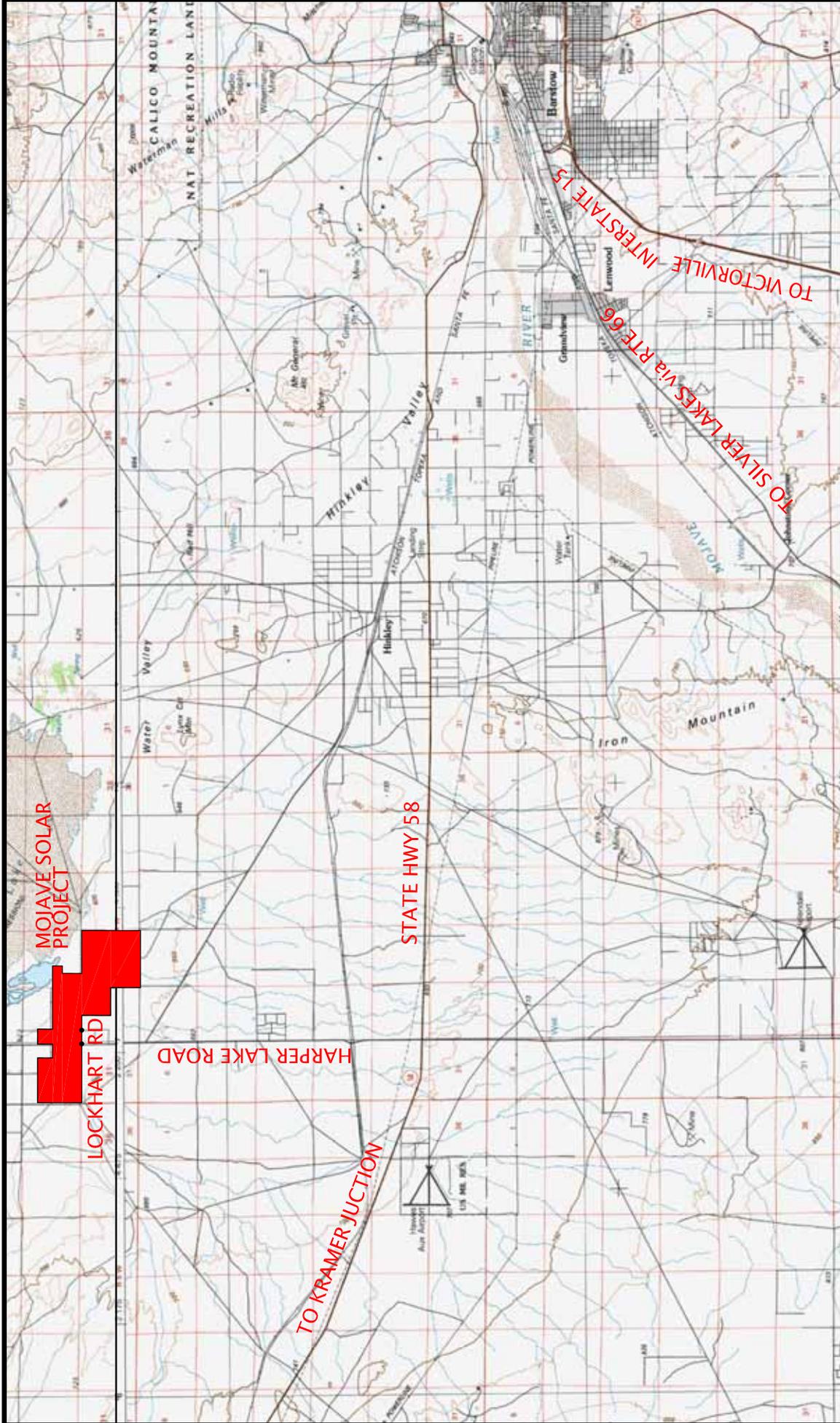
jcumming 11:47am 16 July 2009 P:\3001-4 Harper Lake CEC\1.0-Figure 1-1.dwg - Figure 1-1 Regional and Vicinity - Merrell-Johnson Engineering, Inc.



MOJAVE SOLAR LLC

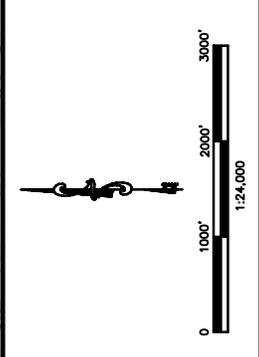
Merrell-Johnson
Engineering, Inc.

PROJECT:
DATE: 07-16-2009



Legend

- Plant Site Boundary



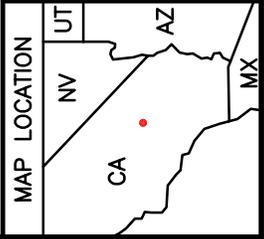
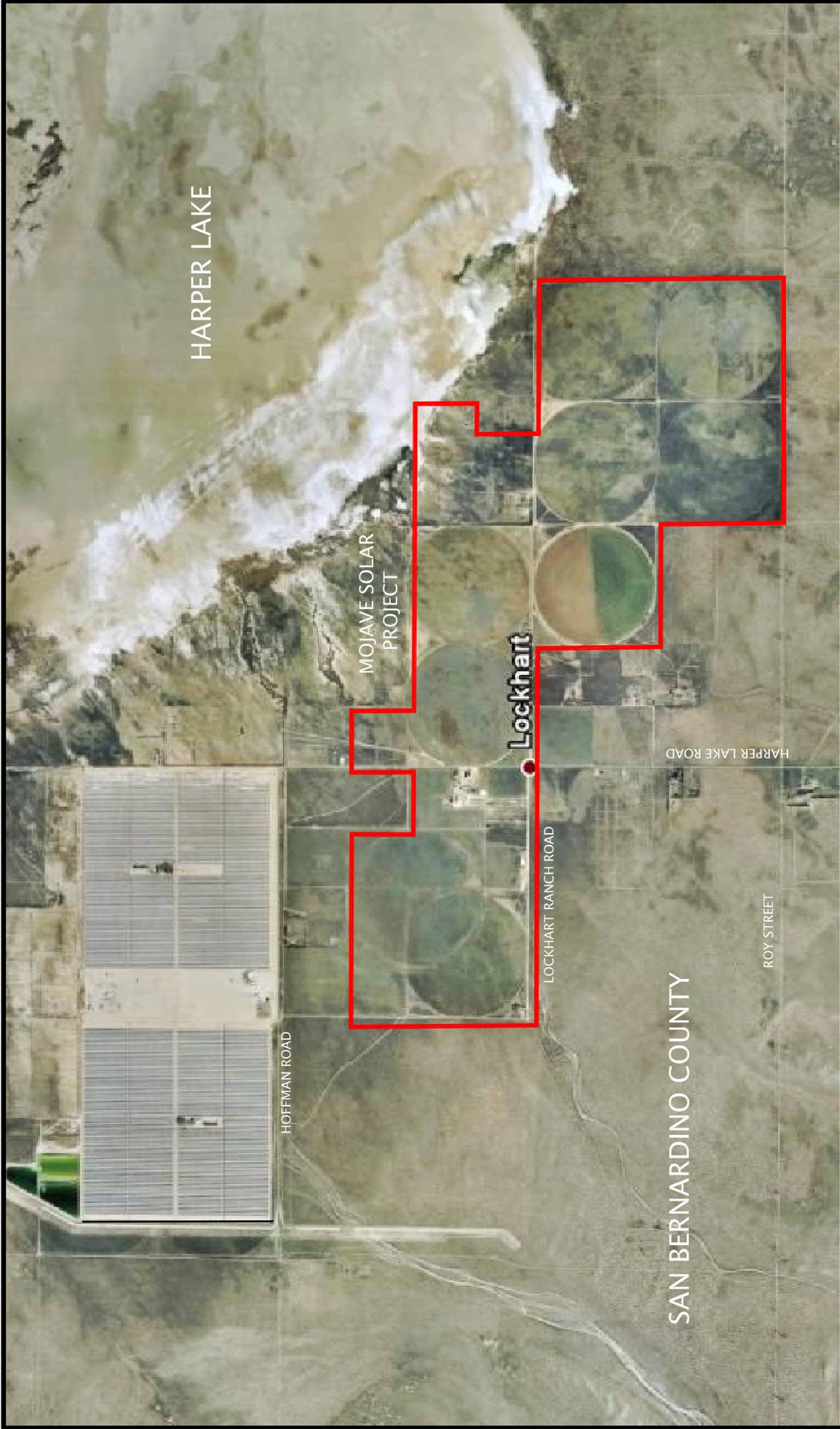
MOJAVE SOLAR PROJECT

**Figure 1-2
Vicinity Map**

**Merrell-Johnson
Engineering, Inc.**

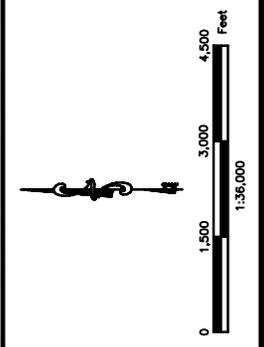
PROJECT:
DATE: 07-16-2009

MOJAVE SOLAR LLC



Legend

Plant Site Boundary



MOJAVE SOLAR PROJECT

Figure 1-3

Site Map

MOJAVE SOLAR LLC

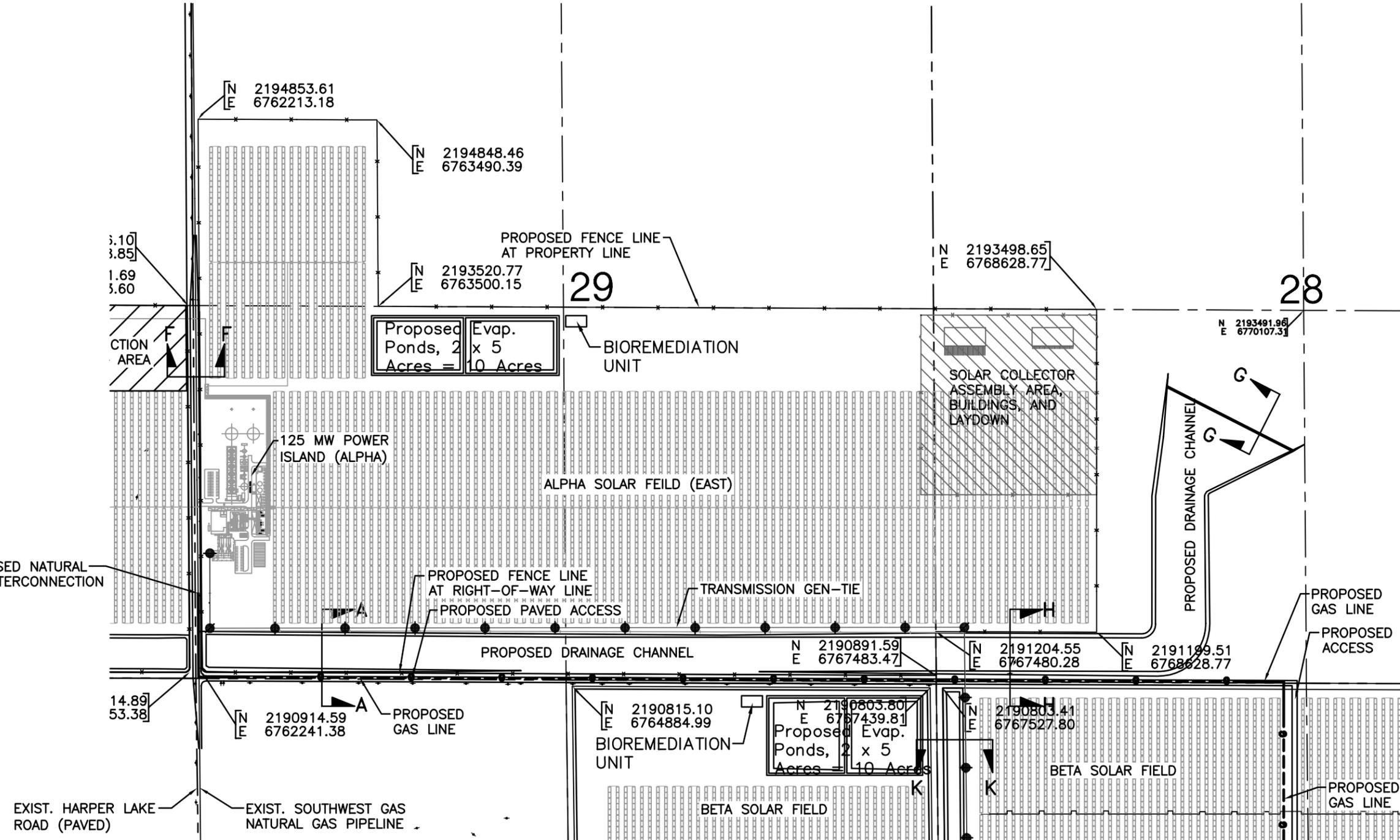


Merrell-Johnson Engineering, Inc.

PROJECT: _____

DATE: 07-16-2009

Summing 11:28am 21 July 2009 PA_3001-4 Harper Lake GEO PROJECT SITE MAP.dwg - General environment_Alpha East Merrell-Johnson Engineering, Inc.



MOJAVE SOLAR PROJECT
Figure 2-3(c)
PROJECT SITE MAP
DETAIL B

0 400' 800' 1200'
 SCALE: 1" = 800'

MOJAVE SOLAR LLC

 Merrell-Johnson Engineering, Inc.
 PROJECT:
 DATE: 07/21/09

Table 2-3. Water Quality Data in the Project Area

Parameter	Result ¹
Chloride (Cl)	580-690 milligrams/liter (mg/l)
Total Dissolved Solids (TDS)	1500-1700 parts per million (ppm)

¹ Concentrations based on testing data gathered during a 7-day pumping test and over the months of August to November 2008. Sample well is an existing agricultural well located near the center of the Project area and constructed to a depth similar to that expected for supplying water to the Project.

2.4.4.4 Water Treatment

The design (summer peak) and annual average water balance diagram is presented in Figure 2-8, Water Balance Diagram and shows the proposed power plant's various water uses and water treatment processes. The raw water, circulating water, process water, and SCA washing water all require onsite treatment and this treatment varies according to the quality required for each of these uses.

Groundwater

The groundwater will be pumped to the raw water storage tank and a biocide (sodium hypochlorite) is used to treat the water. When transferred to the service water tank the water is again treated with the biocide if needed. This water is used directly in the cooling tower as make-up water.

To conserve water, the lower TDS reverse osmosis (RO) reject streams will be recycled back to the Service Water storage tank for reuse in the cooling tower. Additionally, a clear well will be used and when the discharge exceeds the treatment system demand, the clear well discharge will be released to the cooling tower to further conserve water.

Circulating Water Treatment

In order to reduce overall water consumption and sizing of evaporation ponds, service water will first be used as makeup to the cooling tower and circulating water system. Water conditioning chemicals may be fed into the makeup water to minimize corrosion and to inhibit mineral scale formation and biofouling. Sulfuric acid will be fed into the circulating water system for alkalinity reduction in order to control the mineral scaling tendency of the circulating water. The sulfuric acid will be fed in an amount required to maintain a pH setpoint in the circulating water makeup flow. The sulfuric acid feed equipment will include a bulk storage tank and two full-capacity metering pumps.

To further inhibit mineral scale formation, an organic phosphate inhibitor solution may be fed into the circulating water system in an amount proportional to the circulating water blowdown flow. The inhibitor solution feed equipment will include a bulk storage tank and two full-capacity metering pumps. To inhibit biofouling, sodium hypochlorite will be

shock-fed into the circulating water system as a biocide. The sodium hypochlorite feed equipment will include a bulk storage tank and two full capacity metering pumps.

The blowdown from the circulating water/cooling tower system will be continually treated by lime-softening clarification (clarifier) and filtration processes, and then delivered to a clearwell. A portion of this stream will then be further treated for various plant uses that require higher purity water, such as SCA cleaning and steam system makeup. This will be a demand-based usage, where any excess flow out of the clearwell is simply recycled back to the cooling tower for further use in the circulating water system. The clarifier will use lime (calcium hydroxide) and soda ash (sodium carbonate) to precipitate hardness and alkalinity from the cooling tower blowdown water. Each of these systems will include a bulk dry storage bin, slurry makeup tank, and two full capacity delivery pumps. The clarifier also will use magnesium hydroxide slurry, a coagulant (ferric chloride), and a flocculent polymer to aid in settling/removing suspended solids in the clarification process. Each of these chemicals will include a bulk storage tank and two full capacity metering pumps.

The clarifier solids will be further concentrated in a thickener. The overflow or clear water from the Thickener will be recycled as makeup to the cooling tower. The thickener solids stream will then be delivered to a mechanical filter press, where remaining water will be removed, again for reuse in the cooling tower. The solid waste discharge from the filter press will be trucked to an appropriate land fill as described in Section 5.16, Waste Management. This process will allow for an efficient use of the water while reducing the capital and operating expense of other processes. This process reduces the metals content in the water prior to use elsewhere in the system along with extracting these prior to discharge in the evaporation ponds.

The overflow water from the clarifier will be delivered to the clarified water tank, and then pumped through a set of pressure filters. The pressure filters contain typical standard sand and anthracite granular media, and will remove the small amount of solids that carry over from the clarifier. The pressure filters will be backwashed periodically to remove accumulated solids. This backwash water will be recycled back to the clarifier for treatment, so that there is no net waste stream from the pressure filters. The pressure filter product stream will then be directed to the clear well tank.

Following the clear well, the water will be treated by the Cooling Tower Reverse Osmosis (CTRO) system, in order to be utilized for other plant requirements. As pre-treatment to the CTRO process, ion-exchange-type softeners will be utilized to remove any dissolved hardness minerals that remain after the clarifier. The softeners will be periodically regenerated using a salt (sodium chloride) solution. The waste from the softeners will be separated so that backwash and rinse water from the softeners will be recycled back to the clarifier for reuse and the brine stream will be delivered to the evaporation ponds.

The product stream from the CTRO is delivered to the RO surge tank. The flow out of the clear well and through the CTRO is demand-based, so that any excess clear well water will be recycled back to the cooling tower for further use. This format will minimize water usage of the Plant.

The CTRO utilizes several stages of reverse osmosis (RO) treatment to remove most of the mineral content of the water. The reject stream from the CTRO process will be brackish

water; and this will be discharged to the evaporation ponds. The CTRO process is designed to minimize the amount of waste water sent to the Ponds.

The RO surge tank water is withdrawn as required, for further treatment and ultimately for use in SCA washing and steam cycle makeup.

Solar Collector Array Washing Water

To facilitate dust and contaminant removal, partially deionized (demineralized) water will be used to clean the SCAs on a periodic basis, determined by the reflectivity monitoring program and other maintenance considerations. Washing the SCA maintains the mirror surface, the HCE, and other components clean and free to operate normally. This operation is generally completed at night and involves a water truck spraying deionized water on the SCAs in a drive-by fashion. The deionized water production facilities, already in place for SSG makeup water, will be sized to accommodate the additional SCA washing demand of about 60 gallons per minute (average) for each Plant site as shown on the water balance diagrams. Water from the SCA washing operation is expected to evaporate on the SCA with minimal water applied to the ground. No site runoff or recharge is anticipated from this process.

The RO surge tank water is further treated with another stage of RO to obtain water with very low mineral content. The product water from this RO stage will be stored in a surge tank, and will then be withdrawn only as needed for SCA cleaning, and for further treatment for steam cycle makeup.

The reject stream from the SCA cleaning RO treatment is recycled back to the raw water tank, where it will be used to supplement groundwater for cooling tower makeup. This method results in no waste stream from the SCA cleaning RO treatment.

Steam Cycle Process Water

Makeup water for the steam cycle must meet ASME Boiler Code for silica and dissolved solids. To meet these specifications, water will be processed through a demineralized water system. This system is anticipated to consist of multiple unit operations, concluding with mixed-bed demineralizers. Water produced by this system will only be used for makeup to the steam cycle.

The demineralized water treatment will consist of a final stage of RO treatment and mixed-bed ion-exchange polishers. The reject stream from the RO treatment is recycled back to the RO surge tank, resulting in no net waste stream. The mixed-bed ion-exchange units are designed for regeneration off-site, and also have no waste stream associated with this process.

Additional conditioning of the condensate and feedwater circulating in the steam cycle will be provided by means of a chemical feed system. To minimize corrosion, an oxygen scavenger for dissolved oxygen control and an alkaline solution for pH control are fed into the condensate. To minimize scale formation in the SSG, a solution of disodium phosphate (DSP) and trisodium phosphate (TSP) may be fed into each feedwater system. The chemical feed systems will include an oxygen scavenger feed tank, an alkaline solution (amine) feed tank, and a phosphate solution feed tank. The feed tanks will be provided with two full-capacity metering pumps.

A steam cycle sampling and analysis system will monitor the water quality at various points in the plant's steam cycle. The water quality data will be used to guide adjustments in water treatment processes and to determine the need for other corrective operational or maintenance measures. Steam and water samples are routed to a sample panel where steam samples are condensed and the pressure and temperature of all samples are reduced as necessary. The samples are then directed to automatic analyzers for continuous monitoring of conductivity and pH. All monitored values are indicated at the sample panel and critical values will be transmitted to the plant control room. Grab samples will be periodically obtained at the sample panel for chemical analyses that provide information on a range of water quality parameters.

Wastewater

The water balance diagram shows the wastewater streams and the disposition of wastewater (water treatment system effluent) discharging to evaporation ponds. As discussed previously, the cooling tower blowdown will be processed with various processes, including clarification and reverse osmosis, prior to reuse to make SCA washing and steam system makeup water. The reject water will be ultimately discharged to evaporation ponds for final dewatering. The residual solids will remain in the pond for the duration of the plant life, as is discussed below in Section 2.4.4.6.

Wastewater sources include the following:

- Reverse Osmosis/Demineralizer system wastewater, and
- General plant drains from the oil water separator.

2.4.4.5 Cooling Systems

Each of the power islands include two cooling systems; 1) the steam cycle heat rejection system (e.g., cooling tower) and, 2) the closed cooling water system (equipment cooling), each of which is discussed in this section.

Steam Cycle Heat Rejection System

The cooling system for heat rejection from the steam cycle consists of a surface condenser, circulating water system, and a wet cooling tower. The surface condenser receives exhaust steam from the low pressure section of the STG and condenses it to liquid for return to the SSG. The surface condenser is a shell-and-tube heat exchanger with wet, saturated steam condensing on the shell side and circulating water flowing through the tubes to provide cooling. The warmed circulating water exits the condenser and flows to the cooling tower to be cooled and reused.

The circulating water is distributed among multiple cells of the counter-flow cooling towers, where it cascades downward through each cell fill and then collects in the cooling tower basin. The mechanical draft cooling tower employs electric motor-driven fans to move air upward through each cooling tower cell fill. The cascading circulating water is partially evaporated, and the evaporated water is dispersed into the atmosphere as part of the moist air leaving each cooling tower cell. As discussed in Section 5.15, Visual Resources, because of climatic conditions at the site, visible moisture plumes are expected

to occur relatively infrequently and mainly in winter months; therefore, no need is expected for a plume-abated cooling tower.

The circulating water is cooled primarily through partial evaporation, and secondarily through heat transfer with the air. The cooled circulating water is pumped from the cooling tower basin back to the surface condenser and auxiliary cooling water system.

Closed Cooling Water System

The closed cooling water system uses water from the cooling tower for the purpose of cooling equipment including the STG lubrication oil cooler, the STG generator cooler, steam cycle sample coolers, large pumps, etc. The water picks up heat from the various equipment items being cooled and rejects the heat to the cooling tower through a closed loop heat exchanger.

2.4.4.6 Waste Generation and Management

Project wastes include industrial wastewater, sanitary wastewater, non-hazardous solid waste, hazardous solid waste, and hazardous liquid waste. Project waste streams and management details are discussed in Section 5.16, Waste Management and Section 5.17, Water Resources.

Evaporation Ponds for Industrial Wastewater

It is expected that each Plant site will have two double-lined evaporation ponds with a nominal surface area of five acres each for a total of ten acres per site or twenty acres for the entire Project. The ponds will be designed in accordance with Lahontan Regional Water Quality Control Board (RWQCB) requirements. Multiple ponds are planned to allow plant operations to continue in event that a pond needs to be taken out of service for some reason, e.g., needed maintenance. Each pond will have enough surface area so that the evaporation rate exceeds the cooling tower blowdown rate at maximum design conditions and at annual average conditions. Pond depth will be selected so that the ponds will not need to have residual solids removed during the life of the plant.

The pond liner system is expected to consist of a 60 mil high density polyethylene (HDPE) inner liner and a 50 mil HDPE outer liner. Between the liners is a synthetic drainage net that is used as part of the leachate collection and removal system (LCRS). Monitoring of the evaporation ponds will be required to detect the presence of liquid and/or constituents of concern. The LCRS will be monitored and a series of monitoring wells will also be used for the evaporation ponds. Based on the power plant process, chemicals used, and water quality, it is expected that the constituents of concern for this monitoring will include chloride, sodium, sulfate, TDS, biphenyl, diphenyl oxide, potassium, selenium, chromium and phosphate. The proposed detection monitoring program for the facility consists of monitoring the LCRS, lysimeters, and monitoring wells for the presence of liquid and/or constituents of concern.

Septic System for Sanitary Wastewater

The Project's sanitary system will collect wastewater from sanitary facilities such as sinks and toilets. This waste stream will be sent to onsite sanitary waste septic systems located at each power island.

On-Site Bioremediation/Land Farm System

The Project will include bioremediation/land farm units to treat soil contaminated with HTF in the event of a leak or spill. The proposed bioremediation and land farm facilities will cover an area of approximately 1.5 acres on each plant site. Appropriate contamination level for bioremediation and land farming of site-specific soils will be determined by Lahontan-approved testing to ensure the adequacy of the bioremediation/land farm unit design for HTF-contaminated soil. Contaminated soil that exceeds this level will be disposed of at an appropriate waste facility.

The bioremediation/land farm area will be designed in accordance with Lahontan RWQCB requirements and will include a leak detection system and monitoring wells. Treatment in the bioremediation unit involves the addition of nitrogen and phosphorous (i.e., fertilizers) as nutrients to the HTF-contaminated soil to stimulate consumption of HTF by the indigenous bacteria. The soil will remain in the bioremediation/land farm unit until concentrations are reduced to appropriate levels for use as fill material on the site.

Other Non-Hazardous Solid Waste

Construction, operation and maintenance of the Project will generate non-hazardous solid wastes typical of power generation or other industrial facilities (see Section 5.16, Waste Management). These wastes include scrap metal and plastic, insulation material, paper, glass, empty containers, and other miscellaneous solid wastes. These materials will be disposed of by means of contracted refuse collection and recycling services.

Hazardous Solid and Liquid Waste

Small quantities of hazardous wastes will be generated during Project construction and operation. Hazardous wastes generated during the construction phase include substances such as paint and primer, thinners, and solvents. Hazardous solid and liquid waste streams generated during Project operations include substances such as used HTF, used hydraulic fluids, oils, greases, filters, etc., as well as spent cleaning solutions and spent batteries. To the extent possible, both construction and operation-phase hazardous wastes will be recycled. Tables 5.16-5, Summary of Construction Waste Streams and Management Methods, and 5.16-6, Summary of Operation Waste Streams and Management Methods in Section 5.16, Waste Management summarize Project hazardous waste streams in terms of quantities, origin and composition, and management method(s).

WET COOLING OPTION

7/1/2009



	IX Softener Regeneration Waste (Brine and SR), as CaCO3 (NOTE 1)	CT RO Concentrator Reject, as CaCO3	RO CIP Waste, as CaCO3 (NOTE 2)	Oil Water Separator, as CaCO3 (NOTE 3)	Total Liquid Waste To Evap Ponds, as CaCO3	Total Liquid Waste To Evap Ponds, as ION	
AVERAGE Flow Rate GPM	0.552	14.2	0	0	14.75	14.75	
AVERAGE Flow Rate GPD	794.88	20448	0	0	21242.88	21242.88	
Calcium	8182.90	1.83	0.00	0.00	307.95	123.18	Calcium
Magnesium	7013.00	1.81	0.00	0.00	264.16	64.12	Magnesium
Sodium	39169.61	70076.01	0.00	0.00	68919.53	31614.47	Sodium
Potassium	7.42	458.20	0.00	0.00	441.33	344.79	Potassium
Ammonia	0.00	0.00	0.00	0.00	0.00	0.00	Ammonia
Barium	0.00	0.000	0.00	0.00	0.00	0.00	Barium
Strontium	0.00	0.00	0.00	0.00	0.00	0.00	Strontium
Zinc	0.00	0.00	0.00	0.00	0.00	0.00	Zinc
Aluminum	0.00	0.00	0.00	0.00	0.00	0.00	Aluminum
Iron	0.00	0.00	0.00	0.00	0.00	0.00	Iron
Manganese	0.00	0.00	0.00	0.00	0.00	0.00	Manganese
Selenium (NOTE 4)	0.0000	0.2616	0.0000	0.0000		0.2518	Selenium (NOTE 4)
Chromium (NOTE 5)	0.0000	0.2371	0.0000	0.0000		0.2282	Chromium (NOTE 5)
Total Cation	54372.93	70538.35	0.00	0.00	69932.98	32147.03	
Hydroxide	0.00	40.00	0.00	0.00	38.50	13.10	Hydroxide
Carbonate	0.17	312.97	0.00	0.00	301.27	180.40	Carbonate
Bicarbonate	0.31	0.07	0.00	0.00	0.08	0.10	Bicarbonate
Sulfate	9.02	22494.76	0.00	0.00	21653.38	20820.55	Sulfate
Chloride	54448.05	47050.54	0.00	0.00	47327.34	33565.49	Chloride ***
Fluoride	0.03	8.99	0.00	0.00	8.66	3.25	Fluoride
Nitrate	7.50	460.24	0.00	0.00	443.30	547.29	Nitrate
Phosphate	0.00	0.00	0.00	0.00	0.00	0.00	Phosphate
Total Anion	54465.07	70367.58	0.00	0.00	69772.53	55130.18	
Arsenic Total	0.00	0.00	0.00	0.00	0.00	0.00	Arsenic Total
Carbon Dioxide	0.00	0.00	0.00	0.00	0.00	0.00	Carbon Dioxide
Silica	0.69	182.87	0.00	0.00	176.05	212.11	Silica
TDS						87489.32	TDS
pH	9.60	10.80	7.35	7.35	10.70	10.70	pH

- NOTES:**
1. CT RO Product Water is utilized for brine dilution. Softener backwash and final rinse volumes are recycled back to inlet of Clarifier.
 2. CIP Waste not defined. Chemicals can include HCl, NaOH, surfactants, citric acid, ammonia, fluorides, and others. Alternatively, waste can be collected and hauled off site separately.
 3. Oil/Water Separator waste not defined. It is assumed that underflow is recycled to inlet of Clarifier. Waste can include raw water, oils, grease, and other items. Alternatively, waste can be collected and hauled off site separately.
 4. Selenium form present is yet to be determined. Selenium will exit treatment system either as RO Reject to Evaporation Ponds, or as Clarifier Sludge as shown above. The above table Selenium value assumes that 0% of the raw water Selenium is removed in the Clarifier and Filter processes and 100% is sent to the Evaporation Ponds in the RO Reject stream. This is the maximum possible contribution to the Ponds. Selenium reported as ion (Se) only.
 5. Chromium form present is yet to be determined. Chromium will exit treatment system either as RO Reject to Evaporation Ponds, or as Clarifier Sludge as shown above. The above table Chromium value assumes that 0% of the raw water Chromium is removed in the Clarifier and Filter processes and 100% is sent to the Evaporation Ponds in the RO Reject stream. This is the maximum possible contribution to the Ponds. Chromium reported as ion (Cr) only.

Appendix L

Therminol® VP1 MSDS

<h1>Solutia Inc.</h1> <h2>Material Safety Data Sheet</h2>
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1. PRODUCT AND COMPANY IDENTIFICATION

Product name: THERMINOL® VP1 Heat transfer fluid

Reference Number: 00000000211 Date: 05/16/2006

Company Information:

United States:

Solutia Inc.
575 Maryville Center Drive, P.O. Box 66760
St. Louis, MO 63166-6760
Emergency telephone: Chemtrec: 1-800-424-9300
International Emergency telephone: Chemtrec: 703-527-3887
Non-Emergency telephone: 1-314-674-6661

Canada:

Solutia Canada Inc.
6800 St. Patrick Street
LaSalle, PQ H8N 2H3
Emergency telephone: CANUTEC: 1-613-996-6666
Non-Emergency telephone: 1-314-674-6661

Mexico:

Solutia MEXICO, S. DE R.L. DE C.V.
Prol. Paseo de la Reforma 2654
Local 501, Piso-5
Col. Lomas Altas
11950 Mexico, D.F.
Emergency telephone: SETIQ: (in Mexico) 01-800-002-1400
Non-Emergency telephone: (in Mexico) 01-55-5259-6800

Brazil:

Solutia Brazil Ltd.
Avenue Carlos Marcondes, 1200
CEP: 12241-420-São José dos Campos/SP-Brazil
Emergency telephone: 55 12 3932 7100 (PABX)
Non-Emergency telephone: 55 11 3365 1800 (PABX)

2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Form:	liquid
Colour:	clear to colourless
Odour:	characteristic

WARNING STATEMENTS

WARNING!
Causes eye irritation
Causes skin irritation
Causes respiratory tract irritation
Contains material which can cause liver and nerve damage

POTENTIAL HEALTH EFFECTS

Likely routes of exposure: eye and skin contact
inhalation

Eye contact: Highly irritating to eyes.

Skin contact: Highly irritating to skin.
Prolonged or repeated skin contact may result in irritant dermatitis.

Inhalation: Severely irritating if inhaled.
No more than slightly toxic if inhaled.
Significant adverse health effects are not expected to develop under normal conditions of exposure.

Ingestion: No more than slightly toxic if swallowed.
Significant adverse health effects are not expected to develop if only small amounts (less than a mouthful) are swallowed.

Signs and symptoms of overexposure: headache
fatigue
nausea/vomiting
indigestion
abdominal pain
tremors

Target organs/systems: May cause liver damage
May cause nerve damage

Refer to Section 11 for toxicological information.

3. COMPOSITION/INFORMATION ON INGREDIENTS

<u>Components</u>	<u>CAS No.</u>	<u>Average concentration</u>	<u>Concentration range</u>	<u>Units</u>
diphenyl ether	101-84-8	73.5		%
biphenyl	92-52-4	26.5		%

4. FIRST AID MEASURES

If in eyes: Immediately flush with plenty of water for at least 15 minutes.
If easy to do, remove any contact lenses.
Get medical attention.
Remove material from skin and clothing.

If on skin: Immediately flush the area with plenty of water.
Remove contaminated clothing.
Wash skin gently with soap as soon as it is available.
Get medical attention.
Wash clothing before reuse.

If inhaled: Remove patient to fresh air.
If not breathing, give artificial respiration.
If breathing is difficult give oxygen.
Remove material from eyes, skin and clothing.

If swallowed: Immediate first aid is not likely to be required.
A physician or Poison Control Center can be contacted for advice.
Wash heavily contaminated clothing before reuse.

5. FIRE FIGHTING MEASURES

Fire point: 127 C

Hazardous products of combustion: carbon monoxide (CO); carbon dioxide; hydrocarbons

Extinguishing media: Water spray, foam, dry chemical, or carbon dioxide

Unusual fire and explosion hazards: None known

Fire fighting equipment: Firefighters, and others exposed, wear self-contained breathing apparatus.
Equipment should be thoroughly decontaminated after use.

Miscellaneous advice: This product is not classified as a fire-resistant heat transfer fluid.
Precautions to avoid sources of ignitions should be taken.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: Use personal protection recommended in section 8.

Environmental precautions: Keep out of drains and water courses.

Methods for cleaning up: Contain large spills with dikes and transfer the material to appropriate containers for reclamation or disposal. Absorb remaining material or small spills with an inert material and then place in a chemical waste container. Flush spill area with water.

Refer to Section 13 for disposal information and Sections 14 and 15 for reportable quantity information.

7. HANDLING AND STORAGE

Handling

Avoid contact with eyes, skin and clothing.
Avoid breathing vapour or mist.
Keep container closed.
Use with adequate ventilation.
Wash thoroughly after handling.
Precautions against ignitions and fire should be taken with this product.
Heat transfer fluids are intended for INDIRECT heating purposes ONLY.
This product has not been approved for food grade use.

Emptied containers retain vapour and product residue. Observe all recommended safety precautions until container is cleaned, reconditioned or destroyed. Do not cut, drill, grind or weld on or near this container. The reuse of this material's container for non industrial purposes is prohibited and any reuse must be in consideration of the data provided in this material safety data sheet.

Storage

General: Stable under normal conditions of handling and storage.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Airborne exposure limits: (ml/m³ = ppm)

THERMINOL® VP1 No specific occupational exposure limit has been established.

biphenyl ACGIH TLV: 0.2 ml/m³ ; mist ; 8-hr TWA
OSHA PEL: 0.2 ml/m³ ; 1.0 mg/m³ ; ; 8-hr TWA
Mexican OEL: 0.2 ml/m³ ; 1.5 mg/m³ ; ; 8-hr TWA
Mexican OEL: 0.6 ml/m³ ; 4 mg/m³ ; ; 15-min STEL

diphenyl ether ACGIH TLV: 1 ml/m³ ; ; 8-hr TWA
ACGIH TLV: 2 ml/m³ ; ; 15-min STEL
OSHA PEL: 1 ml/m³ ; 7 mg/m³ ; ; 8-hr TWA
Mexican OEL: 1 ml/m³ ; 7 mg/m³ ; ; 8-hr TWA
Mexican OEL: 2 ml/m³ ; 14 mg/m³ ; ; 15-min STEL

Eye protection: Wear safety goggles.
Have eye flushing equipment available.

Hand protection: Wear chemical resistant gloves.
Consult the glove/clothing manufacturer to determine the appropriate type
glove/clothing for a given application.
See Solutia Glove Facts for permeation data.

Body protection: Wear suitable protective clothing.
Consult the glove/clothing manufacturer to determine the appropriate type
glove/clothing for a given application.
Wear full protective clothing if exposed to splashes.
Wash contaminated skin promptly.
Launder contaminated clothing and clean protective equipment before reuse.
Wash thoroughly after handling.
Have safety shower available at locations where skin contact can occur.

Respiratory protection: Avoid breathing vapour or mist.
Use approved respiratory protection equipment (full facepiece recommended) when
airborne exposure limits are exceeded.
If used, full facepiece replaces the need for face shield and/or chemical goggles.
Consult the respirator manufacturer to determine the appropriate type of equipment for
a given application.
Observe respirator use limitations specified by the manufacturer.

Ventilation: Provide natural or mechanical ventilation to control exposure levels below airborne
exposure limits.
If practical, use local mechanical exhaust ventilation at sources of air contamination
such as processing equipment.

Components referred to herein may be regulated by specific Canadian provincial legislation. Please refer to exposure
limits legislated for the province in which the substance will be used.

9. PHYSICAL AND CHEMICAL PROPERTIES

Flash point: 110 C Pensky-Martens closed tester
124 C Cleveland Open Cup

Autoignition temperature: 612 C ASTM D-2155
Density: 1.06 g/cm³ @ 25 C
Boiling point : 257 C
Crystallising point : 12 C
Water solubility: ~25 mg/l

NOTE: These physical data are typical values based on material tested but may vary from sample to sample. Typical values should not be construed as a guaranteed analysis of any specific lot or as specifications for the product.

10. STABILITY AND REACTIVITY

Conditions to avoid: All sources of ignition.
Materials to avoid: Contact with strong oxidizing agents.
Hazardous reactions: Hazardous polymerization does not occur.
Hazardous decomposition products: None known;

11. TOXICOLOGICAL INFORMATION

This product has been tested for toxicity. Results from Solutia sponsored studies or from the available public literature are described below.

Acute animal toxicity data

Oral: LD50 , rat, 2,050 mg/kg , No more than slightly toxic
Dermal: LD50 , rabbit, > 5,010 mg/kg , Practically nontoxic after skin application in animal studies.
Inhalation: LC50 , rat, 2.66 mg/l , 4 h, Toxic based on animal inhalation exposure studies.
Skin irritation: rabbit , Slightly irritating to skin., 24 h
Repeat dose toxicity: rat, , inhalation, 13 weeks, , Produced effects on body weight, serum enzymes and/or organ weights in repeat dose studies.
Repeat dose toxicity: rat, , gavage, 26 weeks, , Produced effects on body weight, serum enzymes and/or organ weights in repeat dose studies. Effects only observed at very high dose levels.
Target organs affected: kidneys, liver, spleen
Repeat dose toxicity: rat, , diet, subchronic, , Repeated oral exposure produced liver and kidney changes in animal models.
Target organs affected: liver, kidneys
Developmental toxicity: rat, , gavage, , No effects on offspring observed in laboratory animals in the presence of maternal toxicity.

Mutagenicity: No genetic effects were observed in standard tests using bacterial and animal cells.

Components

Data from Solutia studies and/or the available scientific literature on the components of this material which have been identified as hazardous chemicals under the criteria of the OSHA Hazard Communication Standard (29 CFR 1910.1200) or the Canadian Hazardous Products Act are discussed below.

biphenyl	Chronic exposure has been reported to cause headache, fatigue, nausea, indigestion, abdominal pain, tremor, central and peripheral nerve damage and liver injury. Slightly toxic following oral administration. Practically nontoxic after skin application in animal studies. Practically non irritating to skin (rabbit). Slightly irritating to eyes (rabbit). No mortality or signs of toxicity at the highest level achievable. Irritating to respiratory system in animal models. Produced effects on body weight, serum enzymes and/or organ weights in repeat dose studies. Produced no dermal sensitization (guinea pigs). No effects on offspring observed in laboratory animals in the presence of maternal toxicity. No genetic effects were observed in standard tests using bacterial and animal cells.
diphenyl ether	Predictive patch testing on human volunteers did not produce irritation or sensitization. Slightly toxic following oral administration. Practically nontoxic after skin application in animal studies. Slightly irritating to eyes (rabbit). Slightly irritating to skin (rabbit). Repeated exposure produced respiratory tract irritation in animal models. Repeated exposure produced eye irritation in animal models. No genetic effects were observed in standard tests using bacterial and animal cells.

12. ECOLOGICAL INFORMATION

Environmental Toxicity

Invertebrates	48 h, EC50	Water flea (<i>Daphnia magna</i>)	2.4 mg/l
Fish:	96 h, LC50	Rainbow trout (<i>Oncorhynchus mykiss</i>)	7.6 mg/l
	96 h, LC50	Fathead minnow (<i>Pimephales promelas</i>)	24 mg/l
Algae:	96 h, EC50	Algae (<i>Selenastrum capricornutum</i>)	1.3 mg/l
Biodegradation	Modified SCAS (OECD 302A) Primary degradation 99 %		

13. DISPOSAL CONSIDERATIONS

US EPA RCRA Status: This material when discarded may be a hazardous waste as that term is defined by the Resource Conservation and Recovery Act (RCRA), 40 CFR 261.24, due to its toxicity characteristic. This material should be analyzed in accordance with Method 1311 for the compound(s) below.

US EPA RCRA D018 Compound/Characteristic: BENZENE

hazardous waste number:

Disposal considerations: Incineration

Miscellaneous advice: This product meets the criteria for a synthetic used oil under the U.S. EPA Standards for the Management of Used Oil (40 CFR 279). Those standards govern recycling and disposal in lieu of 40 CFR 260 -272 of the Federal hazardous waste program in states that have adopted these used oil regulations. Consult your attorney or appropriate regulatory official to be sure these standards have been adopted in your state. Recycle or burn in accordance with the applicable standards.
Solutia operates a used fluid return program for certain fluids under these used oil standards. Contact your Sales Representative for details.
This product should not be dumped, spilled, rinsed or washed into sewers or public waterways.

14. TRANSPORT INFORMATION

The data provided in this section is for information only. Please apply the appropriate regulations to properly classify your shipment for transportation.

US DOT

Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.
biphenyl
Hazard Class: 9
Hazard Identification number: UN3082
Packing Group: Packing Group III
Transport label: Class 9
Special provisions: This material meets the definition of a marine pollutant.
Other: Applies ONLY to containers with an RQ or for shipments in bulk via water transportation.

Canadian TDG

Other: Not regulated for transport.

Reportable Quantity/Limit

US DOT RQ 100 lb *biphenyl*
Package size containing reportable amount: 377 lb

ICAO/IATA Class

Other: See DOT Information

15. REGULATORY INFORMATION

All components are in compliance with the following inventories: U.S. TSCA, EU EINECS, Canadian DSL, Australian AICS, Korean, Japanese ENCS, Phillipine PICCS, Chinese

Canadian WHMIS classification: D2(A) - Materials Causing Other Toxic Effects
D2(B) - Materials Causing Other Toxic Effects

SARA Hazard Notification:

Hazard Categories Under Title III Rules (40 CFR 370): Immediate
Delayed

Section 302 Extremely Hazardous Substances: Not applicable

Section 313 Toxic Chemical(s): biphenyl

CERCLA Reportable Quantity:

100 lbs biphenyl

For this/these chemicals, release of more than the Reportable Quantity to the environment in a 24 hour period requires notification to the National Response Center (800-424-8802 or 202-426-2675).

This product has been classified in accordance with the hazard criteria of the Canadian Controlled Products Regulation and the MSDS contains all the information required by the Canadian Controlled Products Regulation.

Refer to Section 11 for OSHA/HPA Hazardous Chemical(s) and Section 13 for RCRA classification.

Safety data sheet also created in accordance with Brazilian law NBR 14725

16. OTHER INFORMATION

Product use: Heat transferring agents

Reason for revision: Significant changes to the following section(s):, Section 1

	Health	Fire	Reactivity	Additional Information
Suggested NFPA Rating	2	1	0	
Suggested HMIS Rating:	2	1	0	G

Prepared by the Solutia Hazard Communication Group. Please consult Solutia @ 314-674-6661 if further information is needed.

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Appendix L

L.2 Dowtherm™ A MSDS



Material Safety Data Sheet

The Dow Chemical Company

Product Name: DOWTHERM* A HEAT TRANSFER FLUID

Issue Date: 08/03/2007

Print Date: 06 Aug 2007

The Dow Chemical Company encourages and expects you to read and understand the entire (M)SDS, as there is important information throughout the document. We expect you to follow the precautions identified in this document unless your use conditions would necessitate other appropriate methods or actions.

1. Product and Company Identification

Product Name

DOWTHERM* A HEAT TRANSFER FLUID

COMPANY IDENTIFICATION

The Dow Chemical Company
2030 Willard H. Dow Center
Midland, MI 48674
USA

Customer Information Number: 800-258-2436

EMERGENCY TELEPHONE NUMBER

24-Hour Emergency Contact: 989-636-4400
Local Emergency Contact: 989-636-4400

2. Hazards Identification

Emergency Overview

Color: Colorless to yellow

Physical State: Liquid

Odor: Aromatic

Hazards of product:

CAUTION! May cause skin irritation. May cause respiratory tract irritation. Keep upwind of spill. Highly toxic to fish and/or other aquatic organisms.

OSHA Hazard Communication Standard

This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

Potential Health Effects

Eye Contact: May cause pain disproportionate to the level of irritation to eye tissues. May cause slight temporary eye irritation. Vapor may cause eye irritation experienced as mild discomfort and redness.

Skin Contact: Repeated contact may cause skin burns. Symptoms may include pain, severe local redness, swelling, and tissue damage. Prolonged or repeated contact may cause skin irritation.

* Indicates a Trademark

Skin Absorption: Prolonged skin contact is unlikely to result in absorption of harmful amounts.

Inhalation: Excessive exposure may cause irritation to upper respiratory tract (nose and throat) and lungs. May cause headache and nausea due to odor.

Ingestion: Low toxicity if swallowed. Small amounts swallowed incidentally as a result of normal handling operations are not likely to cause injury; however, swallowing larger amounts may cause injury. In animals, effects have been reported on the following organs: Kidney. Liver.

Effects of Repeated Exposure: The data presented are for the following material: Diphenyl oxide (vapour): Observations in animals include: Respiratory effects. The data presented are for the following material: (biphenyl) In humans, effects have been reported on the following organs: Central nervous system. Liver. Peripheral nervous system. In animals, effects have been reported on the following organs: Gastrointestinal tract. Kidney. May cause nausea and vomiting. May cause abdominal discomfort or diarrhea.

Cancer Information: Contains component(s) which have caused cancer in laboratory animals. However, the component(s) is/are not genotoxic, and the relevance of cancer to humans is unknown.

Birth Defects/Developmental Effects: Contains component(s) which, in laboratory animals, have been toxic to the fetus only at doses toxic to the mother.

Reproductive Effects: In animal studies on component(s), effects on reproduction were seen only at doses that produced significant toxicity to the parent animals.

3. Composition Information

Component	CAS #	Amount
Diphenyl oxide	101-84-8	73.0 %
Biphenyl	92-52-4	27.0 %

4. First-aid measures

Eye Contact: Flush eyes thoroughly with water for several minutes. Remove contact lenses after the initial 1-2 minutes and continue flushing for several additional minutes. If effects occur, consult a physician, preferably an ophthalmologist.

Skin Contact: Wash skin with plenty of water.

Inhalation: Move person to fresh air; if effects occur, consult a physician.

Ingestion: If swallowed, seek medical attention. Do not induce vomiting unless directed to do so by medical personnel.

Notes to Physician: If burn is present, treat as any thermal burn, after decontamination. No specific antidote. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient.

5. Fire Fighting Measures

Extinguishing Media: Water fog or fine spray. Dry chemical fire extinguishers. Carbon dioxide fire extinguishers. Foam. Do not use direct water stream. May spread fire. General purpose synthetic foams (including AFFF type) or protein foams are preferred if available. Alcohol resistant foams (ATC type) may function. Water fog, applied gently may be used as a blanket for fire extinguishment.

Fire Fighting Procedures: Keep people away. Isolate fire and deny unnecessary entry. Do not use direct water stream. May spread fire. Burning liquids may be moved by flushing with water to protect personnel and minimize property damage. Water fog, applied gently may be used as a blanket for fire extinguishment. Contain fire water run-off if possible. Fire water run-off, if not contained, may cause environmental damage. Review the "Accidental Release Measures" and the "Ecological Information" sections of this (M)SDS.

Special Protective Equipment for Firefighters: Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, trousers, boots, and gloves). Avoid contact with this material during fire fighting operations. If contact is likely, change to full chemical resistant fire fighting clothing with self-contained breathing apparatus. If this is

not available, wear full chemical resistant clothing with self-contained breathing apparatus and fight fire from a remote location. For protective equipment in post-fire or non-fire clean-up situations, refer to the relevant sections.

Unusual Fire and Explosion Hazards: Violent steam generation or eruption may occur upon application of direct water stream to hot liquids. Liquid mist of this product can burn. Flammable concentrations of vapor can accumulate at temperatures above flash point; see Section 9. Dense smoke is produced when product burns.

Hazardous Combustion Products: During a fire, smoke may contain the original material in addition to combustion products of varying composition which may be toxic and/or irritating. Combustion products may include and are not limited to: Carbon monoxide. Carbon dioxide.

6. Accidental Release Measures

Steps to be Taken if Material is Released or Spilled: Contain spilled material if possible. Collect in suitable and properly labeled containers. See Section 13, Disposal Considerations, for additional information.

Personal Precautions: Keep upwind of spill. Ventilate area of leak or spill. Keep unnecessary and unprotected personnel from entering the area. Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls and Personal Protection. Refer to Section 7, Handling, for additional precautionary measures.

Environmental Precautions: Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. See Section 12, Ecological Information. Spills or discharge to natural waterways is likely to kill aquatic organisms.

7. Handling and Storage

Handling

General Handling: Avoid contact with skin and clothing. Avoid breathing vapor. Wash thoroughly after handling. Use with adequate ventilation. Keep container closed. Spills of these organic materials on hot fibrous insulations may lead to lowering of the autoignition temperatures possibly resulting in spontaneous combustion. See Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION.

Storage

Store away from incompatible materials. See STABILITY AND REACTIVITY section.

8. Exposure Controls / Personal Protection

Exposure Limits

Component	List	Type	Value
Diphenyl oxide	ACGIH	TWA Vapor.	1 ppm
	ACGIH	STEL Vapor.	2 ppm
	OSHA Table Z-1	PEL Vapor.	7 mg/m ³ 1 ppm
Biphenyl	ACGIH	TWA	0.2 ppm
	OSHA Table Z-1	PEL	1 mg/m ³ 0.2 ppm

Personal Protection

Eye/Face Protection: Use safety glasses. If exposure causes eye discomfort, use a full-face respirator.

Skin Protection: When prolonged or frequently repeated contact could occur, use protective clothing chemically resistant to this material. Selection of specific items such as faceshield, boots, apron, or full-body suit will depend on the task.

Hand protection: Use gloves chemically resistant to this material when prolonged or frequently repeated contact could occur. Examples of preferred glove barrier materials include: Viton. Polyethylene. Polyvinyl chloride ("PVC" or "vinyl"). Styrene/butadiene rubber. Polyvinyl alcohol ("PVA"). Ethyl vinyl alcohol laminate ("EVAL"). Examples of acceptable glove barrier materials include: Butyl rubber. Neoprene. Chlorinated polyethylene. Natural rubber ("latex"). Nitrile/butadiene rubber ("nitrile" or "NBR"). NOTICE: The selection of a specific glove for a particular application and duration of use in a workplace should also take into account all relevant workplace factors such as, but not limited to: Other chemicals which may be handled, physical requirements (cut/puncture protection, dexterity, thermal protection), potential body reactions to glove materials, as well as the instructions/specifications provided by the glove supplier.

Respiratory Protection: Atmospheric levels should be maintained below the exposure guideline. When respiratory protection is required for certain operations, use an approved air-purifying respirator. The following should be effective types of air-purifying respirators: Organic vapor cartridge with a particulate pre-filter.

Ingestion: Use good personal hygiene. Do not consume or store food in the work area. Wash hands before smoking or eating.

Engineering Controls

Ventilation: Provide general and/or local exhaust ventilation to control airborne levels below the exposure guidelines.

9. Physical and Chemical Properties

Physical State	Liquid
Color	Colorless to yellow
Odor	Aromatic
Flash Point - Closed Cup	113 °C (235 °F) <i>Closed Cup</i>
Flammable Limits In Air	Lower: 0.8 %(V) <i>Literature</i> Upper: 7.0 %(V) <i>Literature</i>
Autoignition Temperature	599 °C (1,110 °F) <i>Literature</i>
Vapor Pressure	0.025 mmHg @ 25 °C <i>Literature</i>
Boiling Point (760 mmHg)	257 °C (495 °F) <i>Literature</i>
Vapor Density (air = 1)	>1.0 <i>Literature</i>
Specific Gravity (H ₂ O = 1)	1.050 - 1.075 25 °C/25 °C <i>Literature</i>
Freezing Point	12.0 °C (53.6 °F) <i>Literature</i>
Melting Point	12.0 °C (53.6 °F) <i>Literature</i>
Solubility in Water (by weight)	13.8 ppm @ 60 °F <i>Literature</i>
pH	Not applicable
Kinematic Viscosity	3.51 mm ² /s @ 25 °C <i>Literature</i>

10. Stability and Reactivity

Stability/Instability

Thermally stable at typical use temperatures.

Conditions to Avoid: Exposure to elevated temperatures can cause product to decompose.

Incompatible Materials: Avoid contact with oxidizing materials.

Hazardous Polymerization

Will not occur.

Thermal Decomposition

Decomposition products depend upon temperature, air supply and the presence of other materials. Decomposition products can include trace amounts of: Benzene. Phenol.

11. Toxicological Information

Acute Toxicity**Ingestion**

LD50, Rat > 2,000 mg/kg

Skin Absorption

The dermal LD50 has not been determined.

Repeated Dose Toxicity

The data presented are for the following material: Diphenyl oxide (vapour): Observations in animals include: Respiratory effects. The data presented are for the following material: (biphenyl) In humans, effects have been reported on the following organs: Central nervous system. Liver. Peripheral nervous system. In animals, effects have been reported on the following organs: Gastrointestinal tract. Kidney. May cause nausea and vomiting. May cause abdominal discomfort or diarrhea.

Chronic Toxicity and Carcinogenicity

Contains component(s) which have caused cancer in laboratory animals. However, the component(s) is/are not genotoxic, and the relevance of cancer to humans is unknown.

Developmental Toxicity

Contains component(s) which, in laboratory animals, have been toxic to the fetus only at doses toxic to the mother. Contains component(s) which did not cause birth defects in laboratory animals.

Reproductive Toxicity

In animal studies on component(s), effects on reproduction were seen only at doses that produced significant toxicity to the parent animals.

Genetic Toxicology

In vitro genetic toxicity studies were negative. Animal genetic toxicity studies were negative.

12. Ecological Information

CHEMICAL FATE

Data for Component: Diphenyl oxide

Movement & Partitioning

Bioconcentration potential is moderate (BCF between 100 and 3000 or Log Pow between 3 and 5). Potential for mobility in soil is low (Koc between 500 and 2000).

Henry's Law Constant (H): 2.2E-04 atm*m3/mole; 25 °C Estimated

Partition coefficient, n-octanol/water (log Pow): 4.21 Measured

Partition coefficient, soil organic carbon/water (Koc): 820 - 1,950 Estimated

Bioconcentration Factor (BCF): 196 - 470; fish; Measured

Persistence and Degradability

Biodegradation under aerobic static laboratory conditions is high (BOD20 or BOD28/ThOD > 40%). Material is expected to biodegrade only very slowly (in the environment). Fails to pass OECD/EEC tests for ready biodegradability.

Indirect Photodegradation with OH Radicals

Rate Constant	Atmospheric Half-life	Method
9.84E-12 cm ³ /s	1.1 d	Estimated

OECD Biodegradation Tests:

Biodegradation	Exposure Time	Method
6.3 %	28 d	OECD 301C Test

Biological oxygen demand (BOD):

BOD 5	BOD 10	BOD 20	BOD 28
72 - 76 %	80 - 91 %	82 - 99 %	

Chemical Oxygen Demand: 2.19 mg/mg

Theoretical Oxygen Demand: 2.63 mg/mgData for Component: **Biphenyl****Movement & Partitioning**

Bioconcentration potential is moderate (BCF between 100 and 3000 or Log Pow between 3 and 5). Potential for mobility in soil is low (Koc between 500 and 2000).

Henry's Law Constant (H): 4.08E-4 atm*m3/mole; 25 °C Measured**Partition coefficient, n-octanol/water (log Pow):** 3.98 Measured**Partition coefficient, soil organic carbon/water (Koc):** 500 - 630 Estimated**Bioconcentration Factor (BCF):** 340 - 1,900; fish; Measured**Persistence and Degradability**

Material is readily biodegradable. Passes OECD test(s) for ready biodegradability.

Indirect Photodegradation with OH Radicals

Rate Constant	Atmospheric Half-life	Method
6.77E-12 cm3/s	1.6 d	Estimated

OECD Biodegradation Tests:

Biodegradation	Exposure Time	Method
100 %	28 d	OECD 301D Test

Theoretical Oxygen Demand: 3.01 mg/mg**ECOTOXICITY****Fish Acute & Prolonged Toxicity**LC50, fathead minnow (*Pimephales promelas*), 96 h: 9.6 mg/l**Aquatic Invertebrate Acute Toxicity**LC50, water flea *Daphnia magna*, static, 48 h: 0.29 mg/l**13. Disposal Considerations**

DO NOT DUMP INTO ANY SEWERS, ON THE GROUND, OR INTO ANY BODY OF WATER. All disposal practices must be in compliance with all Federal, State/Provincial and local laws and regulations. Regulations may vary in different locations. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator. DOW HAS NO CONTROL OVER THE MANAGEMENT PRACTICES OR MANUFACTURING PROCESSES OF PARTIES HANDLING OR USING THIS MATERIAL. THE INFORMATION PRESENTED HERE PERTAINS ONLY TO THE PRODUCT AS SHIPPED IN ITS INTENDED CONDITION AS DESCRIBED IN MSDS SECTION: Composition Information. FOR UNUSED & UNCONTAMINATED PRODUCT, the preferred options include sending to a licensed, permitted: Incinerator or other thermal destruction device. As a service to its customers, Dow can provide names of information resources to help identify waste management companies and other facilities which recycle, reprocess or manage chemicals or plastics, and that manage used drums. Telephone Dow's Customer Information Group at 1-800-258-2436 or 1-989-832-1556 (U.S.), or 1-800-331-6451 (Canada) for further details.

14. Transport Information**DOT Non-Bulk****Proper Shipping Name:** ENVIRONMENTALLY HAZARDOUS SUBSTANCES, LIQUID, NOS**Technical Name:** BIPHENYL**Hazard Class:** 9 **ID Number:** UN3082 **Packing Group:** PG III**DOT Bulk****Proper Shipping Name:** ENVIRONMENTALLY HAZARDOUS SUBSTANCES, LIQUID, NOS**Technical Name:** BIPHENYL**Hazard Class:** 9 **ID Number:** UN3082 **Packing Group:** PG III

IMDG

Proper Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCES, LIQUID, NOS
Technical Name: BIPHENYL
Hazard Class: 9 **ID Number:** UN3082 **Packing Group:** PG III
EMS Number: F-A,S-F
Marine pollutant.: No

ICAO/IATA

Proper Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCES, LIQUID, NOS
Technical Name: BIPHENYL
Hazard Class: 9 **ID Number:** UN3082 **Packing Group:** PG III
Cargo Packing Instruction: 914
Passenger Packing Instruction: 914

Additional Information

Reportable quantity: 370 lb – BIPHENYL

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. Additional transportation system information can be obtained through an authorized sales or customer service representative. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.

15. Regulatory Information

OSHA Hazard Communication Standard

This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Sections 311 and 312

Immediate (Acute) Health Hazard	Yes
Delayed (Chronic) Health Hazard	Yes
Fire Hazard	No
Reactive Hazard	No
Sudden Release of Pressure Hazard	No

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Section 313

This product contains the following substances which are subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and which are listed in 40 CFR 372.

Component	CAS #	Amount
Biphenyl	92-52-4	27.0%

Pennsylvania (Worker and Community Right-To-Know Act): Pennsylvania Hazardous Substances List and/or Pennsylvania Environmental Hazardous Substance List:

The following product components are cited in the Pennsylvania Hazardous Substance List and/or the Pennsylvania Environmental Substance List, and are present at levels which require reporting.

Component	CAS #	Amount
Diphenyl oxide	101-84-8	73.0%
Biphenyl	92-52-4	27.0%

Pennsylvania (Worker and Community Right-To-Know Act): Pennsylvania Special Hazardous Substances List:

To the best of our knowledge, this product does not contain chemicals at levels which require reporting under this statute.

California Proposition 65 (Safe Drinking Water and Toxic Enforcement Act of 1986)

This product contains no listed substances known to the State of California to cause cancer, birth defects or other reproductive harm, at levels which would require a warning under the statute.

US. Toxic Substances Control Act

All components of this product are on the TSCA Inventory or are exempt from TSCA Inventory requirements under 40 CFR 720.30

CEPA - Domestic Substances List (DSL)

All substances contained in this product are listed on the Canadian Domestic Substances List (DSL) or are not required to be listed.

16. Other Information

Hazard Rating System

NFPA	Health	Fire	Reactivity
	1	1	0

Recommended Uses and Restrictions

A heat transfer agent - For industrial use. Dow recommends that you use this product in a manner consistent with the listed use. If your intended use is not consistent with Dow's stated use, please contact Dow's Customer Information Group.

Revision

Identification Number: 1007176 / 0000 / Issue Date 08/03/2007 / Version: 1.1

Most recent revision(s) are noted by the bold, double bars in left-hand margin throughout this document.

Legend

N/A	Not available
W/W	Weight/Weight
OEL	Occupational Exposure Limit
STEL	Short Term Exposure Limit
TWA	Time Weighted Average
ACGIH	American Conference of Governmental Industrial Hygienists, Inc.
DOW IHG	Dow Industrial Hygiene Guideline
WEEL	Workplace Environmental Exposure Level
HAZ_DES	Hazard Designation
Action Level	A value set by OSHA that is lower than the PEL which will trigger the need for activities such as exposure monitoring and medical surveillance if exceeded.

The Dow Chemical Company urges each customer or recipient of this (M)SDS to study it carefully and consult appropriate expertise, as necessary or appropriate, to become aware of and understand the data contained in this (M)SDS and any hazards associated with the product. The information herein is provided in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ between various locations. It is the buyer's/user's responsibility to ensure that his activities comply with all federal, state, provincial or local laws. The information presented here pertains only to the product as shipped. Since conditions for use of the product are not under the control of the manufacturer, it is the buyer's/user's duty to determine the conditions necessary for the safe use of this product. Due to the proliferation of sources for information such as manufacturer-specific (M)SDSs, we are not and cannot be responsible for (M)SDSs obtained from any source other than ourselves. If you have obtained an (M)SDS from another source or if you are not sure that the (M)SDS you have is current, please contact us for the most current version.

Data Adequacy Supplement

Attachment C

Soils

Erosion Calculation Record

RUSLE2 Expanded Profile Erosion Calculation Record

File: profiles\MSP

Inputs:

Location: San Bernardino county average (San Bernardino)
 Soil: sandy loam (l-m OM, m perm) 8% stone cover
 Horiz. overland flow path length: 1000 ft
 Avg. slope steepness: 0.70 %

Management	Vegetation	Yield units	Yield (# of units)
Fallow Ag			

Contouring: default
 Strips/barriers: (none)
 Diversion/terrace, sediment basin: (none)
 Subsurface drainage: (none)
 Adjust res. burial level: Normal res. burial

Outputs:

Soil loss erod. portion: 0.58 t/ac/yr
 Detachment on slope: 0.58 t/ac/yr
 Soil loss for cons. plan: 0.58 t/ac/yr
 Sediment delivery: 0.58 t/ac/yr

Crit. slope length:
 Surf. cover after planting: 0 %

Date	Operation	Vegetation	Surf. res. cov. after op, %
1/1/0	basic/general/no operation		0

RUSLE2 Expanded Profile Erosion Calculation Record

File: profiles\MSP

Inputs:

Location: San Bernardino county average (San Bernardino)
 Soil: sandy loam (l-m OM, m perm) 8% stone cover
 Horiz. overland flow path length: 1000 ft
 Avg. slope steepness: 0.70 %

Management	Vegetation	Yield units	Yield (# of units)
Construction			

Contouring: default
 Strips/barriers: (none)
 Diversion/terrace, sediment basin: (none)
 Subsurface drainage: (none)
 Adjust res. burial level: Normal res. burial

Outputs:

Soil loss erod. portion: 0.61 t/ac/yr
 Detachment on slope: 0.61 t/ac/yr
 Soil loss for cons. plan: 0.61 t/ac/yr
 Sediment delivery: 0.61 t/ac/yr

Crit. slope length:
 Surf. cover after planting: 0 %

Date	Operation	Vegetation	Surf. res. cov. after op, %
4/15/0	Highly disturbed land\blade fill material		0

RUSLE2 Expanded Profile Erosion Calculation Record

File: profiles\MSP

Inputs:

Location: San Bernardino county average (San Bernardino)
 Soil: sand (I OM, r perm)
 Horiz. overland flow path length: 1000 ft
 Avg. slope steepness: 0.70 %

Management Operations	Vegetation	Yield units	Yield (# of units)

Contouring: default
 Strips/barriers: (none)
 Diversion/terrace, sediment basin: (none)
 Subsurface drainage: (none)
 Adjust res. burial level: Normal res. burial

Outputs:

Soil loss erod. portion: 0.066 t/ac/yr
 Detachment on slope: 0.066 t/ac/yr
 Soil loss for cons. plan: 0.066 t/ac/yr
 Sediment delivery: 0.066 t/ac/yr

Crit. slope length:
 Surf. cover after planting: 0 %

Date	Operation	Vegetation	Surf. res. cov. after op, %
4/15/0	basic/general/no operation		0

Run Summary: Mojave Solar Project_8

Run Date: Friday 11 September 2009 11:30 AM
Client Name: Mojave Solar Project
Farm No: --- **Tract No:** --- **Field No:** ---
Run Location: WEPS_Runs
Management: Fallow Ag.man
Soil: Cajon_112_85_S.ifc

Simulation & Site Information

	X-Length: 2640.09 ft Y-Length: 2640.09 ft	Mode: NRCS Soil Loss T: 5.0 tn/ac/yr
	Area: 160.01 ac Elevation: 2056.99 ft Orientation: 0.00 °	State: California County: San Bernardino Location: 35.0090849° N, Cligen: RANDSBURG Windgen: GEORGE AFB/VICTORVI

Erosion

Period	Crop/Residue	Gross Loss tn/ac	Net Soil Loss From Field (tn/ac)		
			Total	Creep/Salt.	Suspension
Rot. year: 1		874.2	874.2	277.3	596.9
Ave. Annual		874.2	874.2	277.3	596.9

SCI Summary

Soil Conditioning Index	-68.65	Wind Erosion Soil Loss	874.3 tn/ac
Energy Calculator	0.0 gal diesel/ac	Water Erosion Soil Loss	0.0 tn/ac
Average Annual STIR	0.5	SCI Subfactors	
		OM	FO
		-1.00	1.00
		ER	
		-343.22	

Rotation Stir Energy

Date	Operation	Crop	Stir	Energy gal diesel/ac
Jan 01, 01	Graze, stubble or residue 50 pct		0.49	0.0

Notes

Run Summary: Mojave Solar Project_10

Run Date: Friday 11 September 2009 11:56 AM
Client Name: Mojave Solar Project
Farm No: --- **Tract No:** --- **Field No:** ---
Run Location: WEPS_Runs
Management: Construction.man
Soil: Cajon_112_85_S.ifc

Simulation & Site Information

	X-Length: 2640.09 ft Y-Length: 2640.09 ft	Mode: NRCS Soil Loss T: 5.0 tn/ac/yr
	Area: 160.01 ac Elevation: 2056.99 ft Orientation: 0.00 °	State: California County: San Bernardino Location: 35.0090849° N, Cligen: RANDSBURG Windgen: GEORGE AFB/VICTORVI

Erosion

Period	Crop/Residue	Gross Loss tn/ac	Net Soil Loss From Field (tn/ac)		
			Total	Creep/Salt.	Suspension
Rot. year: 1		700.6	700.5	231.6	468.8
Ave. Annual		700.6	700.5	231.6	468.8

SCI Summary

Soil Conditioning Index	-54.99	Wind Erosion Soil Loss	700.6 tn/ac
Energy Calculator	0.9 gal diesel/ac	Water Erosion Soil Loss	0.0 tn/ac
Average Annual STIR	6.7	SCI Subfactors	
		OM	FO
		-1.00	0.93
		ER	
		-274.83	

Rotation Stir Energy

Date	Operation	Crop	Stir	Energy gal diesel/ac
Jan 01, 01	Bulldozer, filling-leveling		5.20	0.6
Jan 01, 01	Irrigation (Custom Depth, Border, Furrow)		0.00	0.0
Jan 01, 01	Roller, corrugated packer		1.46	0.3

Notes

Run Summary: Mojave Solar Project_12

Run Date: Friday 11 September 2009 12:25 PM
Client Name: Mojave Solar Project
Farm No: --- **Tract No:** --- **Field No:** ---
Run Location: WEPS_Runs
Management: Operation.man
Soil: Cajon_112_85_S.ifc

Simulation & Site Information

	X-Length: 2640.09 ft Y-Length: 2640.09 ft	Mode: NRCS Soil Loss T: 5.0 tn/ac/yr
	Area: 160.01 ac Elevation: 2056.99 ft Orientation: 0.00 °	State: California County: San Bernardino Location: 35.0090849° N, Cligen: RANDSBURG Windgen: GEORGE AFB/VICTORVI

Erosion

Period	Crop/Residue	Gross Loss tn/ac	Net Soil Loss From Field (tn/ac)		
			Total	Creep/Salt.	Suspension
Rot. year: 1	water	1.0	1.0	0.5	0.5
Ave. Annual		1.0	1.0	0.5	0.5

SCI Summary

Soil Conditioning Index	0.31	Wind Erosion Soil Loss	1.0 tn/ac
Energy Calculator	0.0 gal diesel/ac	Water Erosion Soil Loss	0.0 tn/ac
Average Annual STIR	0.0	SCI Subfactors	
		OM	FO
		-0.53	1.00
		ER	
		0.60	

Rotation Stir Energy

Date	Operation	Crop	Stir	Energy gal diesel/ac
Jan 01, 01	Add Non-Crop Mulch	water	0.00	0.0

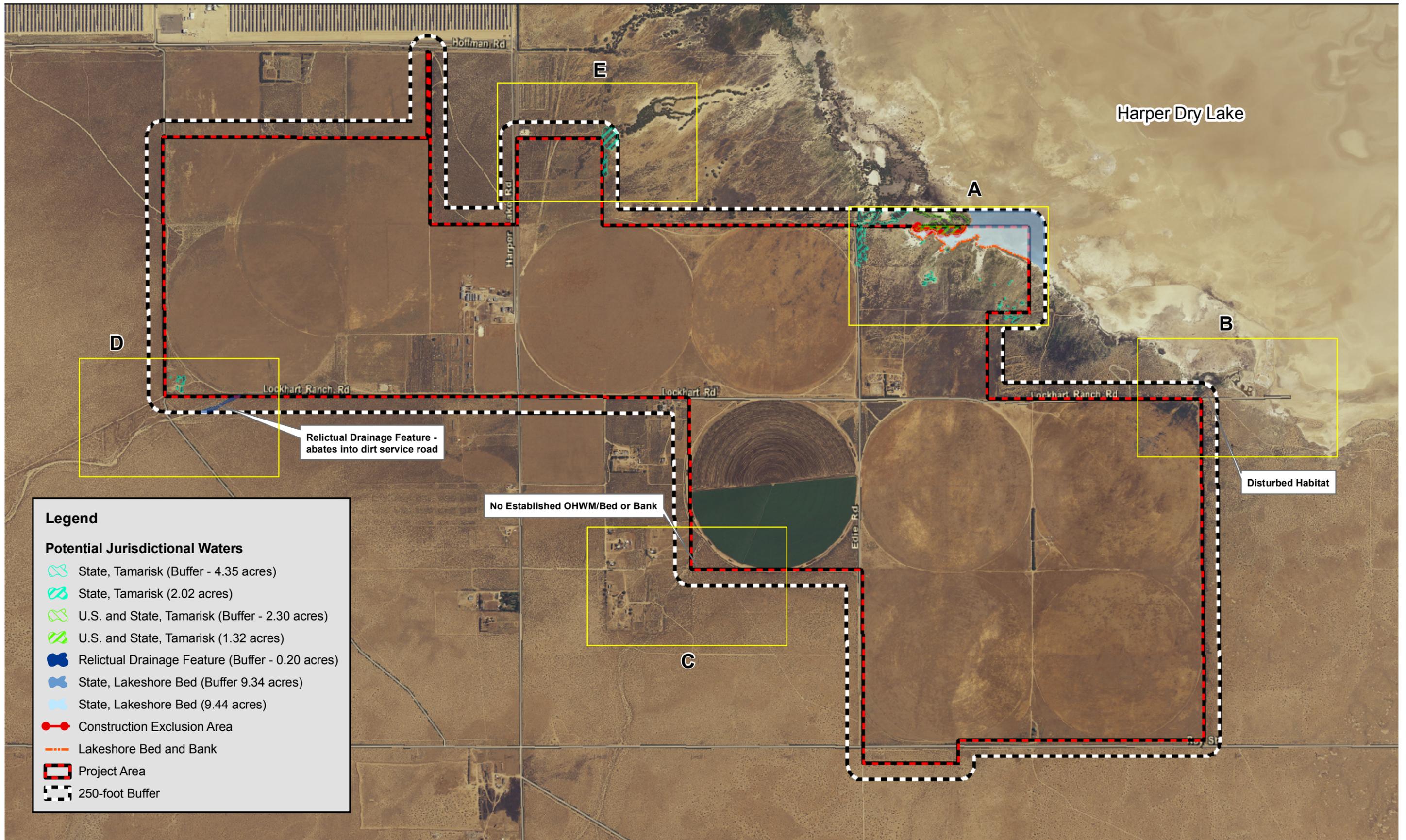
Notes

Data Adequacy Supplement

Attachment D

Biological Resources

Part 1: Wetlands Delineation Maps



Legend

Potential Jurisdictional Waters

- State, Tamarisk (Buffer - 4.35 acres)
- State, Tamarisk (2.02 acres)
- U.S. and State, Tamarisk (Buffer - 2.30 acres)
- U.S. and State, Tamarisk (1.32 acres)
- Relictual Drainage Feature (Buffer - 0.20 acres)
- State, Lakeshore Bed (Buffer 9.34 acres)
- State, Lakeshore Bed (9.44 acres)
- Construction Exclusion Area
- Lakeshore Bed and Bank
- Project Area
- 250-foot Buffer

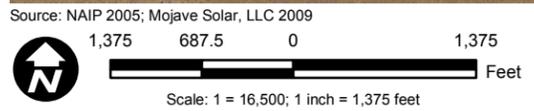


Figure 1
Wetlands Delineation Map



Source: NAIP 2005; Mojave Solar, LLC 2009

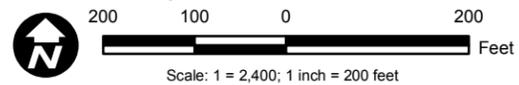
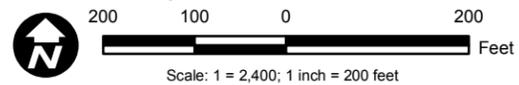


Figure 1A
Wetlands Delineation Map



Source: NAIP 2005; Mojave Solar, LLC 2009



Legend

-  Project Area
-  250-foot Buffer

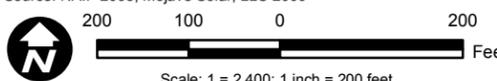
Figure 1B
Wetlands Delineation Map

No Established OHWM/Bed or Bank

Legend

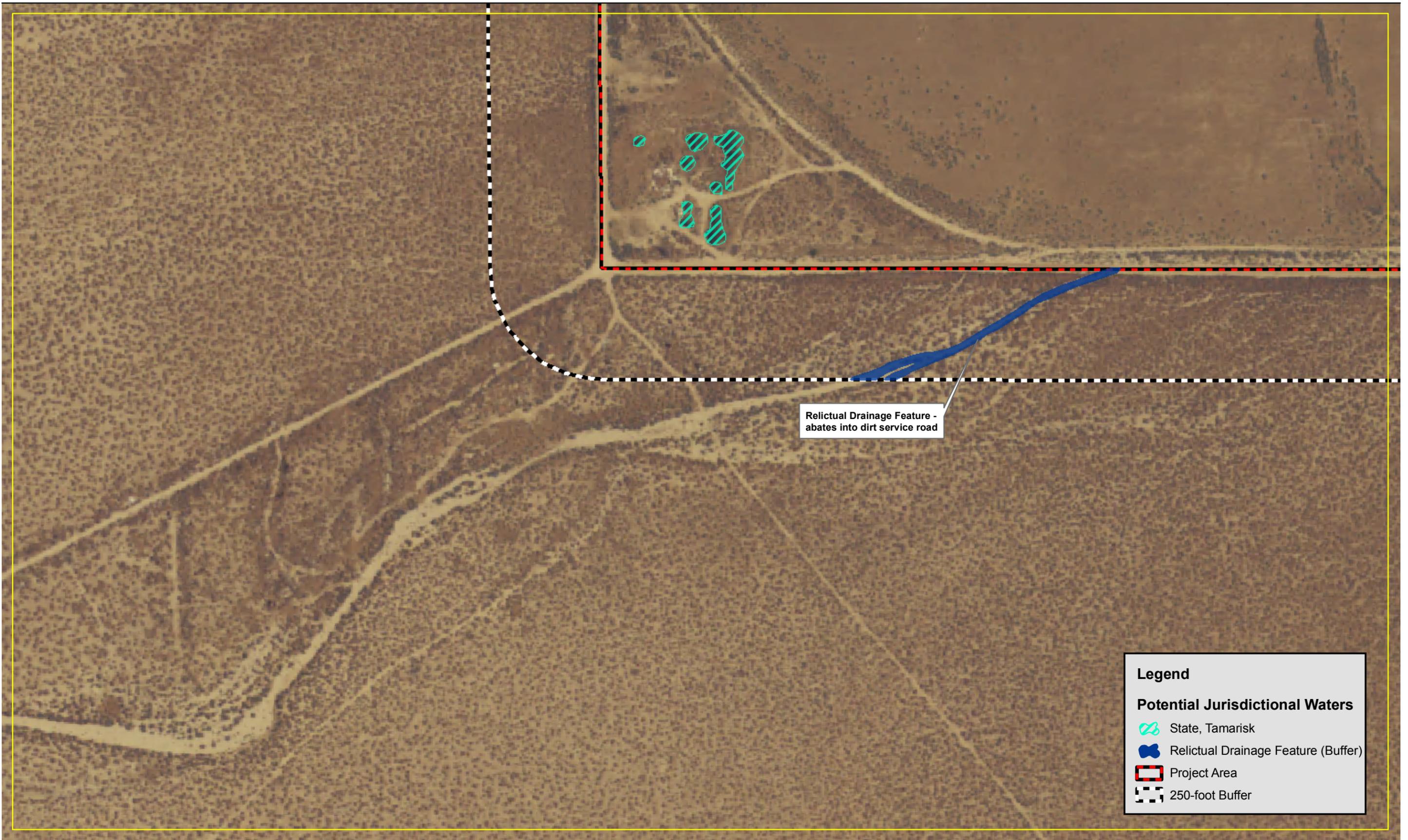
-  Project Area
-  250-foot Buffer

Source: NAIP 2005; Mojave Solar, LLC 2009



Scale: 1 = 2,400; 1 inch = 200 feet

Figure 1C
Wetlands Delineation Map



Relictual Drainage Feature -
abates into dirt service road

Legend

Potential Jurisdictional Waters

-  State, Tamarisk
-  Relictual Drainage Feature (Buffer)
-  Project Area
-  250-foot Buffer

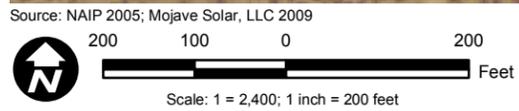
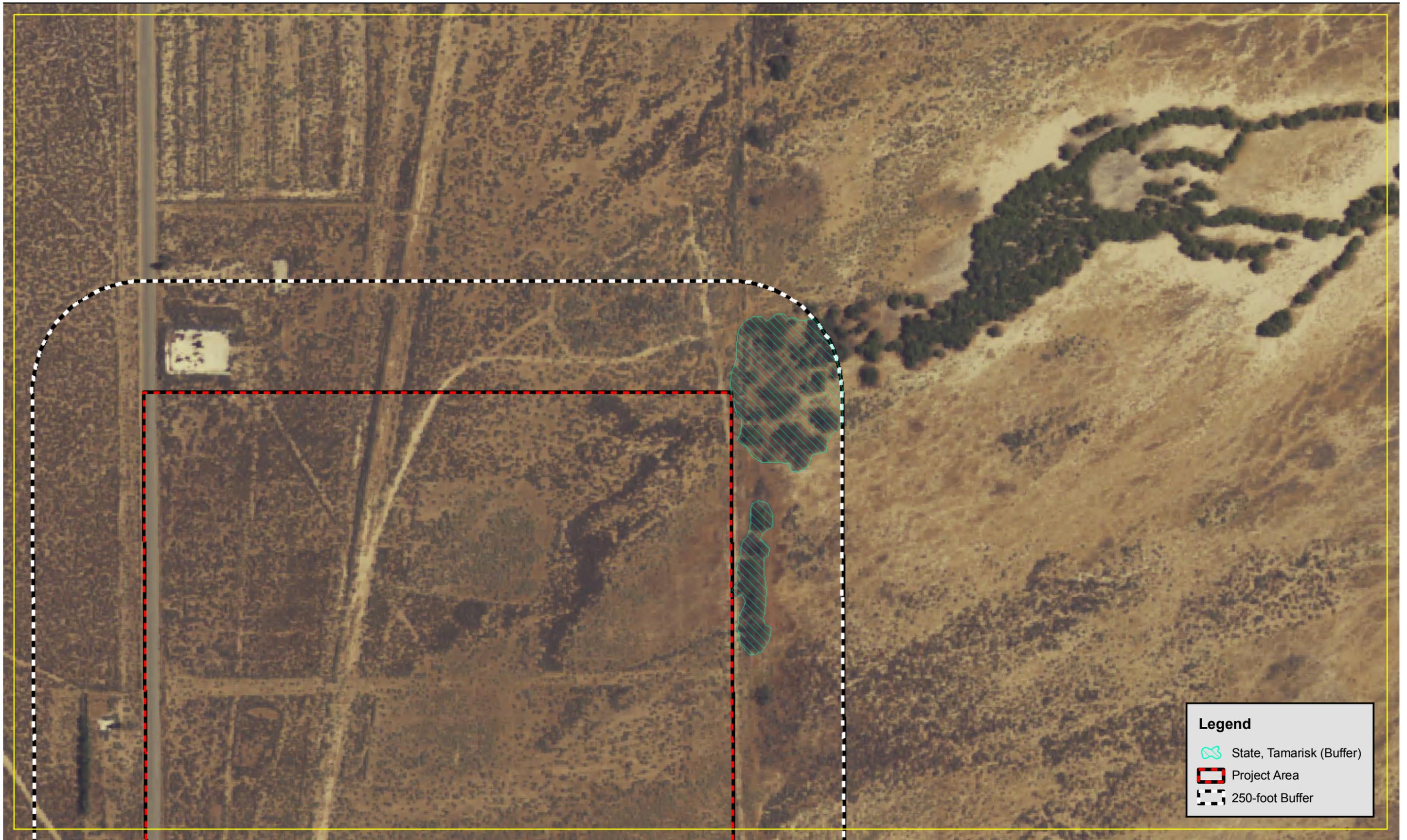
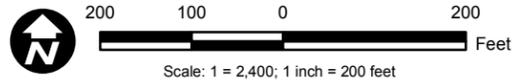


Figure 1D
Wetlands Delineation Map



Source: NAIP 2005; Mojave Solar, LLC 2009



Legend

-  State, Tamarisk (Buffer)
-  Project Area
-  250-foot Buffer

Figure 1E
Wetlands Delineation Map

Data Adequacy Supplement

Attachment D

Biological Resources

Part 2: California Natural Diversity Database

Mail to:
 California Natural Diversity Database
 Department of Fish and Game
 1807 13th Street, Suite 202
 Sacramento, CA 95811
 Fax: (916) 324-0475 email: CNDDDB@dfg.ca.gov

For Office Use Only

Source Code _____ Quad Code _____
 Elm Code _____ Occ. No. _____
 EO Index No. _____ Map Index No. _____

Date of Field Work (mm/dd/yyyy): 08/14/2007

Reset

California Native Species Field Survey Form

Send Form

Scientific Name: *Falco peregrinus annatum*

Common Name: American Peregrine Falcon

Species Found? Yes No _____ If not, why? _____
 Total No. Individuals 1 Subsequent Visit? yes no
Is this an existing NDDDB occurrence? _____ no unk.
 Yes, Occ. # _____
 Collection? If yes: _____
 Number _____ Museum / Herbarium _____

Reporter: Lyndon Quon
Address: 1420 Kettner Blvd., Suite 500
San Diego, CA 92101
E-mail Address: Lyndon.Quon@aecom.com
Phone: (619) 233-1454

Plant Information

Phenology: _____% vegetative _____% flowering _____% fruiting

Animal Information

2
 # adults # juveniles # larvae # egg masses # unknown
 wintering breeding nesting rookery burrow site other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

County: San Bernardino Landowner / Mgr.: Mojave Solar, LLC
 Quad Name: Lockhart Elevation: 2100 feet
 T _____ R _____ Sec _____, _____ ¼ of _____ ¼, Meridian: H M S
 Source of Coordinates (GPS, topo. map & type): GPS
 T _____ R _____ Sec _____, _____ ¼ of _____ ¼, Meridian: H M S
 GPS Make & Model Garmin 5 GPSMAP76S
DATUM: **NAD27** **NAD83** **WGS84**
 Horizontal Accuracy 10 meters meters/feet
Coordinate System: UTM Zone 10 UTM Zone 11 **OR** Geographic (Latitude & Longitude)
Coordinates: _____

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*
Dominant plant communities include desert saltbush scrub, disturbed, fallow agriculture, and fallow agriculture/saltbush re-growth.
Observed twice in the survey area in 2007, perched on the ground, adjacent to an active agricultural field. Likely a transient moving through the region.
 Please fill out separate form for other rare taxa seen at this site.

Site Information Overall site/occurrence quality/viability (site + population): Excellent Good Fair Poor
 Immediate AND surrounding land use: Active and former agricultural operation; existing solar energy development to the northwest of survey area.
 Visible disturbances: Former and current agricultural activities.
 Threats: _____
 Comments: _____

Determination: *(check one or more, and fill in blanks)*

Keyed (cite reference): _____
 Compared with specimen housed at: _____
 Compared with photo / drawing in: _____
 By another person (name): _____
 Other: _____

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Habitat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Diagnostic feature	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

May we obtain duplicates at our expense? yes no

Mail to:
 California Natural Diversity Database
 Department of Fish and Game
 1807 13th Street, Suite 202
 Sacramento, CA 95811
 Fax: (916) 324-0475 email: CNDDDB@dfg.ca.gov

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Source Code _____ Quad Code _____
 Elm Code _____ Occ. No. _____
 EO Index No. _____ Map Index No. _____

Date of Field Work (mm/dd/yyyy): 08/13/2007

Reset

California Native Species Field Survey Form

Send Form

Scientific Name: Buteo swainsoni

Common Name: Swainson's Hawk

Species Found? Yes No _____ If not, why? _____
 Total No. Individuals 2 Subsequent Visit? yes no
 Is this an existing NDDDB occurrence? _____ no unk.
 Yes, Occ. # _____
 Collection? If yes: _____
 Number _____ Museum / Herbarium _____

Reporter: Lyndon Quon
 Address: 1420 Kettner Blvd., Suite 500
San Diego, CA 92101
 E-mail Address: Lyndon.Quon@aecom.com
 Phone: (619) 233-1454

Plant Information

Phenology: _____% vegetative _____% flowering _____% fruiting

Animal Information

2
 # adults # juveniles # larvae # egg masses # unknown
 wintering breeding nesting rookery burrow site other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

County: San Bernardino Landowner / Mgr.: Mojave Solar, LLC
 Quad Name: Lockhart Elevation: 2100 feet
 T _____ R _____ Sec _____, _____ 1/4 of _____ 1/4, Meridian: H M S
 Source of Coordinates (GPS, topo. map & type): GPS
 T _____ R _____ Sec _____, _____ 1/4 of _____ 1/4, Meridian: H M S
 GPS Make & Model Garmin 5 GPSMAP76S
DATUM: NAD27 NAD83 WGS84
 Horizontal Accuracy 10 meters meters/feet
Coordinate System: UTM Zone 10 UTM Zone 11 **OR** Geographic (Latitude & Longitude)
 Coordinates: _____

Habitat Description (plants & animals) plant communities, dominants, associates, substrates/soils, aspects/slope:

Animal Behavior (Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):
Dominant plant communities include desert saltbush scrub, disturbed, fallow agriculture, and fallow agriculture/saltbush re-growth. Scattered salt cedar provides perches; fallow agricultural fields and open disturbed areas and open scrub vegetation provide suitable foraging areas.

Please fill out separate form for other rare taxa seen at this site.

Site Information Overall site/occurrence quality/viability (site + population): Excellent Good Fair Poor
 Immediate AND surrounding land use: Active and former agricultural operation; existing solar energy development to the northwest of survey area.
 Visible disturbances: Former and current agricultural activities.
 Threats: _____
 Comments: _____

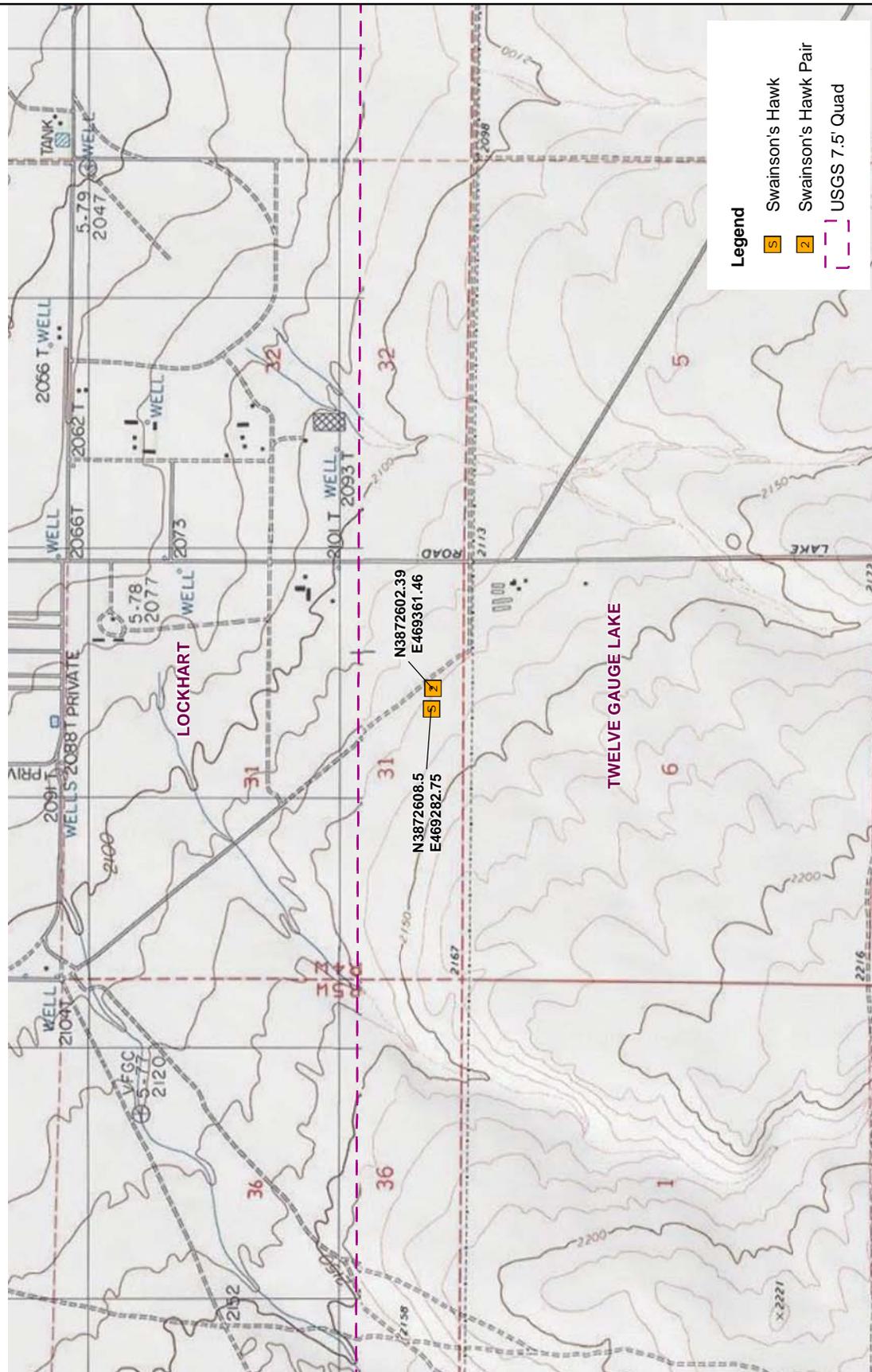
Determination: (check one or more, and fill in blanks)

Keyed (cite reference): _____
 Compared with specimen housed at: _____
 Compared with photo / drawing in: _____
 By another person (name): _____
 Other: _____

Photographs: (check one or more)

	Slide	Print	Digital
Plant / animal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Habitat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Diagnostic feature	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

May we obtain duplicates at our expense? yes no



**Swainson's Hawk Observations
(All locations in UTM NAD 1927, Zone 11)**

Mail to:
California Natural Diversity Database
Department of Fish and Game
1807 13th Street, Suite 202
Sacramento, CA 95811
Fax: (916) 324-0475 email: CNDDDB@dfg.ca.gov

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Source Code _____ Quad Code _____
Elm Code _____ Occ. No. _____
EO Index No. _____ Map Index No. _____

Date of Field Work (mm/dd/yyyy): 06/12/2007

Reset

California Native Species Field Survey Form

Send Form

Scientific Name: Empidonax traillii

Common Name: Willow Flycatcher

Species Found? Yes No _____ If not, why? _____

Total No. Individuals 1 Subsequent Visit? yes no

Is this an existing NDDDB occurrence? _____ no unk.
Yes, Occ. # _____

Collection? If yes: _____
Number _____ Museum / Herbarium _____

Reporter: Lyndon Quon

Address: 1420 Kettner Blvd., Suite 500
San Diego, CA 92101

E-mail Address: Lyndon.Quon@aecom.com

Phone: (619) 233-1454

Plant Information

Phenology: _____% vegetative _____% flowering _____% fruiting

Animal Information

1
adults # juveniles # larvae # egg masses # unknown
 wintering breeding nesting rookery burrow site other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

County: San Bernardino Landowner / Mgr.: Mojave Solar, LLC

Quad Name: Lockhart Elevation: 2100 feet

T _____ R _____ Sec _____, _____ 1/4 of _____ 1/4, Meridian: H M S Source of Coordinates (GPS, topo. map & type): GPS

T _____ R _____ Sec _____, _____ 1/4 of _____ 1/4, Meridian: H M S GPS Make & Model Garmin 5 GPSMAP76S

DATUM: NAD27 NAD83 WGS84 Horizontal Accuracy 10 meters meters/feet

Coordinate System: UTM Zone 10 UTM Zone 11 OR Geographic (Latitude & Longitude)

Coordinates: _____

Habitat Description (plants & animals) plant communities, dominants, associates, substrates/soils, aspects/slope:

Animal Behavior (Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):

Dominant plant communities include desert saltbush scrub, disturbed, fallow agriculture, and fallow agriculture/saltbush re-growth.

No suitable breeding or nesting habitat in the vicinity, and the individual was assumed to be a transient.

Please fill out separate form for other rare taxa seen at this site.

Site Information Overall site/occurrence quality/viability (site + population): Excellent Good Fair Poor

Immediate AND surrounding land use: Active and former agricultural operation; existing solar energy development to the northwest of survey area.

Visible disturbances: Former and current agricultural activities.

Threats: _____

Comments: _____

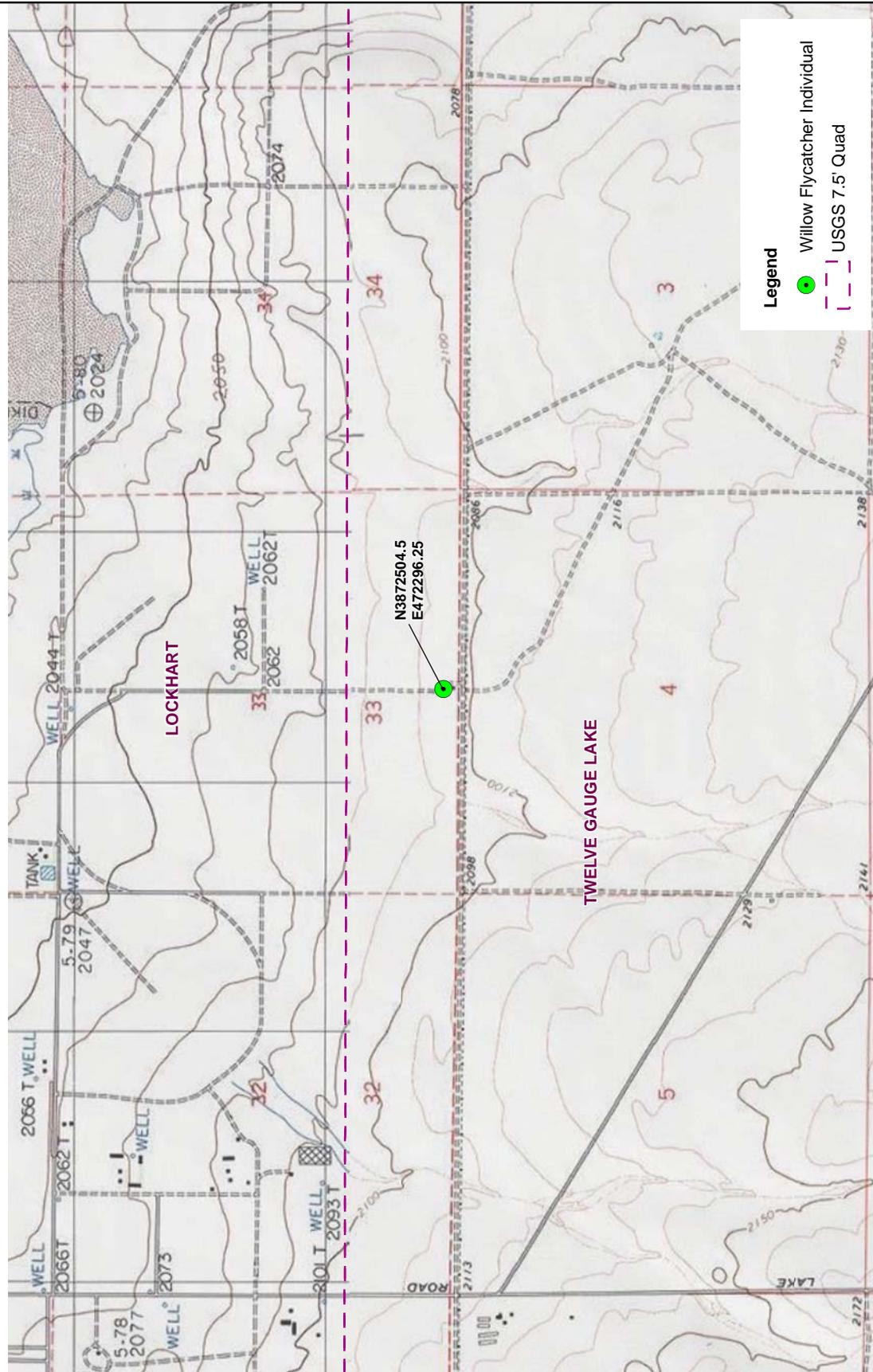
Determination: (check one or more, and fill in blanks)

- Keyed (cite reference): _____
- Compared with specimen housed at: _____
- Compared with photo / drawing in: _____
- By another person (name): _____
- Other: _____

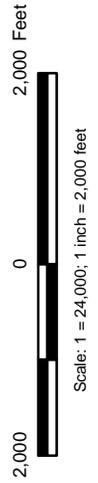
Photographs: (check one or more)

Slide	Print	Digital
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Plant / animal	<input type="checkbox"/>	<input type="checkbox"/>
Habitat	<input type="checkbox"/>	<input type="checkbox"/>
Diagnostic feature	<input type="checkbox"/>	<input type="checkbox"/>

May we obtain duplicates at our expense? yes no



Source: EDAW 2007



Willow Flycatcher Sighting
(All locations in UTM NAD 1927, Zone 11)

California Native Species Field Survey Form

Path: P:\2008\08080191 Harper Lake Abengoa AFC\6.0 GIS\6.2 Project Directory\6.2.5 Layout\CNDDB_submittals\willow_flycatcher_cnddb.mxd, 09/17/09, Lee J

Mail to:
California Natural Diversity Database
Department of Fish and Game
1807 13th Street, Suite 202
Sacramento, CA 95811
Fax: (916) 324-0475 email: CNDDDB@dfg.ca.gov

For Office Use Only

Source Code _____ Quad Code _____
Elm Code _____ Occ. No. _____
EO Index No. _____ Map Index No. _____

Date of Field Work (mm/dd/yyyy): 04/24/2008

Reset

California Native Species Field Survey Form

Send Form

Scientific Name: Athene cunicularia

Common Name: Western Burrowing Owl

Species Found? Yes No If not, why? _____
Total No. Individuals 7 Subsequent Visit? yes no
Is this an existing NDDDB occurrence? yes, Occ. # _____ no unk.
Collection? If yes: _____
Number _____ Museum / Herbarium _____

Reporter: Lyndon Quon
Address: 1420 Kettner Blvd., Suite 500
San Diego, CA 92101
E-mail Address: Lyndon.Quon@aecom.com
Phone: (619) 233-1454

Plant Information

Phenology: _____% vegetative _____% flowering _____% fruiting

Animal Information

7
adults # juveniles # larvae # egg masses # unknown
 wintering breeding nesting rookery burrow site other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

County: San Bernardino Landowner / Mgr.: Mojave Solar, LLC
Quad Name: Lockhart Elevation: 2100 feet
T _____ R _____ Sec _____, _____ 1/4 of _____ 1/4, Meridian: H M S Source of Coordinates (GPS, topo. map & type): GPS
T _____ R _____ Sec _____, _____ 1/4 of _____ 1/4, Meridian: H M S GPS Make & Model Garmin 5 GPSMAP76S
DATUM: NAD27 NAD83 WGS84 Horizontal Accuracy 10 meters meters/feet
Coordinate System: UTM Zone 10 UTM Zone 11 OR Geographic (Latitude & Longitude)
Coordinates: _____

Habitat Description (plants & animals) plant communities, dominants, associates, substrates/soils, aspects/slope:
Animal Behavior (Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):
Dominant plant communities include desert saltbush scrub, disturbed, fallow agriculture, and fallow agriculture/saltbush re-growth.
7 total individuals documented over 3 survey seasons (2006 through 2008); assume a maximum of 4 discrete observational locations within the survey area (2006 and 2007), decreasing to 2 locations in 2008.
Please fill out separate form for other rare taxa seen at this site.

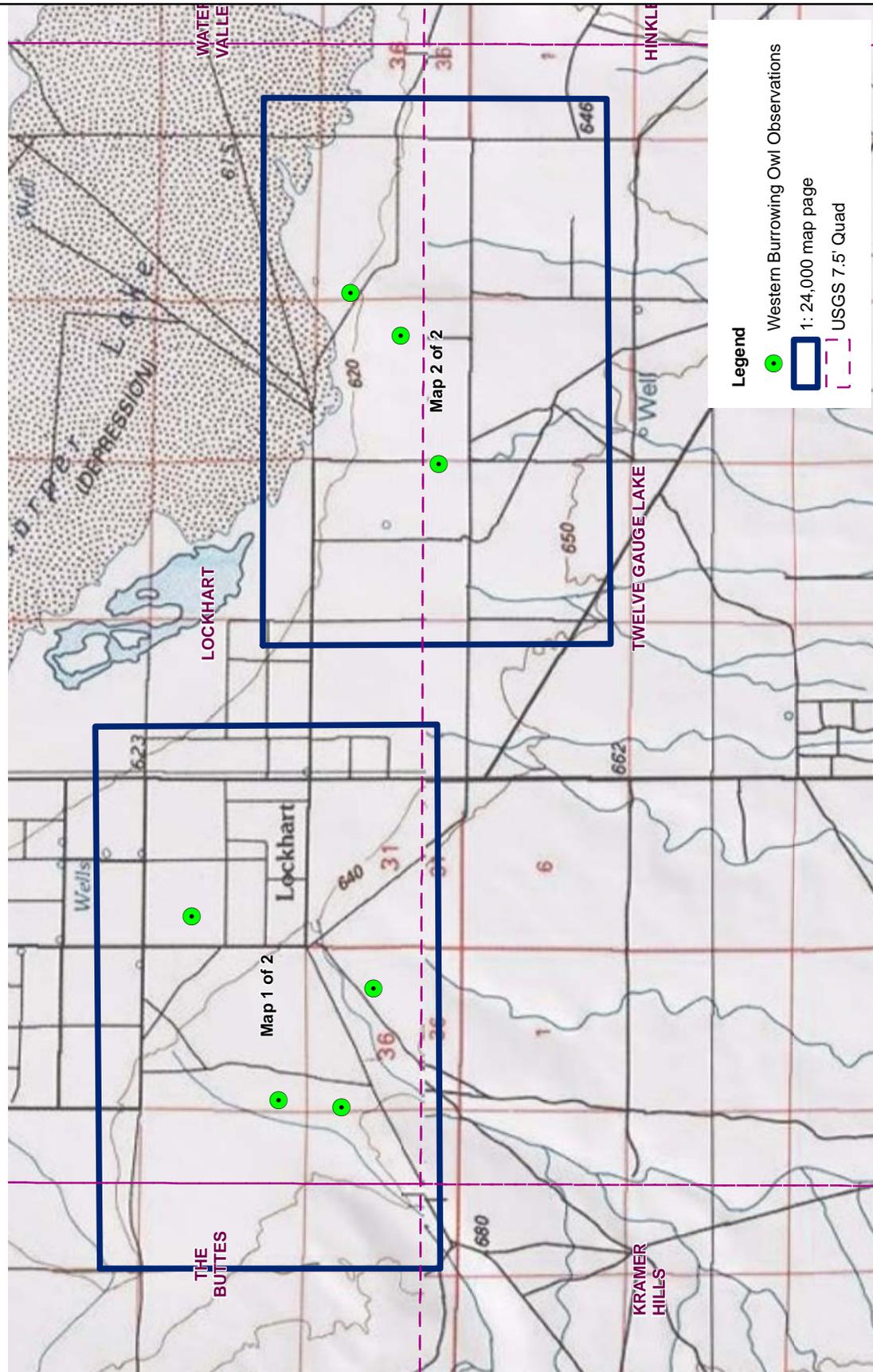
Site Information Overall site/occurrence quality/viability (site + population): Excellent Good Fair Poor
Immediate AND surrounding land use: Active and former agricultural operation; existing solar energy development to the northwest of survey area.
Visible disturbances: Former and current agricultural activities.
Threats: _____
Comments: _____

Determination: (check one or more, and fill in blanks)

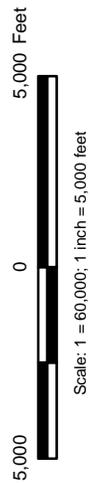
 Keyed (cite reference): _____
 Compared with specimen housed at: _____
 Compared with photo / drawing in: _____
 By another person (name): _____
 Other: _____

Photographs: (check one or more)

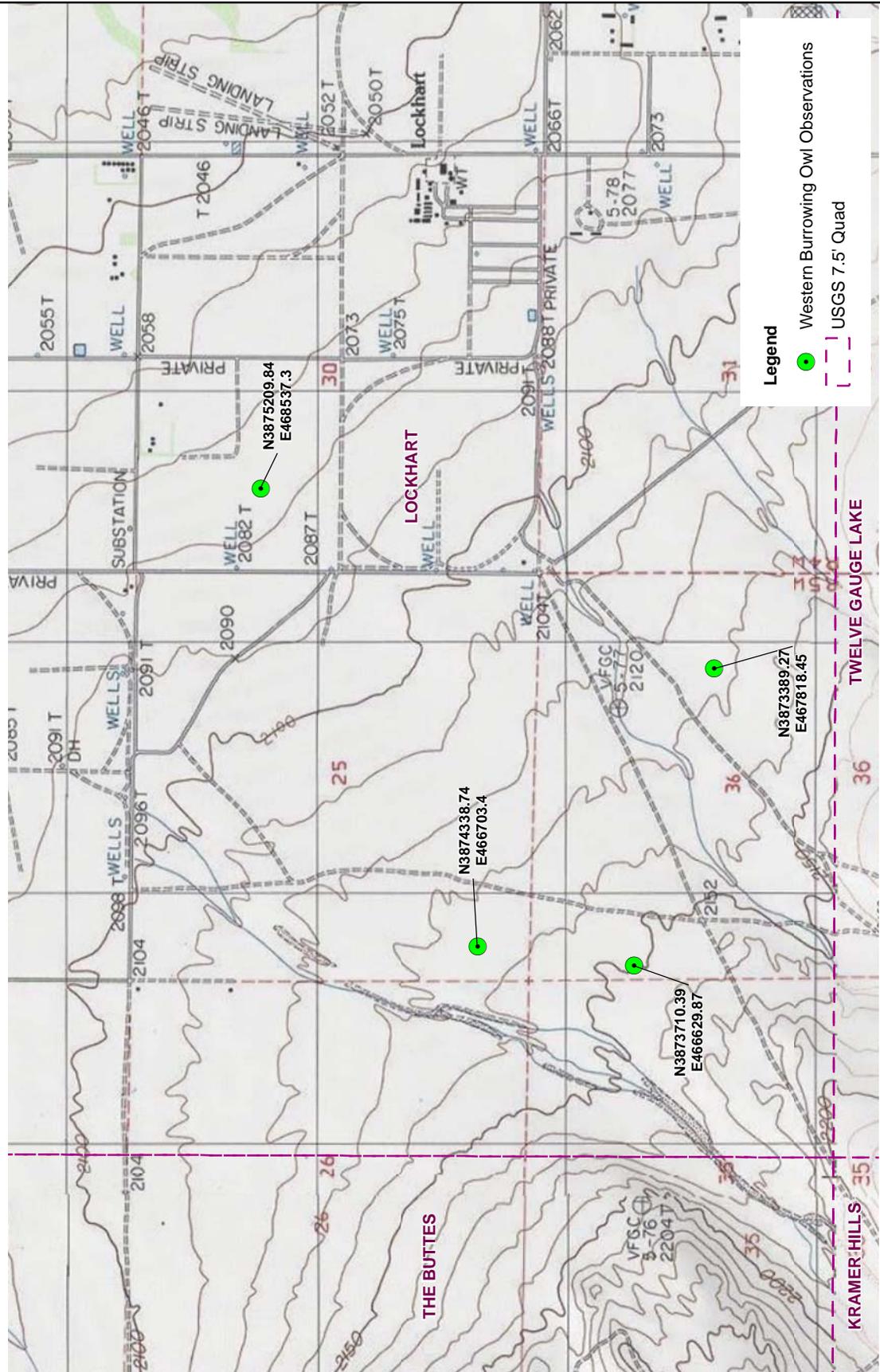
Slide Print Digital
Plant / animal
Habitat
Diagnostic feature
May we obtain duplicates at our expense? yes no



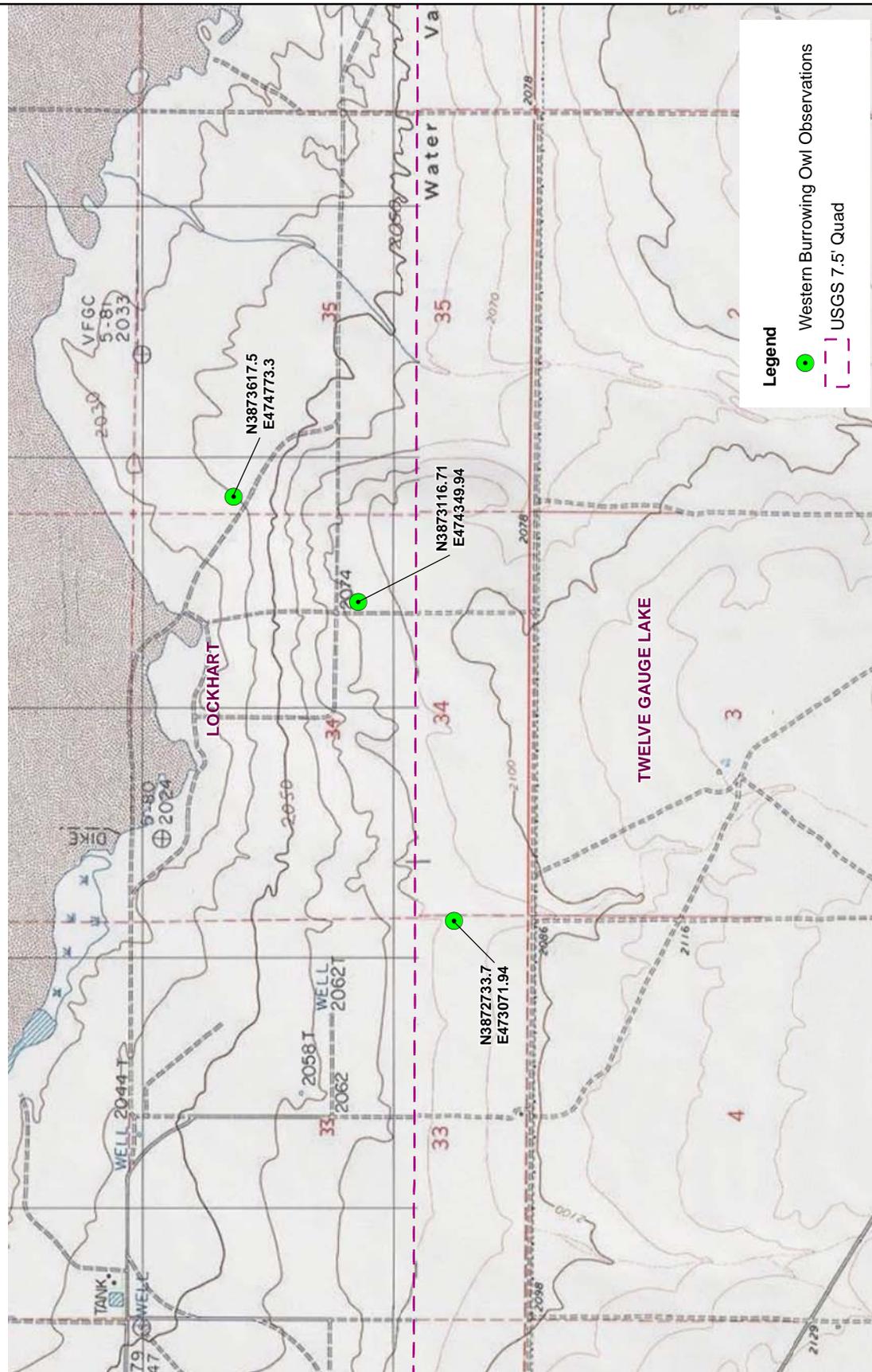
Source: EDAW 2008



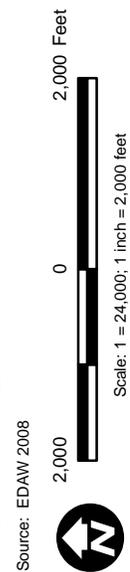
Western Burrowing Owl Observations



Western Burrowing Owl Observations
Map 1 of 2
(All locations in UTM NAD 1927, Zone 11)



Western Burrowing Owl Observations
Map 2 of 2
(All locations in UTM NAD 1927, Zone 11)



Mail to:
California Natural Diversity Database
Department of Fish and Game
1807 13th Street, Suite 202
Sacramento, CA 95811
Fax: (916) 324-0475 email: CNDDDB@dfg.ca.gov

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Source Code _____ Quad Code _____
Elm Code _____ Occ. No. _____
EO Index No. _____ Map Index No. _____

Date of Field Work (mm/dd/yyyy): 04/14/2008

Reset

California Native Species Field Survey Form

Send Form

Scientific Name: *Chorizanthe spinosa*

Common Name: Mojave spineflower

Species Found? Yes No _____ If not, why? _____
Total No. Individuals 1500 Subsequent Visit? yes no
Is this an existing NDDDB occurrence? _____ no unk.
Yes, Occ. # _____
Collection? If yes: _____
Number _____ Museum / Herbarium _____

Reporter: Joshua Corona-Bennett
Address: 1420 Kettner Blvd., Suite 500
San Diego, CA 92101
E-mail Address: Joshua.Corona-Bennett@acem.com
Phone: (619) 233-1454

Plant Information
Phenology: 50% vegetative 50% flowering _____% fruiting

Animal Information

# adults	# juveniles	# larvae	# egg masses	# unknown
<input type="checkbox"/>				
wintering	breeding	nesting	rookery	burrow site
				other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

County: San Bernardino Landowner / Mgr.: Mojave Solar, LLC
Quad Name: Lockhart Elevation: 2100 feet
T _____ R _____ Sec _____, _____ 1/4 of _____ 1/4, Meridian: H M S Source of Coordinates (GPS, topo. map & type): GPS
T _____ R _____ Sec _____, _____ 1/4 of _____ 1/4, Meridian: H M S GPS Make & Model Garmin 5 GPSMAP76S
DATUM: **NAD27** **NAD83** **WGS84** Horizontal Accuracy 10 meters meters/feet
Coordinate System: UTM Zone 10 UTM Zone 11 **OR** Geographic (Latitude & Longitude)
Coordinates: _____

Habitat Description (plants & animals) plant communities, dominants, associates, substrates/soils, aspects/slope:
Animal Behavior (Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):
Dominant plant communities include desert saltbush scrub, disturbed, fallow agriculture, and fallow agriculture/saltbush re-growth.
Estimated 1500 individuals documented between 2 large populations within the survey area within desert washes.
Please fill out separate form for other rare taxa seen at this site.

Site Information Overall site/occurrence quality/viability (site + population): Excellent Good Fair Poor
Immediate AND surrounding land use: Active and former agricultural operation; existing solar energy development to the northwest of survey area.
Visible disturbances: Former and current agricultural activities.
Threats: _____
Comments: _____

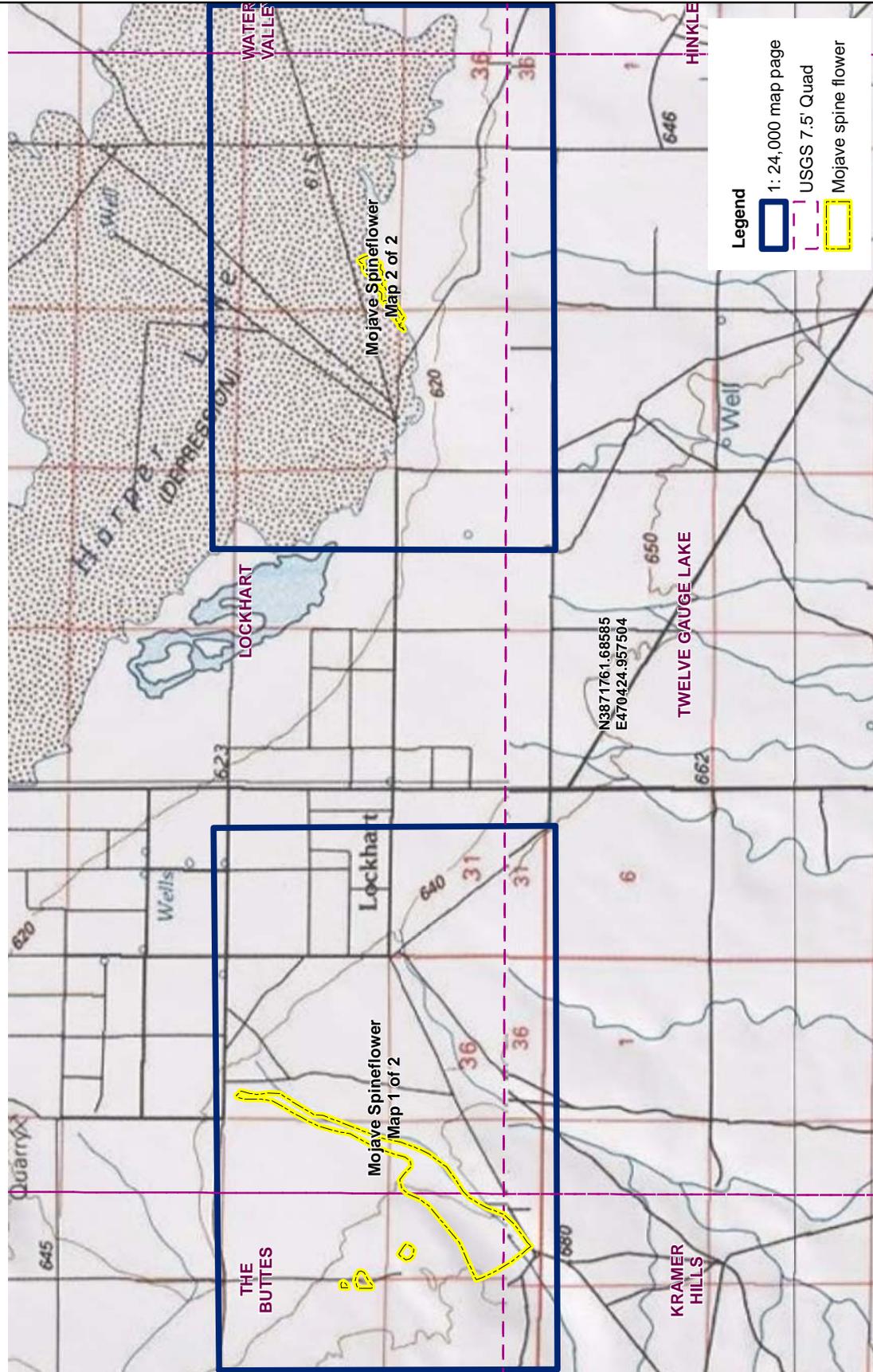
Determination: (check one or more, and fill in blanks)

Keyed (cite reference): _____
 Compared with specimen housed at: _____
 Compared with photo / drawing in: _____
 By another person (name): _____
 Other: _____

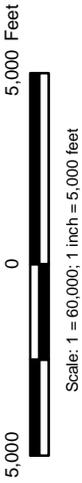
Photographs: (check one or more)

Slide	Print	Digital
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Plant / animal	<input type="checkbox"/>	<input type="checkbox"/>
Habitat	<input type="checkbox"/>	<input type="checkbox"/>
Diagnostic feature	<input type="checkbox"/>	<input type="checkbox"/>

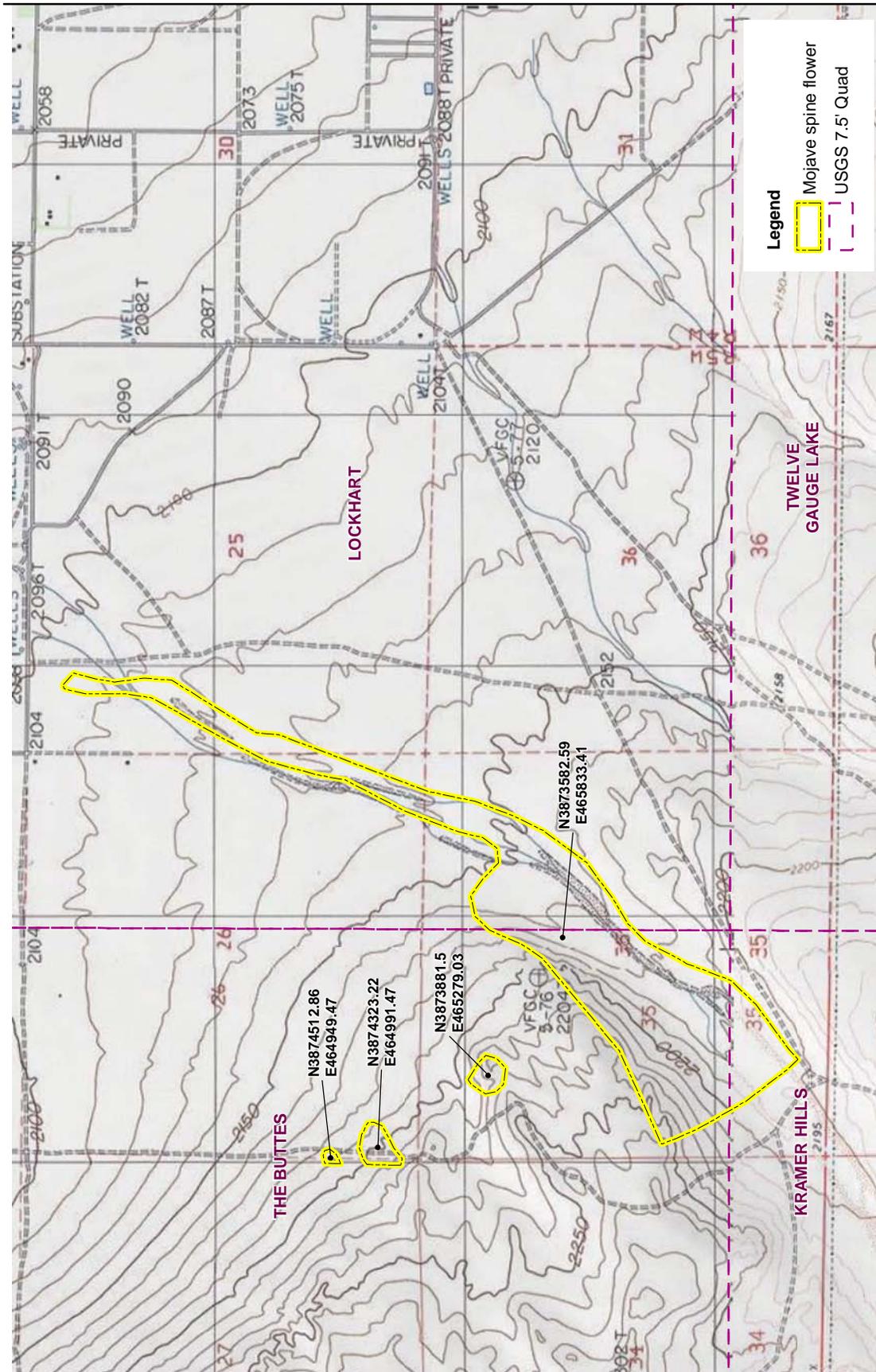
May we obtain duplicates at our expense? yes no



Source: EDAW 2008

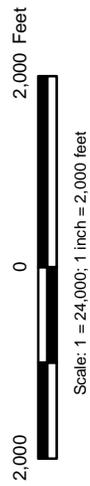


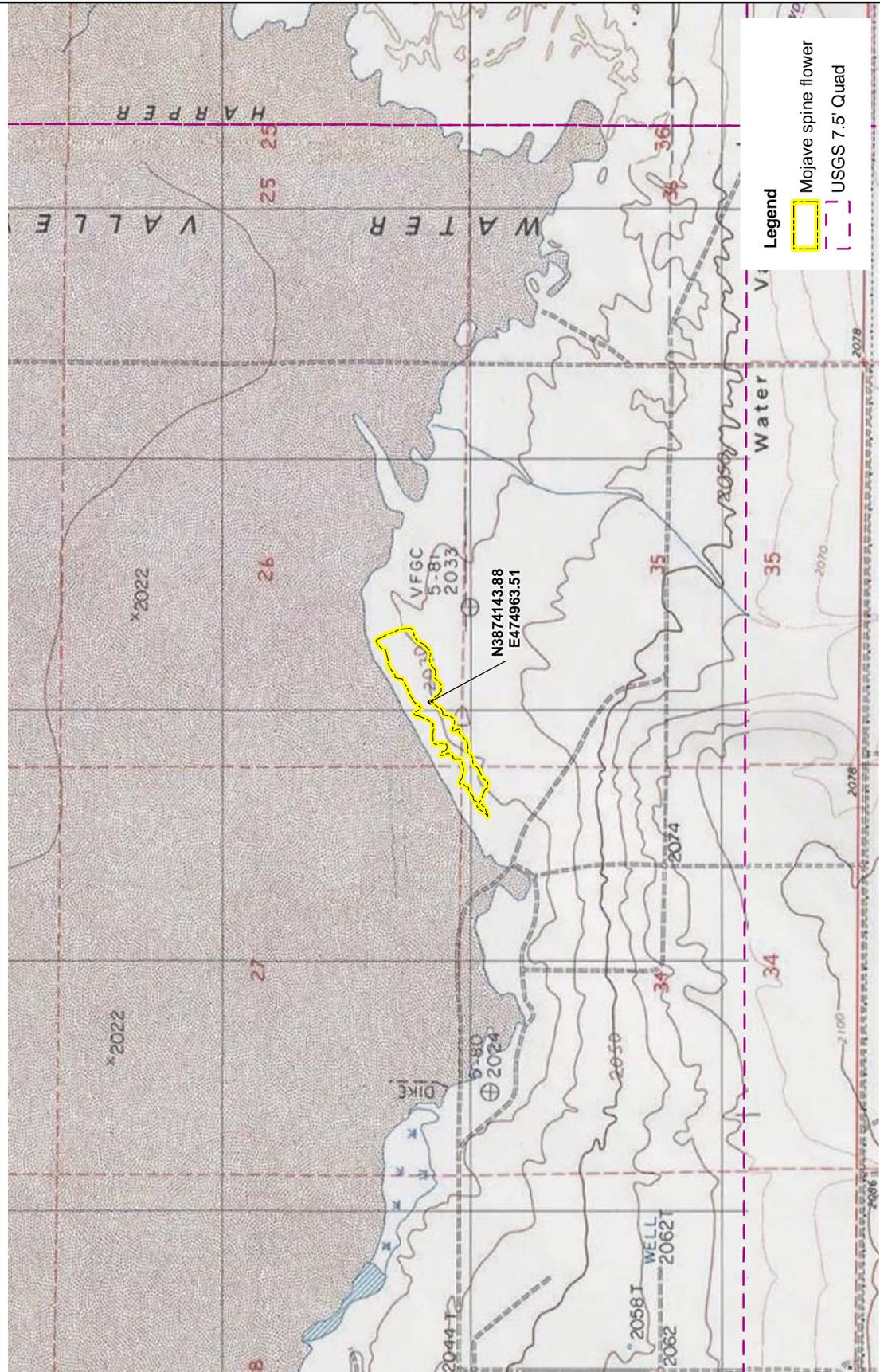
Mojave Spineflower Population



**Mojava Spineflower Population
Map 1 of 2**

Source: EDAW 2008





Mojave Spineflower Population
Map 2 of 2

Source: EDAW 2008

2,000 0 2,000 Feet

Scale: 1 = 24,000; 1 inch = 2,000 feet

Mail to:
California Natural Diversity Database
Department of Fish and Game
1807 13th Street, Suite 202
Sacramento, CA 95811
Fax: (916) 324-0475 email: CNDDDB@dfg.ca.gov

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EO Index No. _____ Map Index No. _____

Date of Field Work (mm/dd/yyyy): 05/22/2008

Reset

California Native Species Field Survey Form

Send Form

Scientific Name: Cymopterus deserticola

Common Name: Desert cymopterus

Species Found? Yes No _____ If not, why? _____
Total No. Individuals 1 Subsequent Visit? yes no
Is this an existing NDDDB occurrence? _____ no unk.
Yes, Occ. # _____
Collection? If yes: _____
Number _____ Museum / Herbarium _____

Reporter: Joshua Corona-Bennett
Address: 1420 Kettner Blvd., Suite 500
San Diego, CA 92101
E-mail Address: Joshua.Corona-Bennett@acem.com
Phone: (619) 233-1454

Plant Information

Phenology: _____% vegetative 100% flowering _____% fruiting

Animal Information

adults _____ # juveniles _____ # larvae _____ # egg masses _____ # unknown _____
 wintering breeding nesting rookery burrow site other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

County: San Bernardino Landowner / Mgr.: Mojave Solar, LLC
Quad Name: Lockhart Elevation: 2100 feet
T _____ R _____ Sec _____, _____ 1/4 of _____ 1/4, Meridian: H M S
Source of Coordinates (GPS, topo. map & type): GPS
T _____ R _____ Sec _____, _____ 1/4 of _____ 1/4, Meridian: H M S
GPS Make & Model Garmin 5 GPSMAP76S
DATUM: **NAD27** **NAD83** **WGS84**
Horizontal Accuracy 10 meters meters/feet
Coordinate System: UTM Zone 10 UTM Zone 11 **OR** Geographic (Latitude & Longitude)
Coordinates: _____

Habitat Description (plants & animals) plant communities, dominants, associates, substrates/soils, aspects/slope:

Animal Behavior (Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):

Dominant plant communities include desert saltbush scrub, disturbed, fallow agriculture, and fallow agriculture/saltbush re-growth.

Single individual documented within a small desert wash, south of Santa Fe Avenue.

Please fill out separate form for other rare taxa seen at this site.

Site Information Overall site/occurrence quality/viability (site + population): Excellent Good Fair Poor

Immediate AND surrounding land use: Active and former agricultural operation; existing solar energy development to the northwest of survey area.

Visible disturbances: Former and current agricultural activities.

Threats:

Comments:

Determination: (check one or more, and fill in blanks)

Keyed (cite reference): _____
 Compared with specimen housed at: _____
 Compared with photo / drawing in: _____
 By another person (name): _____
 Other: _____

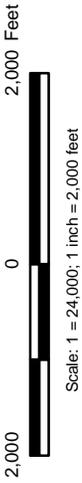
Photographs: (check one or more)

Slide	Print	Digital
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Plant / animal	<input type="checkbox"/>	<input type="checkbox"/>
Habitat	<input type="checkbox"/>	<input type="checkbox"/>
Diagnostic feature	<input type="checkbox"/>	<input type="checkbox"/>

May we obtain duplicates at our expense? yes no



Source: EDAW 2008



Desert Cymopterus
(All locations in UTM NAD 1927, Zone 11)

Mail to:
California Natural Diversity Database
Department of Fish and Game
1807 13th Street, Suite 202
Sacramento, CA 95811
Fax: (916) 324-0475 email: CNDDDB@dfg.ca.gov

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Elm Code _____ Occ. No. _____
EO Index No. _____ Map Index No. _____

Date of Field Work (mm/dd/yyyy): 04/07/2008

Reset

California Native Species Field Survey Form

Send Form

Scientific Name: Gopherus agassizii

Common Name: Desert Tortoise, Mojave Population

Species Found? Yes No _____ If not, why? _____
Total No. Individuals 41 Subsequent Visit? yes no
Is this an existing NDDDB occurrence? _____ no unk.
Yes, Occ. # _____
Collection? If yes: _____
Number _____ Museum / Herbarium _____

Reporter: Lyndon Quon
Address: 1420 Kettner Blvd., Suite 500
San Diego, CA 92101
E-mail Address: Lyndon.Quon@aecom.com
Phone: (619) 233-1454

Plant Information

Phenology: _____% vegetative _____% flowering _____% fruiting

Animal Information

<u>39</u> # adults	<u>2</u> # juveniles	_____ # larvae	_____ # egg masses	_____ # unknown	
<input type="checkbox"/> wintering	<input type="checkbox"/> breeding	<input type="checkbox"/> nesting	<input type="checkbox"/> rookery	<input checked="" type="checkbox"/> burrow site	<input type="checkbox"/> other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

County: San Bernardino Landowner / Mgr.: Mojave Solar, LLC
Quad Name: Lockhart Elevation: 2100 feet
T _____ R _____ Sec _____, _____ 1/4 of _____ 1/4, Meridian: H M S
Source of Coordinates (GPS, topo. map & type): GPS
T _____ R _____ Sec _____, _____ 1/4 of _____ 1/4, Meridian: H M S
GPS Make & Model Garmin 5 GPSMAP76S
DATUM: **NAD27** **NAD83** **WGS84**
Horizontal Accuracy 10 meters meters/feet
Coordinate System: UTM Zone 10 UTM Zone 11 **OR** Geographic (Latitude & Longitude)
Coordinates: _____

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*
Dominant plant communities include desert saltbush scrub, disturbed, fallow agriculture, and fallow agriculture/saltbush re-growth.
Live desert tortoise restricted primarily to desert scrub vegetation.
Please fill out separate form for other rare taxa seen at this site.

Site Information Overall site/occurrence quality/viability (site + population): Excellent Good Fair Poor
Immediate AND surrounding land use: Active and former agricultural operation; existing solar energy development to the northwest of survey area.
Visible disturbances: Former and current agricultural activities.
Threats: _____
Comments: _____

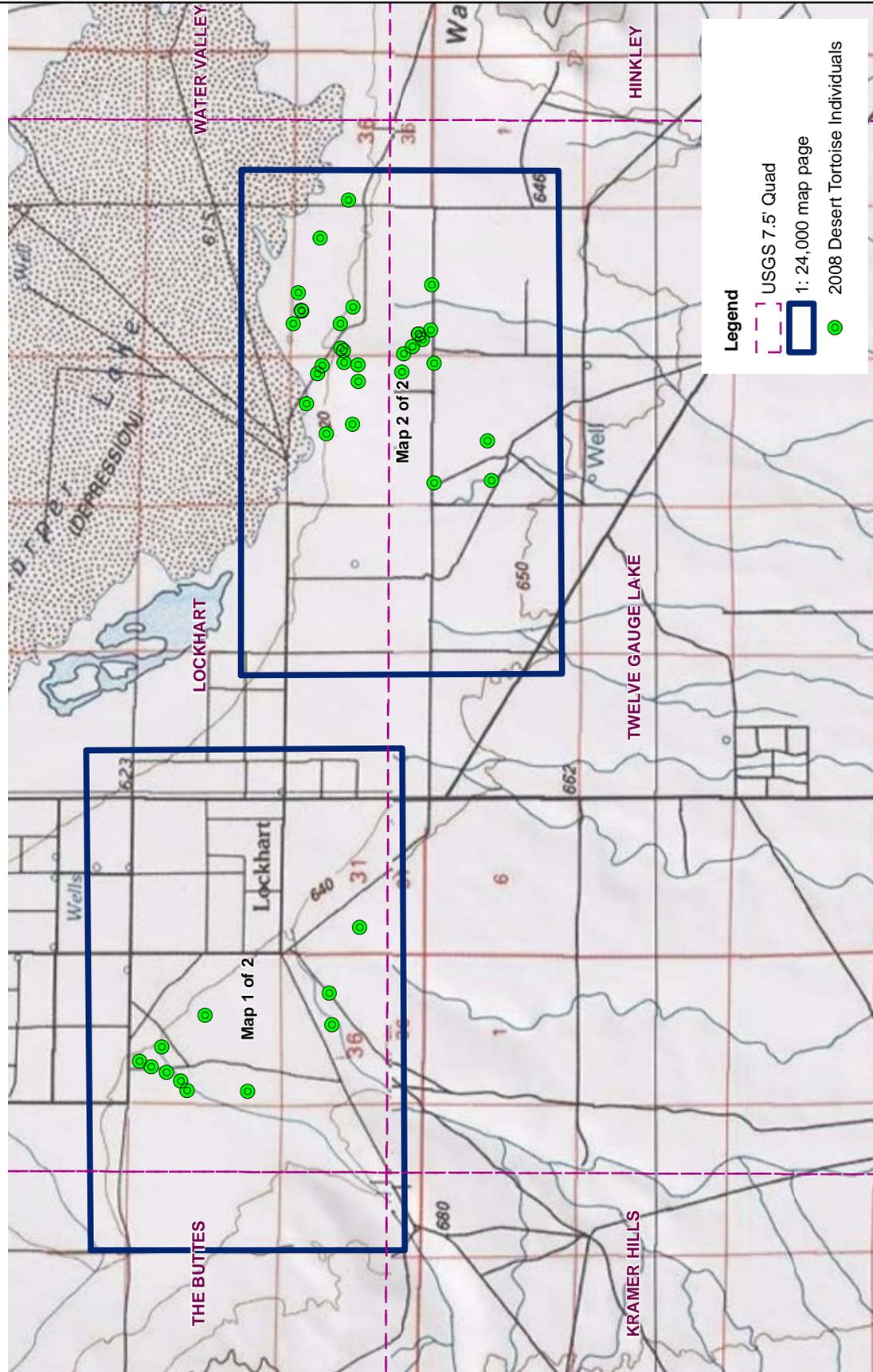
Determination: (check one or more, and fill in blanks)

Keyed (cite reference): _____
 Compared with specimen housed at: _____
 Compared with photo / drawing in: _____
 By another person (name): _____
 Other: _____

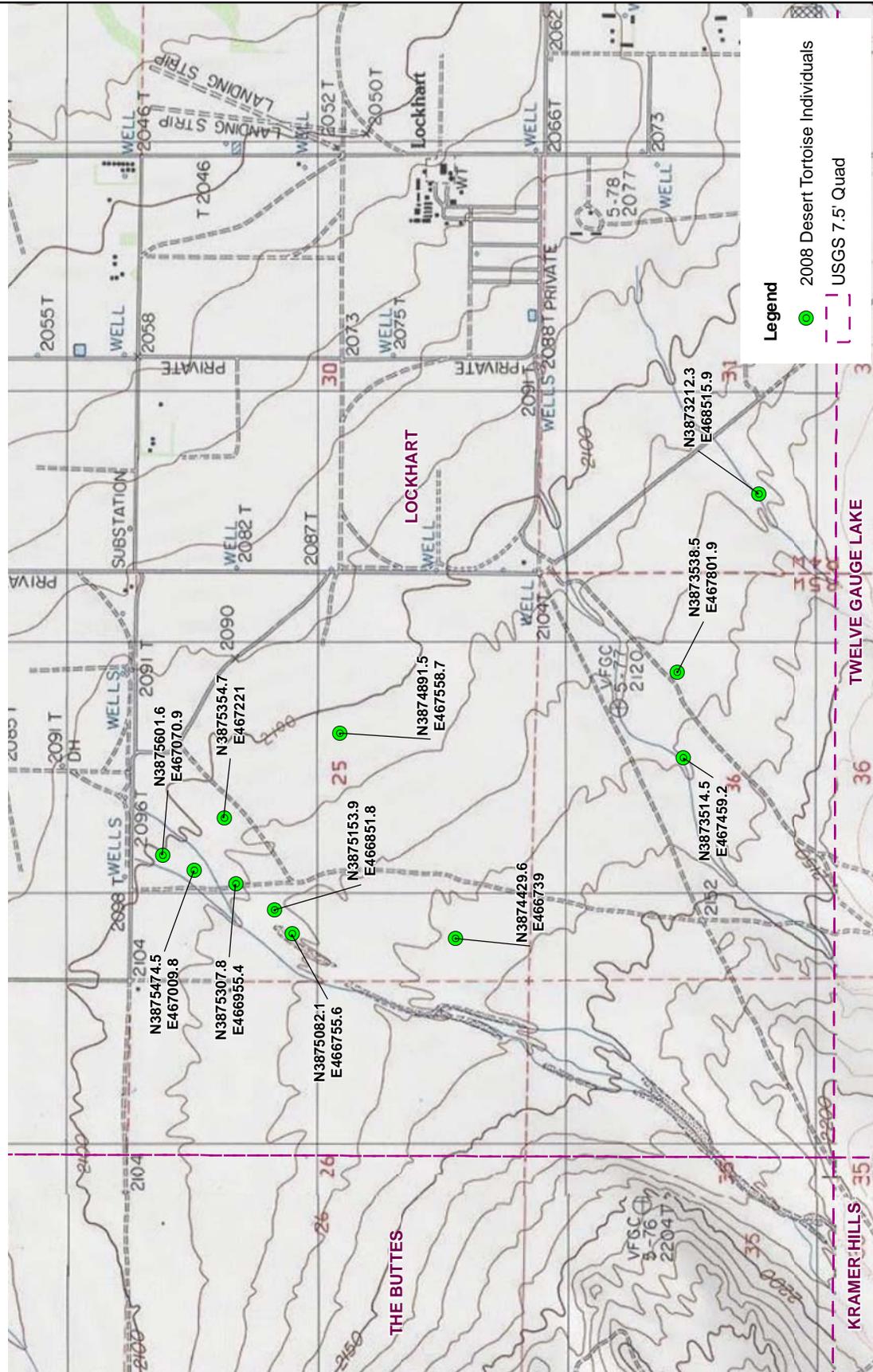
Photographs: (check one or more)

Slide	Print	Digital
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Plant / animal	<input type="checkbox"/>	<input type="checkbox"/>
Habitat	<input type="checkbox"/>	<input type="checkbox"/>
Diagnostic feature	<input type="checkbox"/>	<input type="checkbox"/>

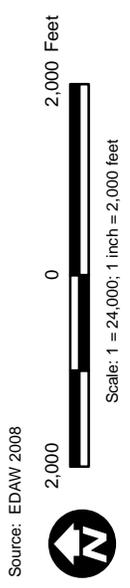
May we obtain duplicates at our expense? yes no

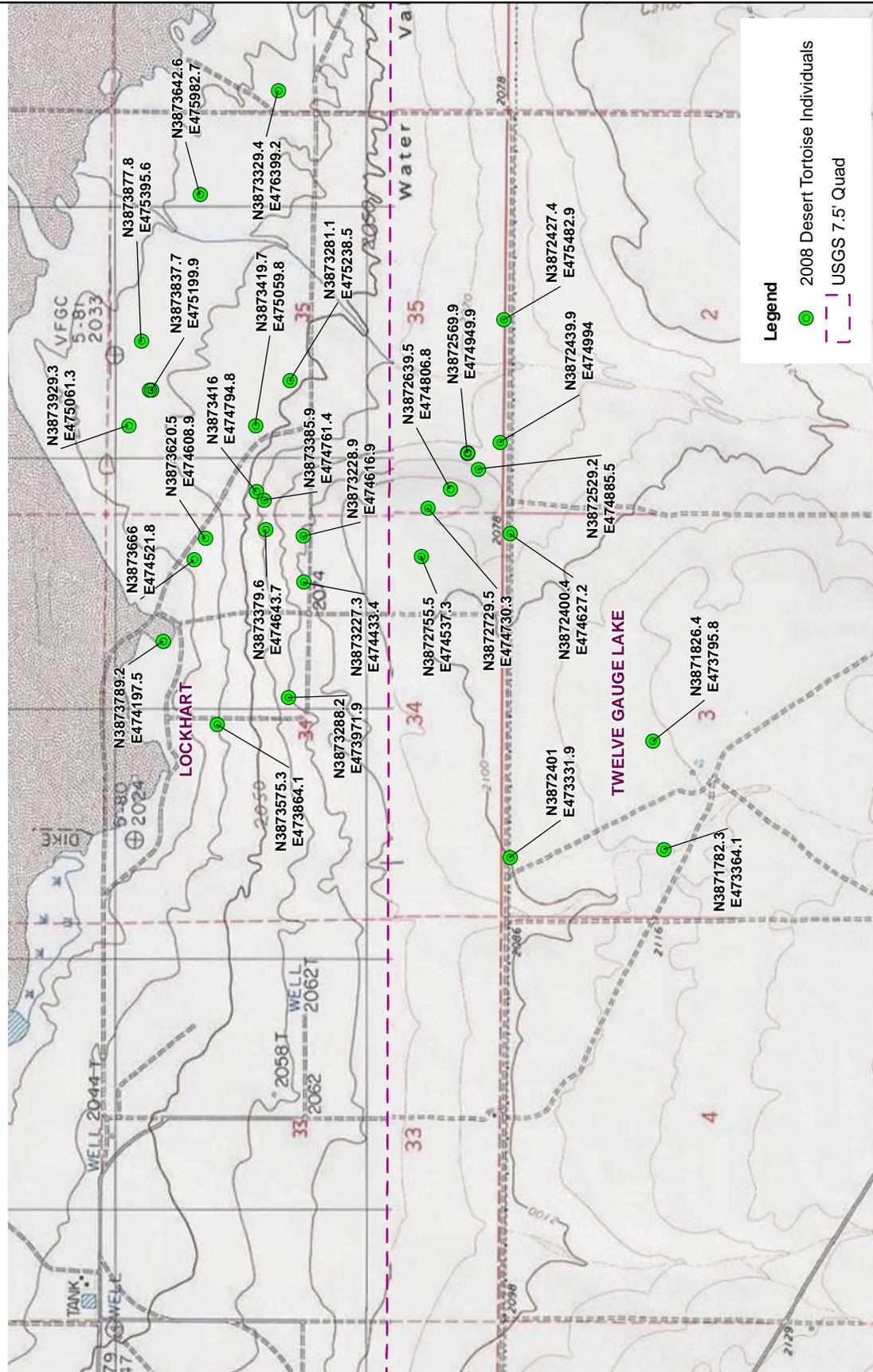


Desert Tortoise Observations

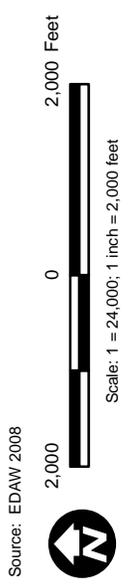


Desert Tortoise Observations
Map 1 of 2
 (All locations in UTM NAD 1927, Zone 11)





Desert Tortoise Observations
Map 2 of 2
(All locations in UTM NAD 1927, Zone 11)



Mail to:
California Natural Diversity Database
Department of Fish and Game
1807 13th Street, Suite 202
Sacramento, CA 95811
Fax: (916) 324-0475 email: CNDDDB@dfg.ca.gov

For Office Use Only

Source Code _____ Quad Code _____
Elm Code _____ Occ. No. _____
EO Index No. _____ Map Index No. _____

Date of Field Work (mm/dd/yyyy): 05/22/2008

Reset

California Native Species Field Survey Form

Send Form

Scientific Name: Sclerocactus polyancistrus

Common Name: Mojave fishhook cactus

Species Found? Yes No _____ If not, why? _____

Total No. Individuals 1 Subsequent Visit? yes no

Is this an existing NDDDB occurrence? _____ no unk.
Yes, Occ. # _____

Collection? If yes: _____
Number _____ Museum / Herbarium _____

Reporter: Joshua Corona-Bennett

Address: 1420 Kettner Blvd., Suite 500
San Diego, CA 92101

E-mail Address: Joshua.Corona-Bennett@acem.com

Phone: (619) 233-1454

Plant Information

Phenology: 100% vegetative _____% flowering _____% fruiting

Animal Information

adults # juveniles # larvae # egg masses # unknown
wintering breeding nesting rookery burrow site other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

County: San Bernardino Landowner / Mgr.: Mojave Solar, LLC

Quad Name: Lockhart Elevation: 2100 feet

T _____ R _____ Sec _____, _____ 1/4 of _____ 1/4, Meridian: H M S Source of Coordinates (GPS, topo. map & type): GPS

T _____ R _____ Sec _____, _____ 1/4 of _____ 1/4, Meridian: H M S GPS Make & Model Garmin 5 GPSMAP76S

DATUM: NAD27 NAD83 WGS84 Horizontal Accuracy 10 meters meters/feet

Coordinate System: UTM Zone 10 UTM Zone 11 **OR** Geographic (Latitude & Longitude)

Coordinates: _____

Habitat Description (plants & animals) plant communities, dominants, associates, substrates/soils, aspects/slope:

Animal Behavior (Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):

Dominant plant communities include desert saltbush scrub, disturbed, fallow agriculture, and fallow agriculture/saltbush re-growth.

Single individual documented within a small desert wash, south of Santa Fe Avenue. Individual was growing on a high-point of sandy but compacted soil within the middle of the wash.

Please fill out separate form for other rare taxa seen at this site.

Site Information Overall site/occurrence quality/viability (site + population): Excellent Good Fair Poor

Immediate AND surrounding land use: Active and former agricultural operation; existing solar energy development to the northwest of survey area.

Visible disturbances: Former and current agricultural activities.

Threats: _____

Comments: _____

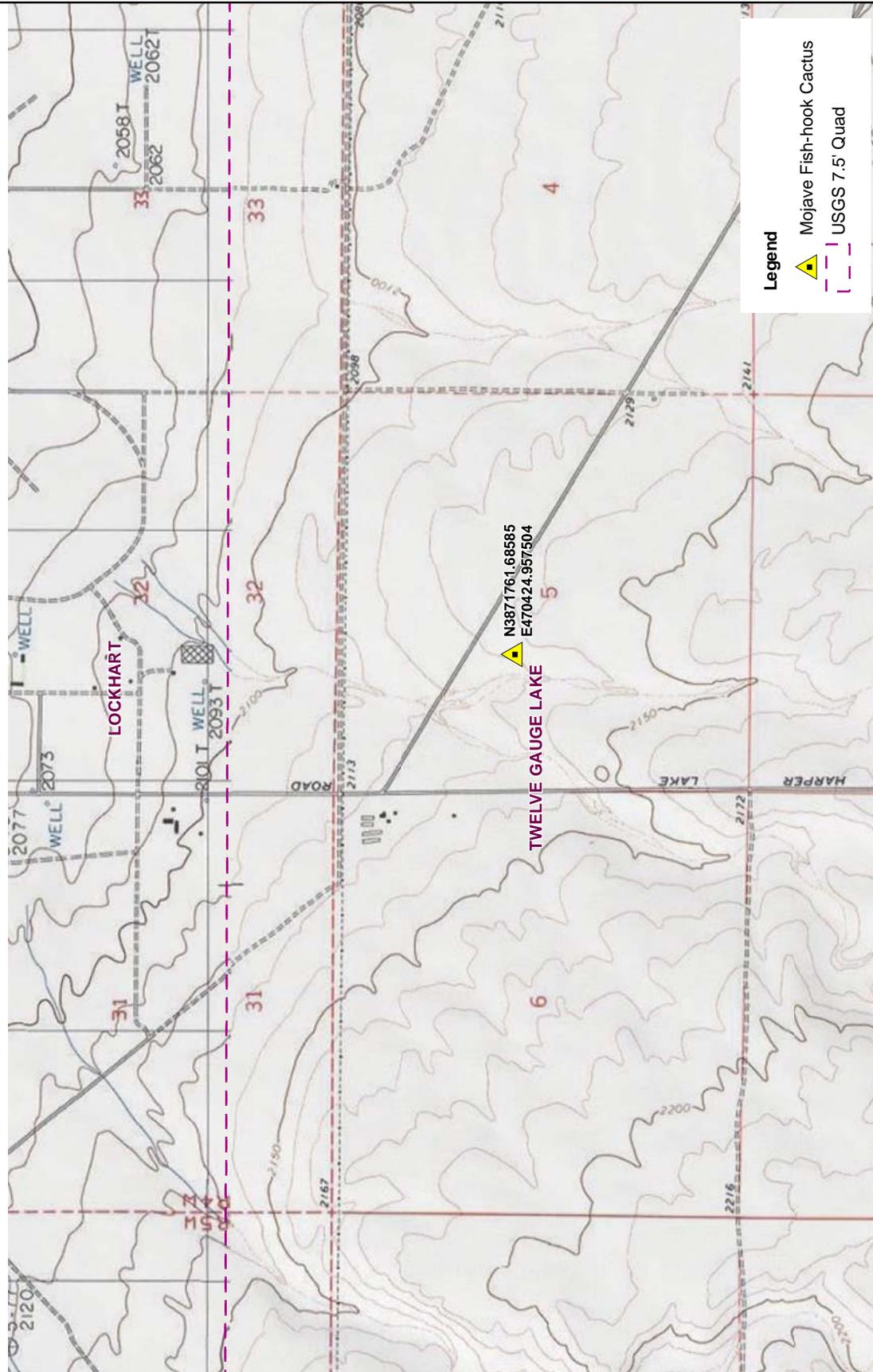
Determination: (check one or more, and fill in blanks)

- Keyed (cite reference): _____
- Compared with specimen housed at: _____
- Compared with photo / drawing in: _____
- By another person (name): _____
- Other: _____

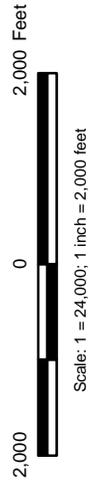
Photographs: (check one or more)

Slide	Print	Digital
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Plant / animal	<input type="checkbox"/>	<input type="checkbox"/>
Habitat	<input type="checkbox"/>	<input type="checkbox"/>
Diagnostic feature	<input type="checkbox"/>	<input type="checkbox"/>

May we obtain duplicates at our expense? yes no



Source: EDAW 2008



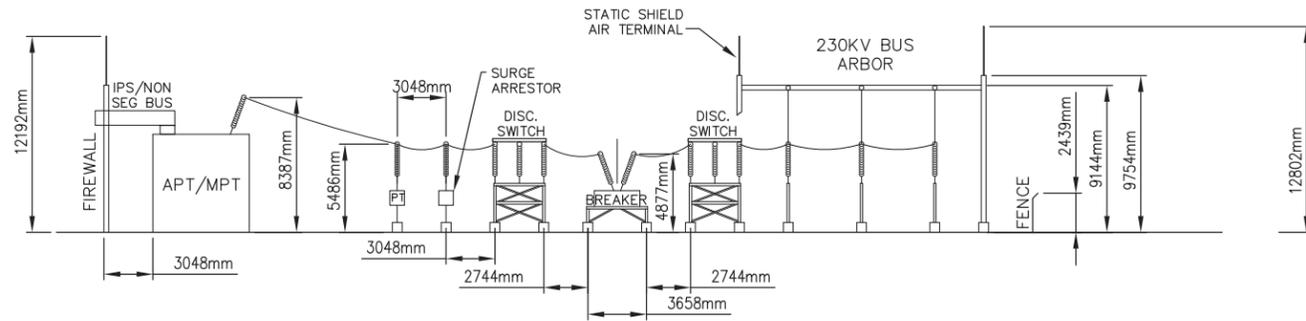
Mojave Fish-hook Cactus
(All locations in UTM NAD 1927, Zone 11)

Data Adequacy Supplement

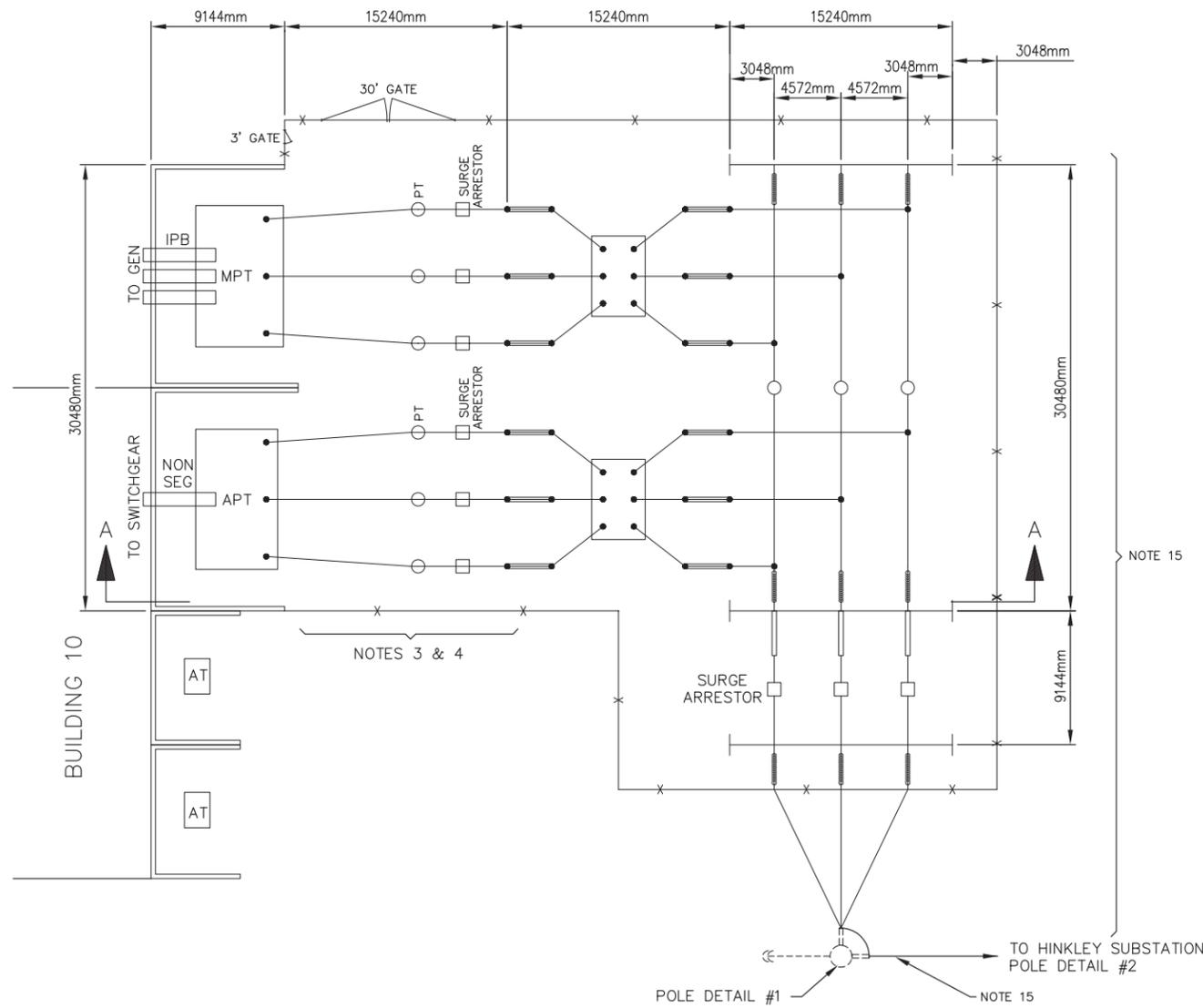
Attachment E

Transmission System Design

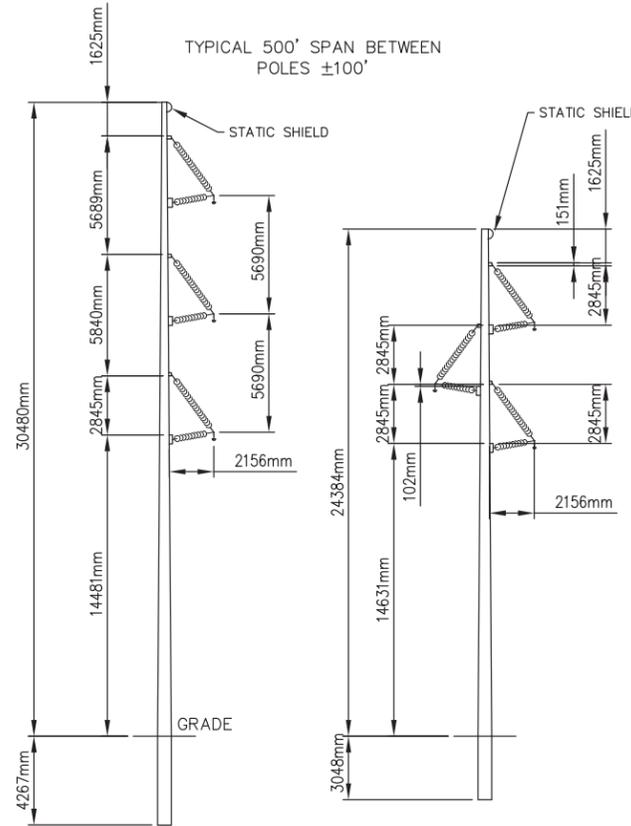
Part 1: Figures



SECTION A-A



PLAN VIEW



POLE DETAIL #1

POLE DETAIL #2

FOR INFORMATION ONLY

NOTES:

1. IPB ISOLATED PHASE BUS SHALL BE RATED 15KV, 8000 AMPS.
2. NON SEG BYS SHALL BE RATED 15KV, 1600 AMPS.
3. HIGH VOLTAGE CABLE FOR MPT SHALL MEET THE MINIMUM REQUIREMENTS OF SOUTHWIRE 477kcmil ACSR CABLE OR EQUIVALENT BETWEEN TRANSFORMER AND THE BREAKER.
4. HIGH VOLTAGE CABLE FOR APT SHALL MEET THE MINIMUM REQUIREMENTS OF SURAL ACSR I/O AWG THRU 397.5kcmil RANGE OR EQUIVALENT.
5. MPT TRANSFORMER RATED 165MVA @ 8% Z OR EQUIVALENT MINIMUM. SEE ATTACHED DATASHEET BY SIEMENS.
6. APT TRANSFORMER RATED 30MVA @ 8% Z OR EQUIVALENT MINIMUM. SEE ATTACHED DATASHEET BY SIEMENS.
7. SUBSTATION SPACING TOLERANCE: PHASE TO PHASE SPACING ARE WITHIN A TOLERANCE OF +/-3 FEET OR 920mm. ALL PHASE TO GROUND SPACING ARE WITHIN A TOLERANCE OF +/-2 FEET OR 610mm.
8. ALL HIGH VOLTAGE BREAKER SHALL BE EQUIVALENT TO SF6 TYPE, 245KV, 50KA, MINIMUM RATED. SEE MITSUBISHI DATA SHEET (200-SFMT-50F) FOR MINIMUM REQUIREMENTS.
9. ALL DISCONNECT SWITCHES SHALL BE EQUIVALENT TO A 1200 AMP, 245KV, 1050KV BIL, PER ATTACHED DATA SHEET AREVA.
10. VOLTAGE PROTECTION/METERING TYPE TRANSFORMERS SHALL BE EQUIVALENT TO ABB CPB 245. SEE ATTACHED DATASHEETS.
11. SURGE ARRESTORS SHALL BE EQUIVALENT TO ABB HS PEXLIM T-T 245KV. SEE ATTACHED DATASHEETS.
12. STATION POST INSULATORS SHALL BE EQUIVALENT TO LAPP 1050KV BIL STACKS. SEE ATTACHED DATASHEETS.
13. TRANSMISSION LINE INSULATORS SHALL BE EQUIVALENT TO LAPP HORIZONTAL VEE 230KV ASSEMBLIES. SEE ATTACHED DATASHEETS.
14. AUXILIARY TRANSFORMERS "AT" RATED 3MVA, 13.8KV-480V.
15. HIGH VOLTAGE CABLE FOR SUBSTATION BUS & TRANSMISSION LINE SHALL MEET THE MINIMUM REQUIREMENTS OF SOUTHWIRE 477kcmil ACSR CABLE OR EQUIVALENT.
16. ALL DESIGNS ARE PRELIMINARY AND PROVIDE MAXIMUM PROTECTION AND RELIABILITY FOR THE FACILITY. FINAL DESIGN OF THE SUBSTATION & TRANSMISSION LINE TO THE HINKLEY SUBSTATION SHALL PROVIDE AN EQUIVALENT LEVEL OF PROTECTION AND RELIABILITY AND CONTINUE TO MAINTAIN ADHERENCE TO LOCAL, STATE & NATIONAL CODES. SUBSTITUTIONS SHALL BE ALLOWED.

Figure 2-DA-1

ABENCS Abener Engineering and Construction Services, LLC ST. LOUIS, MISSOURI					
ABENGOA SOLAR					
ABENER DRAWING NUMBER XXXX-PLN-BBB-00-38-0105					
230KV SUBSTATION LAYOUT ALPHA/BETA SITE PLAN					
ABENGOA SOLAR			HARPER LAKE, CA		
DRAWN	BY	DATE	APP'D.	DATE	JOB NO.
JBC	JBC	11SEP10			120010
CHECKED					DRAWING NO.
					ED-R105
SCALE	NONE				
ISSUE DATE		PURPOSE OF ISSUE			

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ABENCS
Abener Engineering and Construction Services, LLC
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MAY NOT BE USED, REPRODUCED, OR REVEALED TO OTHERS EXCEPT IN ACCORDANCE
WITH THE TERMS OF A CONTRACT WITH OR OTHER WRITTEN PERMISSION OF Abener
Engineering and Construction Services, LLC. ANY REPRODUCTIONS IN WHOLE OR PART
INCLUDING SHOP DRAWINGS SHALL BEAR OR REFER TO THE STAMP.

NOTES:

1. ADDITIONAL COMPONENTS FOR METERING & PROTECTION WILL BE PROVIDED DURING DETAIL DESIGN.
2. HIGH VOLTAGE CABLE FOR MPT SHALL MEET THE MINIMUM REQUIREMENTS OF SOUTHWIRE 477kcmil ACSR CABLE OR EQUIVALENT BETWEEN TRANSFORMER AND THE BREAKER.
3. HIGH VOLTAGE CABLE FOR APT SHALL MEET THE MINIMUM REQUIREMENTS OF SURAL ACSR 1/0 AWG THRU 397.5kcmil RANGE OR EQUIVALENT.
4. HIGH VOLTAGE CABLE FOR SUBSTATION BUS & TRANSMISSION LINE SHALL MEET THE MINIMUM REQUIREMENTS OF SOUTHWIRE 477kcmil ACSR CABLE OR EQUIVALENT.
5. ALL DESIGNS ARE PRELIMINARY AND PROVIDE MAXIMUM PROTECTION AND RELIABILITY FOR THE FACILITY. FINAL DESIGN OF THE SUBSTATION & TRANSMISSION LINE TO THE HINKLEY SUBSTATION SHALL PROVIDE AN EQUIVALENT LEVEL OF PROTECTION AND RELIABILITY AND CONTINUE TO MAINTAIN ADHERENCE TO LOCAL, STATE & NATIONAL CODES. SUBSTITUTIONS SHALL BE ALLOWED.

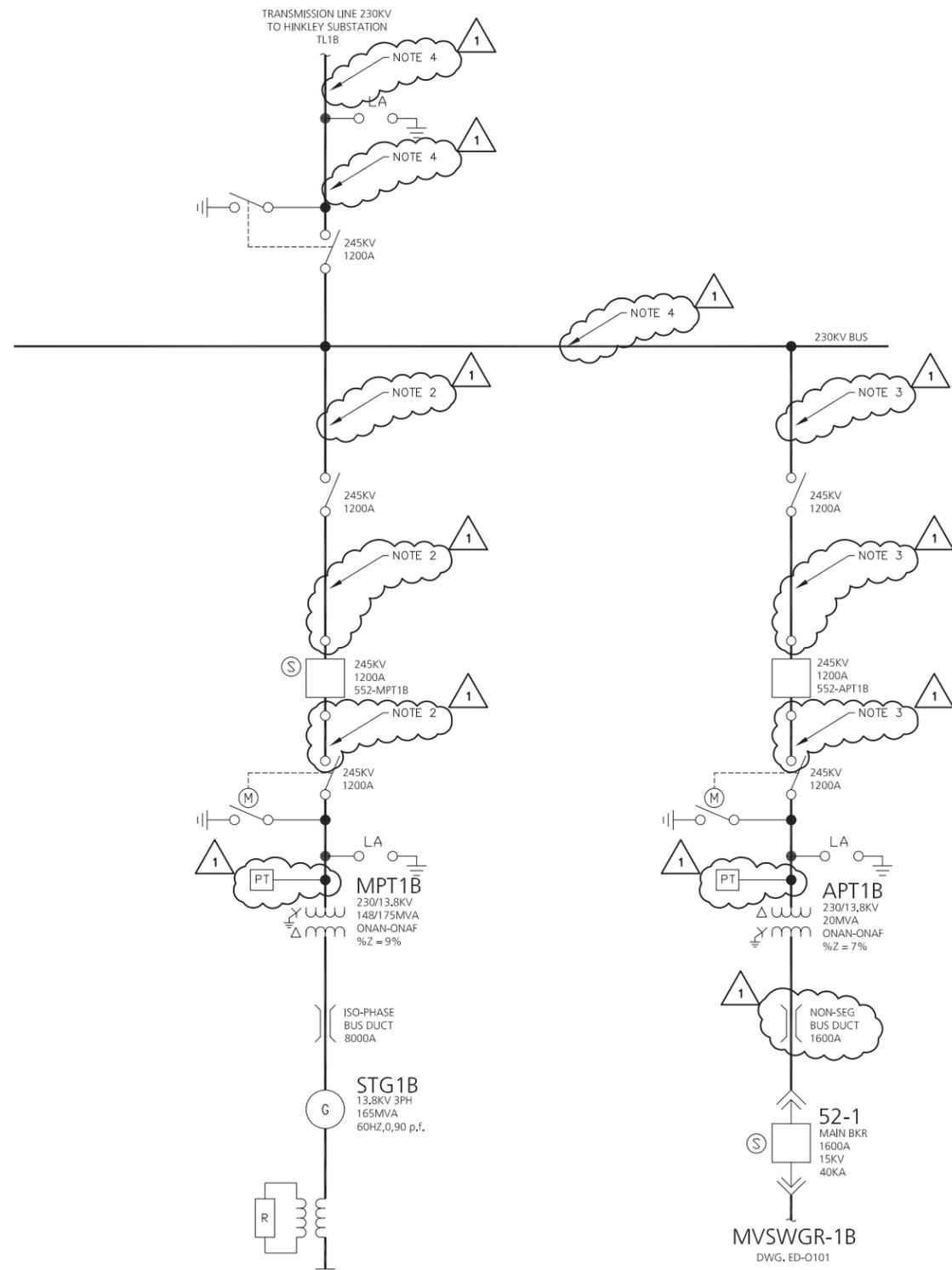


Figure 2-7(e)-DA

PRELIMINARY
DATE _____

ABENCS Abener Engineering and Construction Services, LLC ST. LOUIS, MISSOURI					
ABENGOA SOLAR					
ABENGOA SOLAR HARPER LAKE, CA					
ABENER DRAWING NUMBER XXXX-PLN-BBB-28-21-0106					
GENERAL ONE-LINE DIAGRAM 230KV SUBSTATION BETA SITE					
DRAWN	BY	DATE	APP'D.	DATE	JOB NO.
MKB		2/09	GDT		120010
CHECKED	BY	DATE	DATE	DRAWING NO.	
SDE/BLY		16FEB09	17FEB09	ED-0106	
SCALE	NONE				

NO.	DATE	DESCRIPTION	BY	BY	BY
1		ADDED NOTES, NOTE CALLOUTS, BUS DUCT & PTS			

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ABENCS
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FOR REVIEW
ISSUE DATE _____ PURPOSE OF ISSUE _____

Data Adequacy Supplement

Attachment E

Transmission System Design

Part 2: Supporting Documentation

11-9 ACSR/TW

ACSR/TW

Aluminum Conductor. Steel Reinforced.
Trapezoidal Shaped Aluminum Strands. Bare.



APPLICATIONS

Shaped Wire Compact Concentric-Lay-Stranded Aluminum Conductor, Steel-Reinforced(ACSR/TW) is designed for use as a bare overhead conductor. There are two designs of ACSR/TW. One design gives an equal area of aluminum when compared to the standard ACSR conductor sizes. The other design gives an overall outside diameter equal to standard ACSR conductor sizes. Use of this conductor in the equal area design allows equal ampacity in a smaller diameter conductor when compared with standard ACSR conductor. Use of this conductor in the equal diameter design allows more ampacity in an equal diameter conductor when compared with standard ACSR conductor.

SPECIFICATIONS

Southwire ACSR/TW conductor meets or exceeds ASTM specification:

- B-779 Shaped Wire Compact Concentric-Lay-Stranded Aluminum Conductors, Steel-Reinforced (ACSR/TW).

CONSTRUCTION

Aluminum alloy 1350-H19 trapezoidal shaped wires, concentrically stranded about a steel core. Core wire for ACSR/TW is available with class A, B, or C galvanizing; "aluminized" aluminum coated (AZ); or aluminum-clad (AW¹). Additional corrosion protection is available through the application of grease to the core or infusion of the complete cable with grease.

¹For aluminum-clad ACSR/TW, contact you Southwire representative.

ACSR/TW CONDUCTOR AREA EQUAL TO STANDARD ACSR SIZES																
Code Name	Conductor Size			Type Code	Stranding		Outside Diameter		Weight per 1000 ft.			Rated Strength (lbs.)	Resistance		Allowable Ampacities+	
	kcmil	Area (square ins.)			Alum.	Steel	Complete Conductor (ins.)	Steel Core (ins.)	Total	Alum.	Steel		Ohms/1000 ft.			
		Alum.	Total										DC @ 20°C	AC @ 75°C		
Merlin/TW	336.4	0.2642	0.2788	6	2	14	1x0.1367	0.630	0.1367	365.0	315.5	49.5	8560	0.0510	0.0625	508
Flicker/TW	477.0	0.3747	0.4233	13	2	18	7x0.0940	0.776	0.2820	612.8	448.4	164.4	17200	0.0357	0.0437	641
Hawk/TW	477.0	0.3746	0.4356	16	2	18	7x0.1053	0.789	0.3159	655.0	448.7	206.3	19400	0.0356	0.0435	645
Parakeet/TW	556.5	0.4371	0.4937	13	2	18	7x0.1015	0.835	0.3045	714.9	523.2	191.7	20000	0.0306	0.0375	706
Dove/TW	556.5	0.4371	0.5083	16	2	20	7x0.1138	0.852	0.3414	764.5	523.5	241.0	22600	0.0305	0.0374	711
Swift/TW	636.0	0.4995	0.5133	3	3	27	1x0.1329	0.850	0.1329	646.0	599.2	46.8	13500	0.0272	0.0335	750
Rook/TW	636.0	0.4995	0.5643	13	2	19	7x0.1085	0.890	0.3255	816.0	597.9	219.1	22900	0.0268	0.0329	766
Grosbeak/TW	636.0	0.4995	0.5808	16	2	20	7x0.1216	0.908	0.3648	873.5	598.4	275.1	25400	0.0267	0.0327	772
Tern/TW	795.0	0.6244	0.6675	7	2	17	7x0.0886	0.960	0.2658	892.0	745.9	146.1	21000	0.0215	0.0266	869
Puffin/TW	795.0	0.6244	0.6919	10	2	18	7x0.1108	0.980	0.3324	975.3	746.9	228.4	25900	0.0215	0.0264	876
Condor/TW	795.0	0.6244	0.7053	13	2	20	7x0.1203	0.993	0.3639	1021.0	747.2	273.8	28200	0.0214	0.0264	880
Drake/TW	795.0	0.6244	0.7261	16	2	20	7x0.1360	1.010	0.4080	1092.0	747.8	344.2	31800	0.0213	0.0263	887
Phoenix/TW	954.0	0.7493	0.7876	5	3	30	7x0.0837	1.044	0.2511	1032.0	901.6	130.4	23700	0.0181	0.0224	967
Rail/TW	954.0	0.7493	0.8011	7	3	32	7x0.0971	1.061	0.2913	1075.0	900.0	175.0	25900	0.0180	0.0224	973
Cardinal/TW	954.0	0.7493	0.8464	13	2	20	7x0.1329	1.084	0.3987	1226.0	897.3	328.7	33500	0.0178	0.0221	985
Snowbird/TW	1033.5	0.8117	0.8534	5	3	30	7x0.0871	1.089	0.2613	1115.0	973.8	141.2	25700	0.0167	0.0208	1017
Ortolan/TW	1033.5	0.8117	0.8678	7	3	32	7x0.1010	1.102	0.3030	1165.0	975.2	189.8	28100	0.0167	0.0207	1021
Curlew/TW	1033.5	0.8117	0.9169	13	2	20	7x0.1383	1.129	0.4149	1327.0	971.1	355.9	36300	0.0165	0.0204	1036

Ring Bus & Transmission Line Cable - MAT

ACSR/TW CONDUCTOR AREA EQUAL TO STANDARD ACSR SIZES																
Code Name	Conductor Size			Type Code	Stranding		Outside Diameter		Weight per 1000 ft.			Rated Strength (lbs.)	Resistance		Allowable Ampacities+	
	kcmil	Area (square ins.)			Alum.	Steel	Complete Conductor (ins.)	Steel Core (ins.)	Total	Alum.	Steel		Ohms/1000 ft.			
		Alum.	Total										DC @ 20°C	AC @ 75°C		
Avocet/TW	1113.0	0.8742	0.9191	5	3	30	7x0.0904	1.129	0.2712	1201.0	1048.9	152.1	27500	0.0155	0.0193	1063
Bluejay/TW	1113.0	0.8742	0.9347	7	3	33	7x0.1049	1.143	0.3147	1257.0	1052.2	204.8	30300	0.0155	0.0193	1069
Finch/TW	1113.0	0.8742	0.9851	13	3	38	19x0.0862	1.185	0.4310	1429.0	1052.6	376.4	39100	0.0154	0.0191	1084
Oxbird/TW	1192.5	0.9366	0.9848	5	2	30	7x0.0936	1.167	0.2808	1286.0	1123.0	163.0	29500	0.0144	0.0180	1111
Bunting/TW	1192.5	0.9366	1.0013	7	3	33	7x0.1085	1.181	0.3255	1343.0	1124.0	219.0	32400	0.0144	0.0181	1114
Grackel/TW	1192.5	0.9366	1.0554	13	3	38	19x0.0892	1.225	0.4460	1530.0	1127.0	403.0	41900	0.0144	0.0179	1130
Scissortail/TW	1272.0	0.9991	1.0505	5	3	30	7x0.0967	1.203	0.2901	1372.0	1198.0	174.0	31400	0.0135	0.0170	1152
Bittern/TW	1272.0	0.9990	1.0681	7	3	35	7x0.1121	1.220	0.3363	1433.0	1198.0	234.0	34600	0.0135	0.0170	1159
Pheasant/TW	1272.0	0.9990	1.1256	13	3	39	19x0.9210	1.264	0.4605	1632.0	1202.0	430.0	44100	0.0135	0.0168	1176
Dipper/TW	1351.0	1.0615	1.1348	7	3	35	7x0.1155	1.256	0.3465	1522.0	1274.0	248.0	36700	0.0127	0.0160	1202
Martin/TW	1351.0	1.0615	1.1959	13	3	39	19x0.0949	1.300	0.4745	1734.0	1278.0	456.0	46800	0.0127	0.0159	1219
Bobolink/TW	1431.0	1.1236	1.2017	7	3	36	7x0.1189	1.291	0.3567	1613.0	1350.0	263.0	38900	0.0120	0.0152	1243
Plover/TW	1431.0	1.1239	1.2664	13	3	37	19x0.0977	1.337	0.4885	1836.0	1353.0	483.0	49600	0.0120	0.0150	1262
Lapwing/TW	1590.0	1.2488	1.3351	7	3	36	7x0.1253	1.358	0.3759	1791.0	1499.0	292.0	42200	0.0183	0.0138	1323
Falcon/TW	1590.0	1.2488	1.4071	13	3	42	19x0.1030	1.408	0.5150	2040.0	1503.0	537.0	55100	0.0108	0.0136	1345
Chukar/TW	1780.0	1.3986	1.5120	8	3	37	19x0.0874	1.445	0.4370	2063.0	1676.0	387.0	50700	0.0096	0.0124	1420
Bluebird/TW	2156.0	1.0934	1.8312	8	4	64	19x0.0961	1.608	0.4805	2515.0	2047.0	468.0	61100	0.0080	0.0105	1586

+Ampacity calculated assuming: ambient 25°C, conductor 75°C, wind 2 ft./ sec., sun.

ACSR/TW CONDUCTOR DIAMETERS EQUAL TO STANDARD ACSR SIZES																
Code Name	Conductor Size			Type Code	Stranding			Outside Diameter		Weight per 1000 ft.			Rated Strength (lbs.)	Resistance		Allowable Ampacities+
	kcmil	Area (square ins.)			No. of Layers of Alum.	Alum.	Steel	Complete Conductor (ins.)	Steel Core (ins.)	Total	Alum.	Steel		Ohms/1000 ft.		
		Alum.	Total											DC @ 20°C	AC @ 75°C	
Monongahela/TW	405.1	0.3181	0.3362	6	2	14	1x0.1520	0.68	0.152	441	379.8	61.2	10200	0.0423	0.0519	569
Mohawk/TW	571.7	0.449	0.5074	13	2	18	7x0.1030	0.846	0.309	734.7	537.3	197.4	20700	0.0298	0.0365	718
Calumet/TW	565.3	0.4439	0.5165	16	2	18	7x0.1147	0.858	0.3438	714.8	523.1	191.7	22900	0.03	0.0368	718
Mystic/TW	666.6	0.5236	0.5914	13	2	20	7x0.1111	0.913	0.333	856.3	626.6	229.7	24000	0.0255	0.0314	790
Oswego/TW	664.8	0.5221	0.6072	16	2	20	7x0.1244	0.927	0.3732	913.4	625.4	288	26600	0.0255	0.0313	794
Nechako/TW	768.9	0.6039	0.622	3	3	27	1x0.1520	0.93	0.152	781.9	720.7	61.2	16400	0.0255	0.0278	843
Maumee/TW	768.2	0.6034	0.6819	13	2	20	7x0.1195	0.977	0.3585	987.8	722.1	265.7	27700	0.0222	0.0273	862
Wabash/TW	762.8	0.5992	0.6966	16	2	20	7x0.1331	0.99	0.3993	1047	717	330	30500	0.0222	0.0274	863
Kettle/TW	957.2	0.7518	0.8038	7	3	32	7x0.0973	1.06	0.2919	1079	902.8	176.2	26000	0.018	0.0223	974
Fraser/TW	946.7	0.7436	0.8168	10	3	35	7x0.1154	1.077	0.3462	1142	894	248	29600	0.018	0.0223	978
Columbia/TW	966.2	0.7589	0.8573	13	2	21	7x0.1338	1.092	0.4014	1241	908	333	34000	0.0176	0.0218	993
Suwannee/TW	959.6	0.7537	0.8762	16	2	22	7x0.1493	1.108	0.4479	1318	903	415	37000	0.0177	0.0218	996
Cheyenne/TW	1168.1	0.9175	0.9646	5	3	30	7x0.0926	1.155	0.2778	1260	1100.4	159.6	28900	0.0148	0.0185	1095
Genesee/TW	1158	0.9095	0.9733	7	3	33	7x0.1078	1.165	0.3234	1308	1092	216	31600	0.0149	0.0186	1095
Hudson/TW	1158.4	0.9098	1.0281	13	2	26	7x0.1467	1.196	0.4401	1489	1089	400	39600	0.0147	0.0183	1111
Catawba/TW	1272	0.9991	1.0505	5	3	30	7x0.0967	1.203	0.2901	1372	1198	174	31400	0.0135	0.017	1152
Nelson/TW	1257.1	0.9874	1.0557	7	3	35	7x0.1115	1.213	0.3345	1417	1185.7	231.3	34200	0.0137	0.0172	1150
Yukon/TW	1233.6	0.9689	1.0925	13	3	38	19x0.0910	1.245	0.455	1586	1166.5	419.5	42900	0.0139	0.0173	1154

ACSR/TW CONDUCTOR DIAMETERS EQUAL TO STANDARD ACSR SIZES																
Code Name	Conductor Size			Type Code	Stranding			Outside Diameter		Weight per 1000 ft.			Rated Strength (lbs.)	Resistance		Allowable Ampacities+
	kcmil	Area (square ins.)			No. of Layers of Alum.	Alum.	Steel	Complete Conductor (ins.)	Steel Core (ins.)	Total	Alum.	Steel		Ohms/1000 ft.		
		Alum.	Total											DC @ 20°C	AC @ 75°C	
Truckee/TW	1372.5	1.078	1.1334	5	3	30	7x0.1004	1.248	0.3012	1481	1293.4	187.6	33400	0.0126	0.0159	1206
Mackenzie/TW	1359.7	1.0679	1.1418	7	3	36	7x0.1559	1.259	0.3477	1530	1280	250	36900	0.0127	0.0159	1206
Thames/TW	1334.6	1.348	1.1809	13	3	39	19x0.0944	1.29	0.472	1713	1261.6	451.4	46300	0.0128	0.016	1210
St. Croix/TW	1467.8	1.1529	1.2124	5	3	33	7x0.1041	1.292	0.3123	1585	1383	202	35800	0.0117	0.0149	1256
Miramichi/TW	1455.3	1.143	1.2222	7	3	36	7x0.1200	1.302	0.36	1640	1372	268	39200	0.0118	0.015	1256
Merrimack/TW	1433.6	1.125	1.2677	13	3	39	19x0.0978	1.34	0.489	1840	1356	434	49700	0.0119	0.015	1264
Platte/TW	1569	1.2323	1.2957	5	3	33	7x0.1074	1.334	0.3222	1693	1478	215	38200	0.011	0.014	1306
Potomac/TW	1557.4	1.2232	1.3079	7	3	36	7x0.1241	1.345	0.3723	1755	1468	287	41900	0.0111	0.014	1307
Rio Grande/TW	1533.3	1.2043	1.3571	13	3	39	19x0.1012	1.382	0.506	1968	1449	519	53200	0.0112	0.0141	1316
Schuykill/TW	1657.4	1.302	1.392	7	3	36	7x0.128	1.386	0.384	1868	1563	305	44000	0.0104	0.0133	1356
Pecos/TW	1622	1.2739	1.4429	13	3	39	19x0.1064	1.424	0.532	2107	1533	574	57500	0.0106	0.0133	1363
Pee Dee/TW	1758.6	1.381	1.477	7	3	37	7x0.1319	1.427	0.3957	1982	1658	324	46700	0.0098	0.0126	1404
James/TW	1730.6	1.359	1.5314	13	3	34	19x0.1075	1.47	0.5375	2221	1636	585	59400	0.0099	0.0126	1415
Athabaska/TW	1949.6	1.5312	1.6377	7	3	42	7x0.1392	1.504	0.4176	2199	1838	361	51900	0.0088	0.0115	1491
Cumberland/TW	1926.9	1.5134	1.7049	13	3	42	19x0.1133	1.545	0.5665	2471	1821	650	65300	0.0089	0.0114	1507
Powder/TW	2153.8	1.6912	1.829	8	4	64	19x0.0961	1.602	0.4805	2498	2030	468	61100	0.008	0.0105	1584
Santee/TW	2627.3	2.063	2.2268	8	4	64	19x0.1062	1.762	0.531	3048	2477	571	74500	0.0066	0.0089	1768

+Ampacity calculated assuming: ambient 250C, conductor 75°C, wind 2 ft./sec., sun.



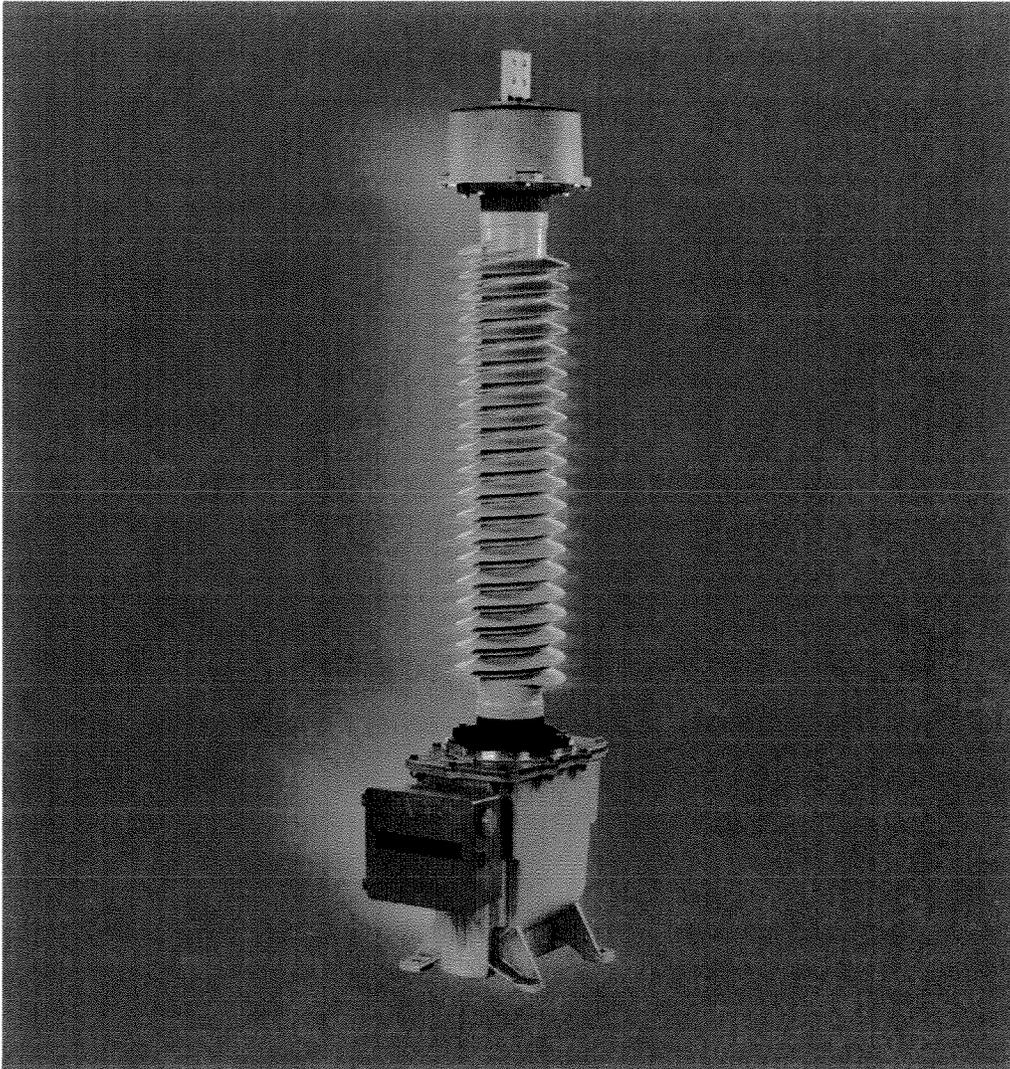
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IN ★ THE
USA**

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Capacitor Voltage Transformer CPB 72.5 - 245 kV

For outdoor installation



ABB

Design features and advantages

ABB's capacitor voltage transformers (CVTs) are intended for connection between phase and ground in net-works with isolated or grounded neutral.

ABB offers a world-class CVT with efficient ferro-resonance suppression and good transient response.

The design corresponds to the requirements of IEC and all national standards based on them.

Due to the design of the capacitor elements, described below, CPB is, with regard to accuracy, equivalent to inductive voltage transformers.

Capacitor Voltage Divider

The capacitor voltage divider (CVD) consists of a large number of series-connected, oil-insulated capacitor elements. The units are completely filled with synthetic oil, which is kept under a slight overpressure by the design of the expansion system. O-ring seals are used throughout the design.

The capacitor elements are designed with respect to the demands made by revenue metering, and their active component consists of aluminum foil, insulated with paper/polypropylene film, impregnated by a PCB-free synthetic oil, which has better insulating properties than normal mineral oil and is required for the mixed dielectric.

Electromagnetic Unit

The voltage divider and the electromagnetic unit are connected by internal bushings, which is necessary for applications with high accuracy.

The EMU has double-enameled copper windings and an iron core made of high quality steel sheet and is insulated in a hermetically sealed aluminum tank with mineral oil.

The primary coil is divided into a main winding, and a set of externally connected trimming windings. The nominal intermediate voltage is approximately $22/\sqrt{3}$ kV.

The electromagnetic unit have a reactor, which is connected in series between the voltage divider and the high voltage end of the primary winding. This reactor compensates for the shift in phase angle caused by the capacitive voltage divider. The inductive reactances are tuned individually on each transformer before accuracy testing.

Climate

These transformers are designed for, and are installed in widely varying conditions, from arctic to desert climates, on every continent.

Ferro-resonance

The low induction, combined with an efficient damping circuit, gives a safe and stable damping of ferro-resonance at all frequencies and voltages up to the rated voltage factor.

Life time

The low voltage stress within the capacitor elements ensures a safe product with an expected service life of more than 30 years.

Transient properties

The high intermediate voltage and high capacitance result in good transient properties.

Stray capacitance

The design with the compensating reactor on the high voltage side of the main winding ensures less than 200 pF stray capacitance, which is the most stringent requirement in the IEC standard for carrier properties.

Stability

The CPB have a high Quality Factor, as a result of their comparatively high capacitance, combined with a high intermediate voltage.

The Quality Factor = $C_{\text{equivalent}} \times U_{\text{intermediate}}^2$ is a measure of the accuracy stability and the transient response. The higher this factor, the better the accuracy, and the better the transient response.

Material

All external metal surfaces are made of an aluminum alloy, resistant to most known environment factors. Bolts, nuts, etc. are made of acid-proof steel. The aluminum surfaces do not normally need painting.

Creepage distance

As standard, CPB is offered with creepage distance 25 mm/kV phase-phase (IEC pollution class Heavy). Longer creepage distances can be offered on request.

Silicone Rubber Insulators

The complete CVT range is available with silicone rubber (SIR) insulators. Our SIR insulators are produced with a patented helical extrusion molding technique, which gives completely joint-free insulators with outstanding performance. All CVTs with this type of insulators have the same high creepage distance 25 mm/kV phase-phase, as porcelain.

Mechanical stability

The mechanical stability gives sufficient safety margin for normal wind loads and conductor forces.

Design features and advantages

Ferro-resonance damping circuit

All CVTs need to incorporate some kind of ferro-resonance damping, since the capacitance in the voltage divider, in series with the inductance of the transformer and the series reactor, constitutes a tuned resonance circuit.

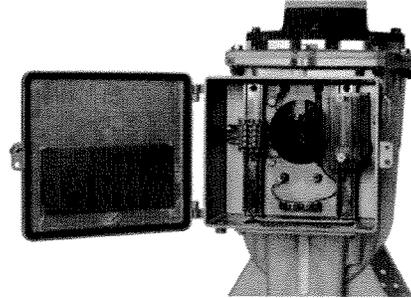
This circuit can be brought into resonance, that may saturate the iron core of the transformer by various disturbances in the network. This phenomenon can also overheat the electro-magnetic unit, or lead to insulation breakdown.

The CPB uses a damping circuit, connected in parallel with one of the secondary windings. The damping circuit consists of a reactor with an iron core, and an oil-cooled resistor in series. Under normal use, the iron core of the damping reactor is not saturated, yielding high impedance, so that practically no current is flowing through this circuit.

Rating plates

Corrosion resistant rating plates with text and wiring diagrams are used. General data can be found on the door of the terminal box, connection diagrams and secondary winding data on the inside.

Each capacitor unit is marked with measured capacitance at the top.



Secondary voltage and burdens

Standards IEC 60044-5

Rated data at 50 or 60 Hz, Voltage factor 1.5 or 1.9

The transformer normally has one or two windings for continuous load, and one earth-fault winding.

Other configurations can be offered according to requirements.

Approximate maximum total burdens in VA

Measuring winding		
Highest class	Voltage factor 1.5 ^{*)}	Voltage factor 1.9 ^{*)}
0.2	50	Available on request
0.5	100	
1.0/3P	200	
Earth-fault winding, irrespective of the voltage factor		
3P/6P	100	Available on request

^{*)} The IEC standards state as standard values for effectively earthed systems 1.5/30 sec. For systems without effective earthing with automatic earth fault tripping rated voltage factor 1.9/30 sec., and 1.9/8 hrs for systems with insulated neutral point without automatic earth fault tripping.

The above values are total maximum values for the secondary winding(s), voltage $100/\sqrt{3}$ or $110/\sqrt{3}$ V and one or no residual voltage winding, class 3P, intended for connection in open delta, voltage 100 or 110 ($100/3$ or $110/3$) V. For other configurations please consult us.

If the transformer has more than one continuously loaded winding, possibly with different classes, the table above must be applied to the sum of these burdens and the most accurate class.

Since the residual voltage winding is not loaded except during a fault, the effect of its load on the accuracy of the other windings is disregarded in accordance with IEC.

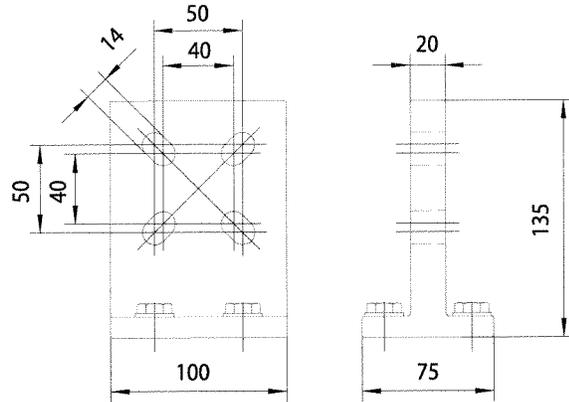
Stated values should only be considered as maximum values. Please note that modern meters and protection require much lower burdens than those above, and to achieve best accuracy you should avoid specifying burdens higher than necessary.

Primary terminal

CPB is normally delivered with a flat 4-hole aluminum pad, suitable for bolts with C-C from 40 to 50 mm and for connecting normal aluminum cable clamps. Other primary terminals can be offered on request, such as a round aluminum studs, $\varnothing=30$ mm.

Test forces at the primary terminal as per IEC 60044-5 clause 7.6:

72 kV:	500 N
123-170 kV:	1000 N
245 kV:	1250 N



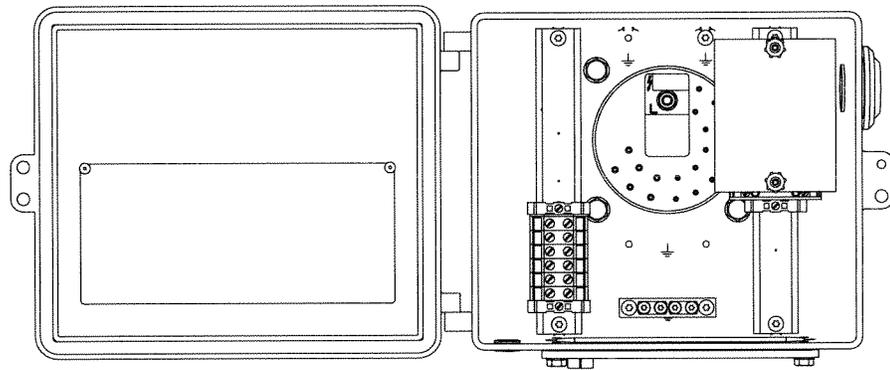
Secondary terminal box and secondary terminals

The transformer is equipped with a secondary terminal box, protection class IP55. This box is equipped with a detachable, undrilled gland plate, which on installation can be drilled for cable bushings. It is also provided with a drain. The terminal box have space for fuses or micro circuit breakers.

The secondary terminals normally consist of Phoenix standard terminal blocks for wire cross-section 10 mm².

In the terminal box are also terminals (d1-d2) for damping circuit, terminals for the adjustment windings (B1 to B10) and the capacitor low voltage terminal "L" (for power line carrier equipment).

Terminals d1 - d2 and B1 - B10 are intended for factory settings and thus located behind a sealed covering hood to prevent inadvertent reconnection.



**Standard terminal box
without accessories**

**The "L" terminal must always be grounded
if no carrier equipment is connected.**

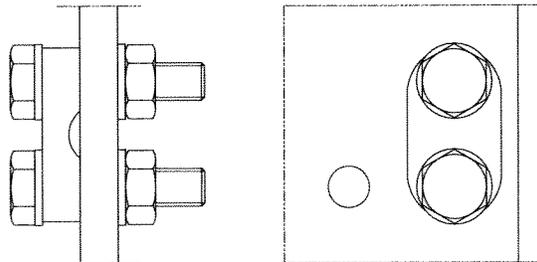


Ground terminals

The transformer is normally equipped with a ground clamp with a cap of nickel-plated brass, for conductors 8-16 mm (area 50-200 mm²), which can be moved to either mounting foot.

A stainless steel bar, 80 x 145 x 8 mm, can be quoted on request. The bar can be supplied undrilled or drilled according to IEC or NEMA standards.

Grounding terminals for the secondary circuits are placed inside the terminal box.



Design data according to IEC

Number of capacitor units, capacitance, flashover and creepage distance

Type	Number of capacitor units	Standard capacitance	Normal insulator (minimum values)			Insulator with extra long creepage distance (minimum values)
			Flashover distance Polymer/Porcelain	Creepage distance	Protected creepage distance	
			pF (+10; -5%)	mm	mm	
CPB 72	1	18200	680/660	1813	800	Offered on request. Normally insulator as for the nearest higher voltage
CPB 123	1	11200	1025/1005	3075	1300	
CPB 145	1	9100	1235/1215	3625	1600	
CPB 170	1	7800	1445/1425	4250	1900	
→ CPB 245	1	5600	2005/1985	6125	2700	Not available

Test voltages: IEC 60044-5

Type	Highest voltage for equipment (U _m)	1min wet/dry	LIWL 1.2/50 μs	Switching impulse 250/2500 μs	PD test voltage	Max. PD level	RIV test voltage	RIV level
	kV	kV	kV	kV	kV	pC ^{*)}	kV Max.	μV
CPB 72	72.5	140/140	325	-	1.2 x U _m	10	-	-
CPB 123	123	230/230	550	-	1.2 x U _m	10	78	≤ 2500
CPB 145	145	275/275	650	-	1.2 x U _m	10	92	≤ 2500
CPB 170	170	325/325	750	-	1.2 x U _m	10	108	≤ 2500
→ CPB 245	245	460/460	1050	-	1.2 x U _m	10	156	≤ 2500

Test voltages above are valid for altitudes ≤ 1000 meters above sea level.

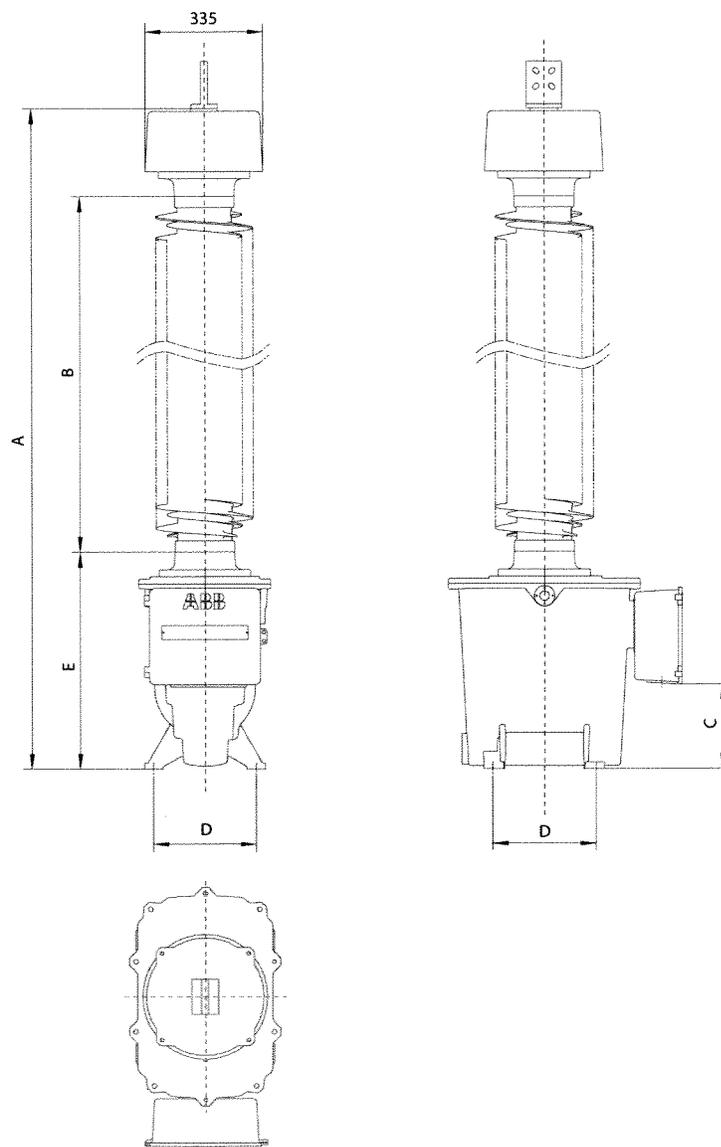
*) 5 pC at test voltage 1.2 x U_m/√3

Dimensions

Capacitor Voltage Transformer CPB

Type	Number of capacitor units	A	B	C	D	E
		Total height ^{*)}	Flashover distance	Height to flange	Mounting hole distance	Ground level height
		mm	Polymer/Porcelain mm	mm	mm	Polymer/Porcelain mm
CPB 72	1	1580	680/660	225	335	640/650
CPB 123	1	1925	1025/1005	225	335	640/650
CPB 145	1	2135	1235/1215	225	335	640/650
CPB 170	1	2345	1445/1425	225	335	640/650
CPB 245	1	2905	2005/1985	225	335	640/650

^{*)} Primary terminal excluded.



Estimated shipping data

Capacitor Voltage Transformers CPB

Type	Net weight incl. oil		Shipping weight		Shipping dimensions	Shipping volume
	Polymer/Porcelain	Oil	Polymer/Porcelain	Oil	L x W x H	Total
	kg	kg	kg	kg	m	m ³
CPB 72	185/215	41	720/750 ¹⁾		1.67 x 0.94 x 1.85 ¹⁾	2.5 ¹⁾
CPB 123	195/241	42	770/816 ¹⁾		1.67 x 0.94 x 2.19 ¹⁾	2.8 ¹⁾
CPB 145	200/256	42	785/841 ¹⁾		1.67 x 0.94 x 2.46 ¹⁾	3.1 ¹⁾
CPB 170	205/270	44	359/424 ²⁾		3.18 x 0.65 x 1.05 ²⁾	2.17 ²⁾
→ CPB 245	225/315	45	425/515 ²⁾		3.32 x 0.65 x 1.05 ²⁾	2.27 ²⁾

1) Vertical 3-pack

2) Horizontal 1-pack

Installation and maintenance

Unpacking

Please check the crates and their contents for damage during transportation upon receipt. Should there be any damage, please contact ABB for advice before the goods are handled further. Any damage should be documented (photographed).

Assembly

The electromagnetic unit and the capacitor voltage divider are delivered as one unit.

Maintenance

The CPB is designed for a service life of more than 30 years, and is practically maintenance-free. We recommend however the following checks and measures.

• Visual check

We recommend a periodic inspection, to check for oil leakages and also to inspect the insulator for collection of dirt.

• Control measurements of the CVD

Since the voltage divider is permanently sealed under slight over pressure it is not possible to take oil samples from it. Under normal service conditions, no noticeable ageing will occur within the capacitors (verified by ageing tests). However discrepancies between the secondary voltages in parallel phases can be an indication of a fault in a capacitor part of one of the voltage transformers, which is why such a comparison is recommended. In such a case a further measurement of the capacitance value is recommended. Readings can be taken between the top and the "L" terminal in the secondary terminal box.

• Control measurements of the EMU

An easy test is to measure the insulation resistance in mega-ohms (max. test voltage 1,000 VDC) of the secondary windings.

Since the high voltage winding of the transformer is not capacitively graded, a measurement of the loss angle (tan delta) will give no significant result.

Environmental aspects

Impregnant

Both Faradol 810 (the synthetic oil in the voltage dividers), and Nynäs NYTRO 10 XN (the standard transformer oil in the electromagnetic unit) are free from PCB and other strongly harmful substances, and pose a low impact to the environment.

Destruction

After draining the oils, they can be burnt in an appropriate plant. In this respect, Faradol has similar combustion properties as normal mineral oil.

The disposal should be carried out in accordance with local legal provisions, laws and regulations.

The porcelain can be deposited after it has been crushed.

The metals in the electromagnetic unit and the housings of the voltage divider can be recycled. Aluminum parts are labeled with material specifications. In order to recycle the copper in the windings, the oil-saturated paper insulation should be burnt.

The aluminum in the capacitor elements, with their combination of foil, paper and polypropylene film, can be recycled after the insulation has been burnt; the plastic film will not emit any harmful substances during this process.



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NOTE! ABB AB is working continuously to improve the products. We therefore reserve the right to change designs, dimensions and data without prior notice.

High Voltage Surge Arresters
Buyer's Guide — Section HS PEXLIM T-T

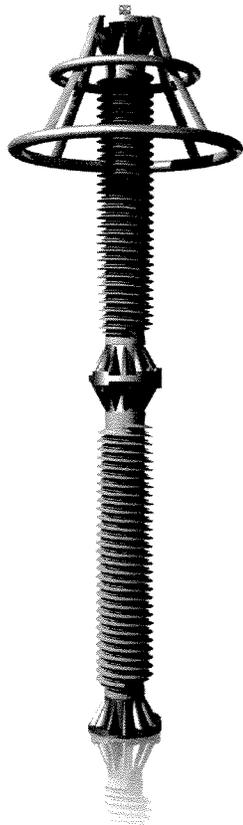
Zinc-Oxide Surge Arrester HS PEXLIM T-T

Protection of switchgear, transformers and other equipment in high voltage systems against atmospheric and switching overvoltages.

- in areas with very high lightning intensity
- where grounding or shielding conditions are poor or incomplete
- for important installations
- where energy requirements are very high (e.g. very long lines, capacitor protection).
- Specially suited to extreme seismic zones.

Superior where low weight, non-fragility and additional personnel safety is required.

Other data can be ordered on request. Please contact your local sales representative.



Brief performance data

System voltages (U_m)	245 - 800 kV
Rated voltages (U_r)	180 - 624 kV
Nominal discharge current (IEC)	10/15/20 kA _{peak}
Classifying current (ANSI/IEEE)	10/15 kA _{peak}
Discharge current withstand strength:	
High current 4/10 μ s	100 kA _{peak}
Low current 2000 μ s	2200 A _{peak}
Energy capability:	
Line discharge class (IEC)	Class 5
[2 impulses, (IEC Cl. 8.5.5)]	15.4 kJ/kV (U_r)
Fulfills/exceeds requirements of ANSI transmission-line discharge test for 362 kV systems.	
Short-circuit/Pressure relief capability	65 kA _{sym}
External insulation	Fulfills/exceeds standards
Mechanical strength:	
Specified long-term load (SLL)	19 000 Nm
Specified short-term load (SSL)	28 000 Nm
Service conditions:	
Ambient temperature	-50 °C to +45 °C
Design altitude	max. 1 000 m
Frequency	15 - 62 Hz

HS PEXLIM T-T

Guaranteed protective data

Max. system voltage U_m kV _{rms}	Rated voltage U_r kV _{rms}	Max. continuous operating voltage ¹⁾		TOV capability ²⁾		Max. residual voltage with current wave						
		as per IEC	as per ANSI/IEEE	1 s	10 s	30/60 μs			8/20 μs			
		U_c	MCOV			0.5 kA	1 kA	2 kA	5 kA	10 kA	20 kA	40 kA
		kV _{rms}	kV _{rms}	kV _{rms}	kV _{rms}	kV _{peak}	kV _{peak}	kV _{peak}	kV _{peak}	kV _{peak}	kV _{peak}	kV _{peak}
245	180	144	144	209	198	354	364	371	389	405	438	476
	192	154	154	218	207	369	380	387	406	423	457	497
	216	156	174	246	233	415	427	435	457	476	514	559
	228	156	180	259	246	438	451	459	482	502	542	590
300	228	182	182	259	246	438	451	459	482	502	542	590
	240	191	191	273	258	461	475	484	507	528	571	621
362	258	206	209	310	293	523	538	548	575	599	647	704
	264	211	212	310	293	523	538	548	575	599	647	704
	276	221	221	314	297	531	546	556	583	608	656	714
380	288	230	230	328	310	554	569	580	609	634	685	745
400	300	240	240	342	323	577	593	604	634	660	713	776
420	330	264	267	378	358	638	656	669	702	731	789	859
	360	267	291	410	388	692	712	725	761	792	856	931
	390	267	315	444	420	750	771	786	824	858	927	1013
550	396	317	318	474	448	793	816	831	872	908	981	1072
	420	336	336	478	453	807	830	846	888	924	998	1091
	444	349	353	506	479	853	878	894	938	977	1060	1153
800	On request											

More detailed information on the TOV capability and the protective characteristics are given in Publ. 1HSM 9543 13-01en.

1) The continuous operating voltages U_c (as per IEC) and MCOV (as per ANSI) differ only due to deviations in type test procedures.
 U_c has to be considered only when the actual system voltage is higher than the tabulated.
 Any arrester with U_c higher than or equal to the actual system voltage divided by $\sqrt{3}$ can be selected.

2) With prior duty equal to the maximum single-impulse energy stress (10.0 kJ/kV (U_r)).

3) Arresters for system voltages 36 kV or below can be supplied, on request, when the order also includes arresters for higher system voltages.

Arresters with lower or higher rated voltages may be available on request for special applications.

HS PEXLIM T-T

Technical data for housings

Max. system voltage	Rated voltage	Housing	Creepage distance	External insulation				Dimensions						
				1.2/50 μ s dry	50 Hz wet (60s)	60 Hz wet (10s)	250/2500 μ s wet	Mass	A _{max}	B	C	D	Fig.	
U _m	U _r													
kV _{rms}	kV _{rms}		mm	kV _{peak}	kV _{rms}	kV _{rms}	kV _{peak}	kg	mm	mm	mm	mm		
→ 245	180-216	TH245	7150	1081	524	510	750	170	2310	600	-	300	1	
	228	TV245	9900	1500	700	700	1050	245	3495	600	-	300	2	
300	228-240	TV300	9900	1500	700	700	1050	260	3495	1600	800	1000	3	
362	258-276	TH362	9900	1500	700	700	1050	265	3495	1600	800	1000	3	
380	288	TH380	9900	1500	700	700	1050	270	3495	1600	800	1000	3	
400	300	TM400	9900	1500	700	700	1050	270	3495	1600	800	1000	3	
420	330	TH420	12100	1831	874	860	1275	300	4035	1600	800	1000	3	
	360	TH420	12100	1831	874	860	1275	300	4035	1200	800	600	3	
	390	TV420	14300	2162	1048	1020	1500	330	4575	1200	800	600	3	
550	396	TH550	14300	2162	1048	1020	1500	350	4890	2000	1000	1200	4	
	420	TH550	14300	2162	1048	1020	1500	350	4890	2000	1000	1200	4	
	444	TH550	14850	2250	1050	1050	1575	405	5540	2000	1000	1200	5	

) Sum of withstand voltages for empty units of arrester.

HS PEXLIM T-T

Technical data for housings

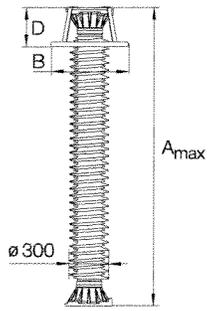


Figure 1

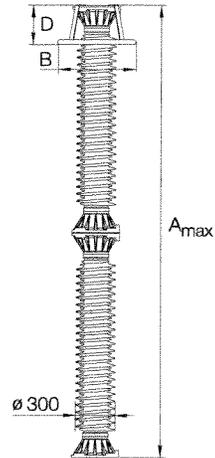


Figure 2

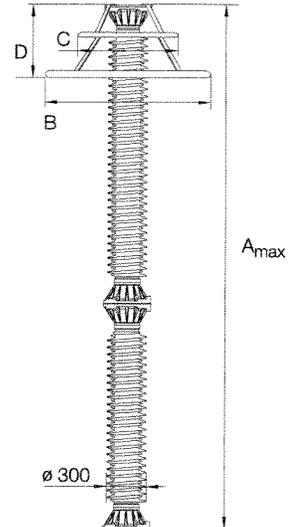


Figure 3

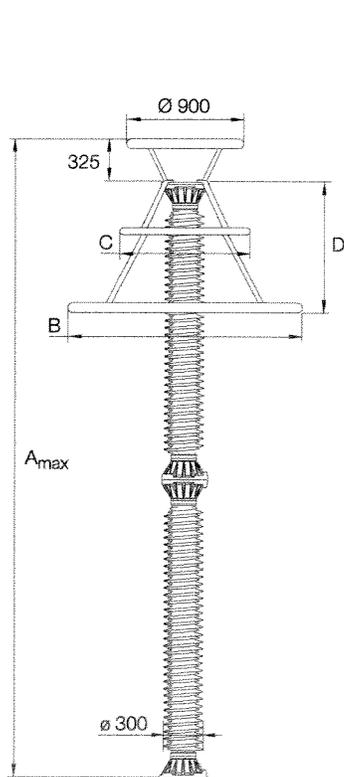


Figure 4

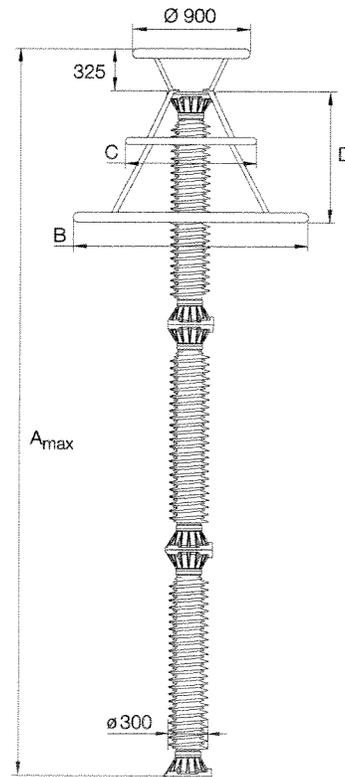
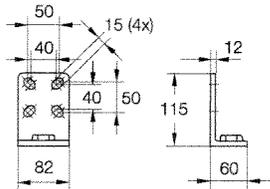


Figure 5

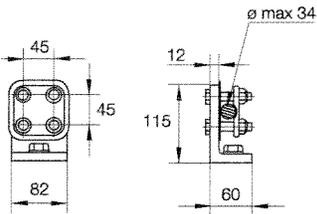
HS PEXLIM T-T

Accessories

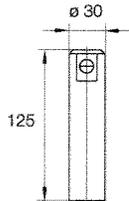
Line terminals



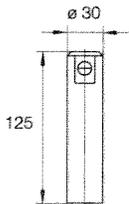
1HSA410 000-A
Aluminium



1HSA410 000-B
Aluminium flag with other
items in stainless steel

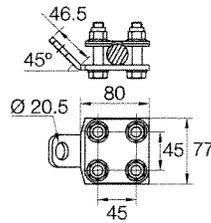


1HSA410 000-C
Aluminium

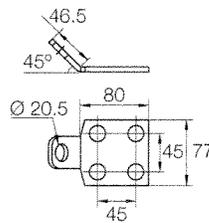


1HSA410 000-D
Aluminium

Earth terminals

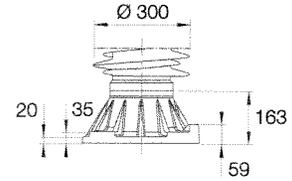
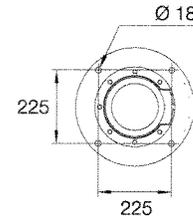


1HSA420 000-U
Stainless steel

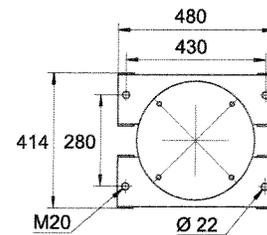
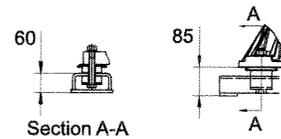


1HSA420 000-002
Stainless steel

Drilling plans



Without insulating base
Aluminium



Insulating base
1HSA430 000-P
Galvanized steel

M20 bolts for connection to
structure are not supplied by ABB.

HS PEXLIM T-T

Shipping data

Rated voltage U_r	Housing	Number of arresters per crate					
		One		Three		Six	
kV_{rms}		Volume	Gross	Volume	Gross	Volume	Gross
		m^3	kg	m^3	kg	m^3	kg
180	TH245	5.4	315	5.4	676	6.0	1262
192	TH245	5.4	316	5.4	680	6.0	1270
216	TH245	5.4	321	5.4	692	6.0	1295
228	TV245	2.6	340	4.3	893	-	-
228	TV300	2.8	405	5.3	1006	-	-
240	TV300	2.8	407	5.3	1011	-	-
258	TH362	2.8	411	5.3	1026	-	-
264	TH362	2.8	411	5.3	1026	-	-
276	TH362	2.8	412	5.3	1028	-	-
288	TH380	2.8	414	5.3	1033	-	-
300	TM400	2.8	416	5.3	1038	-	-
330	TH420	5.8	507	6.6	1163	-	-
360	TH420	5.2	452	5.5	1086	-	-
390	TV420	5.2	483	5.5	1179	-	-
396	TH550	6.7	611	6.7	1355	-	-
420	TH550	6.7	612	6.7	1357	-	-

Rated voltage U_r	Housing	Number of arresters per crate			
		One		Two	
kV_{rms}		Volume	Gross	Volume	Gross
		m^3	kg	m^3	kg
444	TH550	3.7	602	5.5	1054

Each crate contains a certain number of arrester units and accessories for assembly and erection. A packing list is attached externally on each crate.

Each separate crate is numbered and the numbers of all crates and their contents are listed in the shipping specifica-

tion. ABB reserves the right to pack arresters in the most effective/economic combination. Alternate or non-standard crates may involve additional charges.

The table above is to be seen as an approximation and specific data for deliveries may differ from the values given.

For more information please contact:

ABB AB

High Voltage Products

Surge Arresters

SE-771 80 Ludvika, Sweden

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Fax: +46 (0)240 179 83

E-Mail: arresters.div@se.abb.com

www.abb.com/arrestersonline

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NOTE! ABB AB is working continuously to improve the products. We therefore reserve the right to change designs, dimensions and data without prior notice.

Section of 1HSM 9543 12-00en Surge Arresters Buyer's Guide, Edition 7, 2009-06

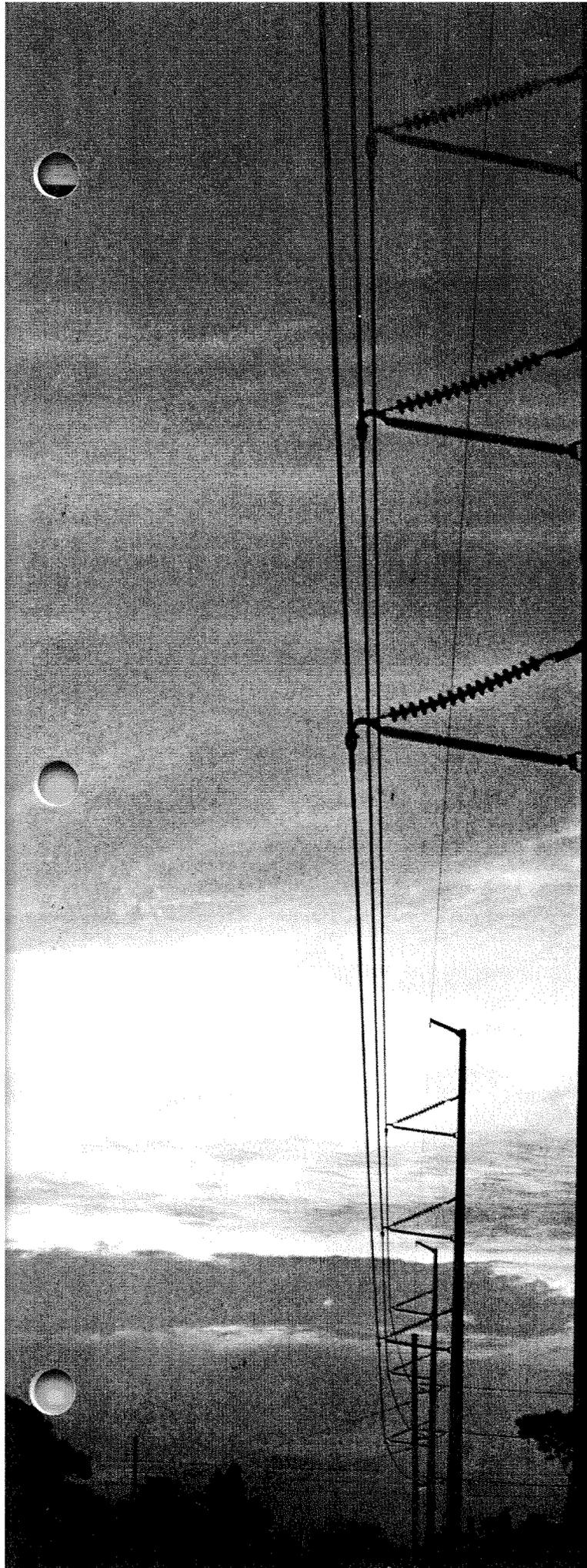


LAPP

HORIZONTAL VEE

COMPACT TRANSMISSION LINE DESIGN

115kV - 500kV

A black and white photograph of a transmission tower with multiple horizontal cross-arms and insulators. The tower is positioned on the left side of the frame. The background shows a vast, open landscape under a cloudy sky, with a body of water visible in the distance. The overall tone is industrial and serene.

CATALOG 606

**LAPP INSULATOR
LEROY, N.Y. 14482**

HORIZONTAL VEE APPLICATIONS

DESIGN CONSIDERATIONS

The Horizontal Vee assembly is completely articulated. It is free to rotate about the axis between the attachment point of the suspension string to the structure and the attachment point of the rigid insulator, or strut, to the structure. Should unbalanced longitudinal loads occur, for any reason, the insulator will tend to rotate about this axis. Since the strut is a tension or compression insulator only, the points of attachment to the structure are designed to provide freedom of movement, preventing both bending and torsional loading of the strut. Refer to Figure 1 below.

The axis of rotation is inclined at an angle from vertical at the hinge angle so that, when the assembly rotates, the line end rises. This provides a self-restoring force which is particularly helpful during construction and conductor stringing operations. In service, the conductor weight and tension stabilize the assembly in its normal position.

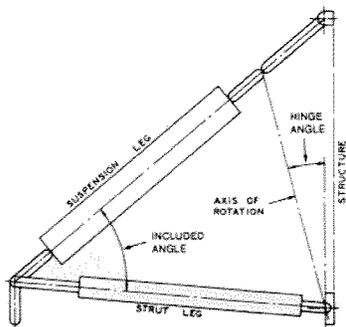


FIGURE 1

The line load is applied to the Horizontal Vee assembly at the point where the axes of the suspension string and the strut intersect. This prevents bending forces on the strut, particularly under unbalanced loading, either static or dynamic. Only tension loads can be transmitted to the suspension insulators, but alternately, both tension and compression loads can be applied to the strut insulators.

Rotational freedom is provided between the conductor and the insulator assembly by standard suspension fittings. If the conductor breaks, the Horizontal Vee assembly adjacent to the break will swing in line with the conductor, and act as a dead-end assembly.

All of the standard Horizontal Vee assemblies listed in this catalog have a 45° included angle. Experience has shown 45° to be an efficient angle for loading the insulator legs while, at the same time, minimizing the distance between the conductor and the structure. Assemblies with other angles can be provided.

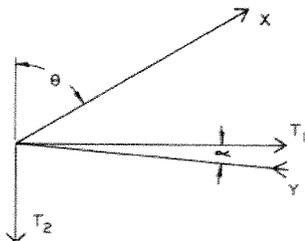


FIGURE 2

Figure 2 is a load diagram showing the division of externally applied loads into the two insulator legs. The relationship between these loads is expressed in the following formulae:

$$\begin{aligned} T_1 &= Y \cos \alpha - X \sin \theta \\ T_2 &= X \cos \theta + Y \sin \alpha \end{aligned}$$

where

$$\begin{aligned} T_2 &= \text{Vertical load, downward, lbs.} \\ T_1 &= \text{Horizontal load toward structure, lbs.} \\ X &= \text{Suspension insulator load, lbs.} \\ Y &= \text{Strut insulator load, lbs.} \\ \theta &= \text{Angle of suspension string to vertical} \\ \alpha &= \text{Angle of strut insulator to horizontal} \end{aligned}$$

Angles α and θ are constant for all the assemblies shown in this bulletin ($\alpha = 5^\circ$, $\theta = 50^\circ$). The equations for insulator loads can, therefore, be simplified to the following:

$$\begin{aligned} X &= 1.409 T_2 - 0.123 T_1 \\ Y &= 1.083 T_2 + 0.909 T_1 \end{aligned}$$

As an example, the following calculation applies to NESC heavy loading on a No. 307318 345 kV Horizontal Vee tangent assembly to be used on 800 ft. spans (equal weight and wind spans) two 954 MCM 45/7 ACSR "Rail" conductors per phase.

The transverse load from wind pressure on the iced subconductor is .7217 lb./ft., and the load T_1 is:

$$\begin{aligned} T_1 &= .7217 \text{ lb./ft.} \times 2 \text{ (Conductor/Phase)} \times 800 \text{ ft.} \\ &= 1155 \text{ lbs.} \end{aligned}$$

The vertical load from the iced subconductor is 2.114 lb./ft. and the load T_2 is:

$$\begin{aligned} T_2 &= 2.114 \text{ lb./ft.} \times 2 \text{ (Conductor/Phase)} \times 800 \text{ ft.} \\ &= 3382 \text{ lbs.} \end{aligned}$$

With transverse wind blowing toward structure, insulator loads are:

$$\begin{aligned} X &= 1.409 (3382) - 0.123 (1155) \\ &= 4623 \text{ lbs. (Tension load in suspension insulator string)} \\ Y &= 1.083 (3382) + 0.909 (1155) \\ &= 4713 \text{ lbs. (Compression load in strut)} \end{aligned}$$

With transverse loads blowing away from structure,

$$\begin{aligned} X &= 1.409 (3382) + 0.123 (1155) \\ &= 4907 \text{ lbs. (Tension load in suspension insulator string)} \\ Y &= 1.083 (3382) - 0.909 (1155) \\ &= 2613 \text{ lbs. (Compression load in strut)} \end{aligned}$$

These values are well within the maximum recommended working load ratings of the insulators.

The same procedure can be used to calculate loads for the extreme wind and/or ice loads which are assumed for the transmission line design.

The maximum conductor swing angle for each assembly is indicated on the catalog drawings. Adapters listed on page 9 are recommended for higher swing angles, such as may be required on heavy outside line angles (with resultant forces toward the structure), or high wind loading locations which may occur in hurricane areas.

HORIZONTAL VEE ASSEMBLIES

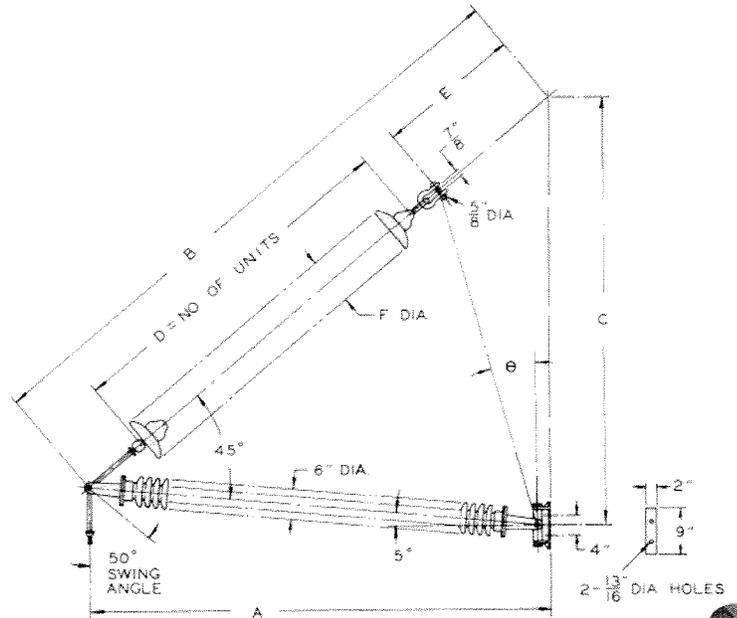
230 kV

The standard Horizontal Vee design listed in the table will meet the requirements for most applications at this voltage level. All of these assemblies have a 45° included angle and are available for steel, concrete or wood pole mounting in four insulation levels determined by the number of suspension insulators required. The strut insulator matches the electrical characteristics of the number of suspensions in the assembly.

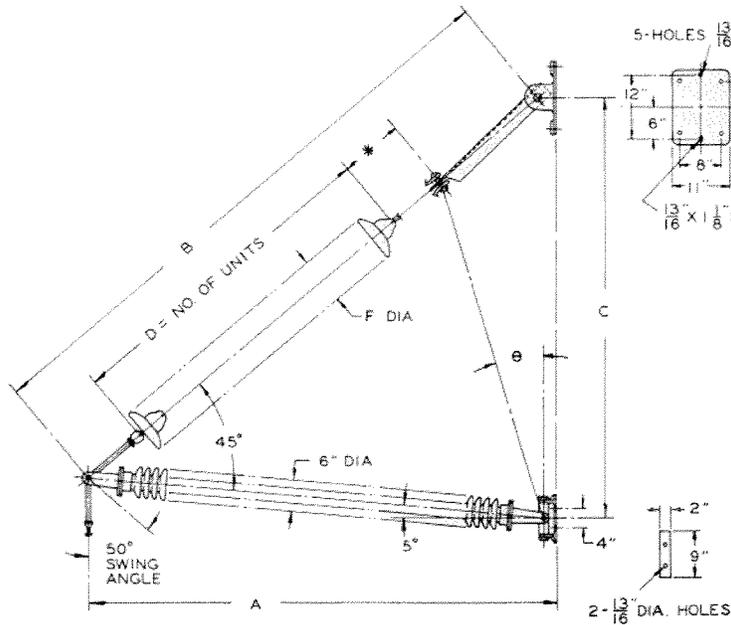
The basic assembly is cataloged without the top mounting bracket for use on structures where a stub arm is supplied as part of the structure. This design is recommended for new construction on steel poles or lattice towers.

The addition of suffix "A" or "C" to the catalog number indicates that a top mounting bracket is required, and denotes the type of structure being used. A suitable top mounting bracket is supplied with the assembly. These assemblies are furnished complete, with the exception of the conductor clamps, which must be ordered separately. The Horizontal Vee assemblies accommodate all standard aluminum suspension clamps with a NEMA 52-5 socket and are suitable for single or bundled conductors. Clamps can be ordered by using a separate catalog number as shown on page 9.

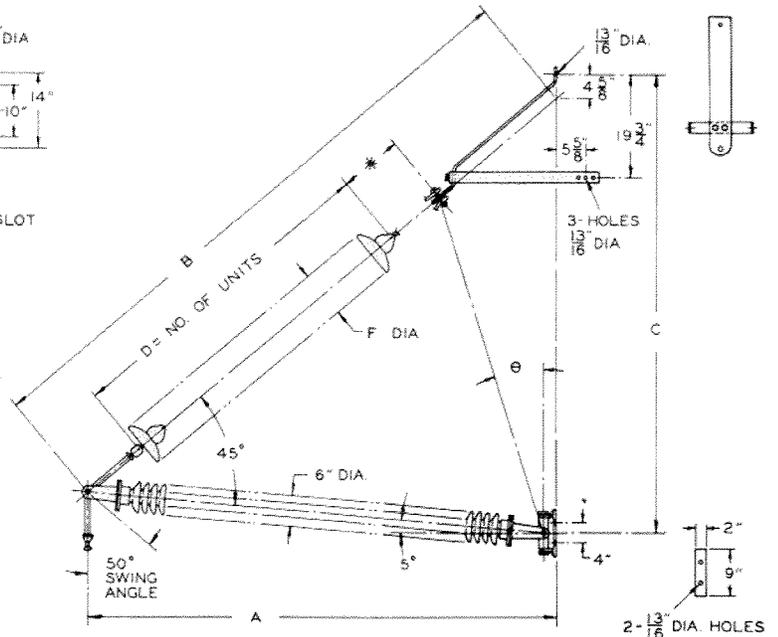
Insulators are light gray, Lapp No. 70 glaze. Hardware is ferrous, hot-dip galvanized.



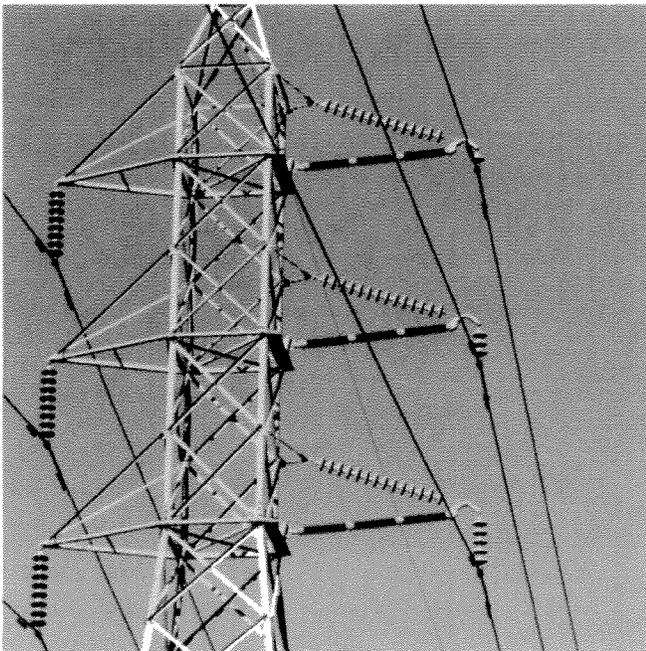
BASIC ASSEMBLIES										
Catalog Number	Hinge Angle	Dimensions in Inches						Strength Ratings Lbs.		Aprx. Net Weight/Assy. Lbs.
		A	B	C	D	E	F	Suspensions	Struts	
307312	22°	96 ³ / ₁₆	125 ¹³ / ₁₆	89 ¹ / ₁₆	12	37 ⁹ / ₁₆	9	15K	15K	260
307313	21°	101 ³ / ₁₆	132 ³ / ₁₆	93 ³ / ₁₆	13	38 ³ / ₁₆	9	15K	15K	275
307314	22°	108 ⁹ / ₁₆	141 ³ / ₁₆	100 ³ / ₁₆	14	42	10	20K	25K	375
307315	20°	111 ⁹ / ₁₆	145 ¹ / ₁₆	103 ³ / ₁₆	15	40 ³ / ₁₆	10	20K	25K	395
STEEL POLE OR CONCRETE POLE MOUNTING										
307312A	16°	96 ³ / ₁₆	121 ⁹ / ₁₆	86 ³ / ₁₆	12	—	9	15K	15K	315
307313A	15°	101 ³ / ₁₆	128 ³ / ₁₆	91	13	—	9	15K	15K	330
307314A	14°	108 ⁹ / ₁₆	137	97 ³ / ₁₆	14	—	10	20K	25K	430
307315A	13°	111 ⁹ / ₁₆	141 ³ / ₁₆	100 ⁹ / ₁₆	15	—	10	20K	25K	450
WOOD POLE MOUNTING										
307312C	16°	96 ³ / ₁₆	126	93 ¹ / ₁₆	12	—	9	15K	15K	295
307313C	15°	101 ³ / ₁₆	132 ⁹ / ₁₆	98 ¹ / ₂	13	—	9	15K	15K	310
307314C	14°	108 ⁹ / ₁₆	141 ⁷ / ₁₆	104 ¹ / ₁₆	14	—	10	20K	25K	415
307315C	13°	111 ⁹ / ₁₆	145 ¹ / ₁₆	107 ⁷ / ₁₆	15	—	10	20K	25K	435



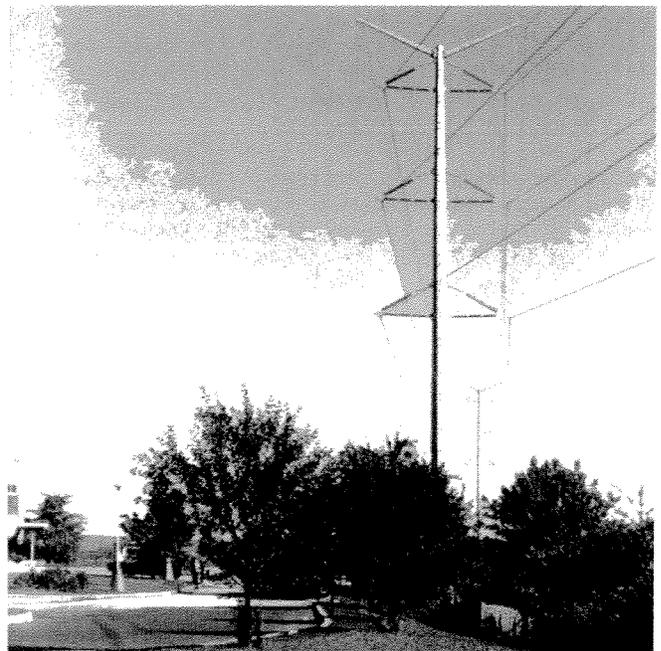
Steel Pole or Concrete Mounting



Wood Pole Mounting

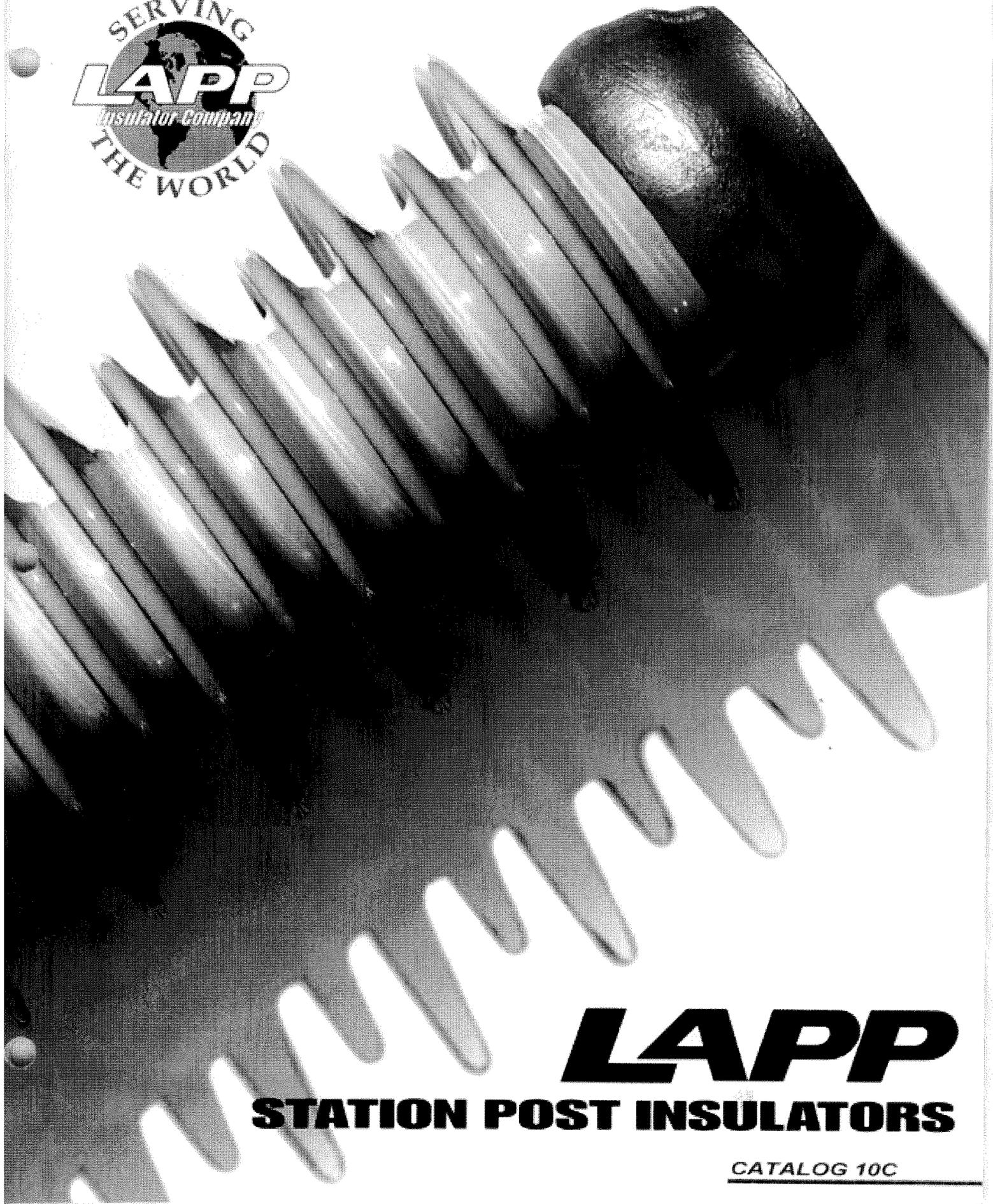


Horizontal Vee construction made it possible to upgrade one side of a double circuit 115 kV line to 230 kV. Capacity was increased from 200 MVA to 400 MVA on same structures at minimal cost.



Neat appearance of double circuit Horizontal Vee design on tapered steel poles helped gain public acceptance for this 230 kV transmission line through an attractive residential area.

*Linkage made up of standard fittings to hold overall length.



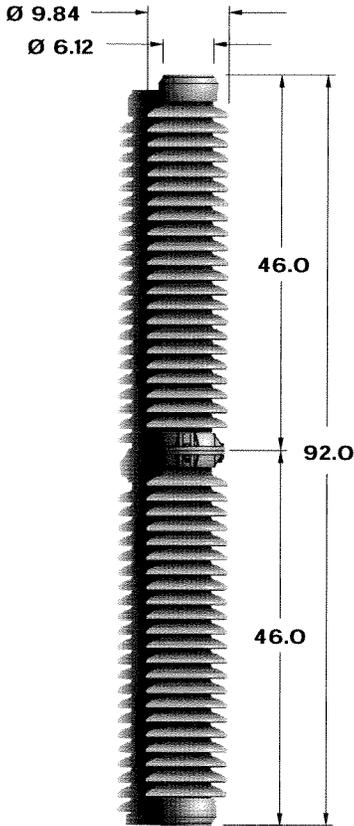
LAPP
STATION POST INSULATORS

CATALOG 10C

STANDARD STRENGTH UNIT

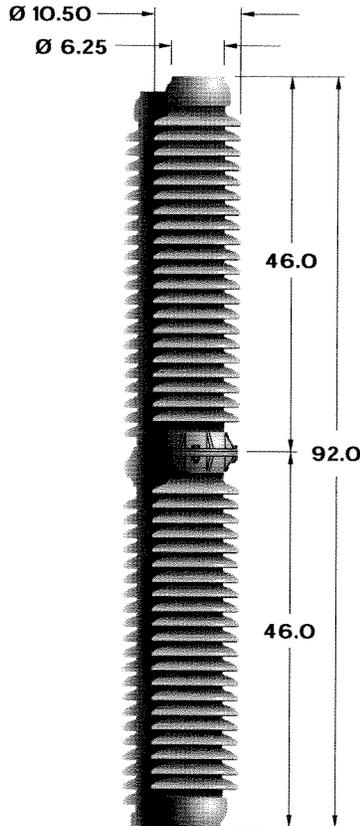
HIGH STRENGTH UNIT

EXTRA-HIGH STRENGTH UNIT



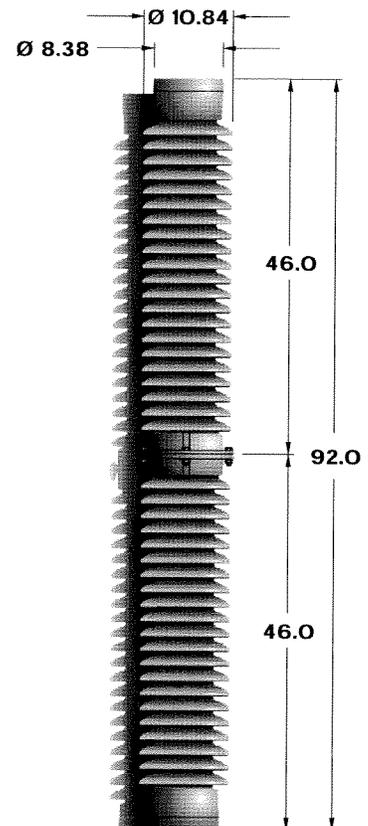
4 TAPPED HOLES
5/8-11 +.015 OVERSIZE
11/16" FULL THREAD
ON 5.0" BOLT CIRCLE

315312-70



4 TAPPED HOLES
5/8-11 +.015 OVERSIZE
3/4" FULL THREAD
ON 5.0" BOLT CIRCLE

315316-70



4 TAPPED HOLES
3/4-10 +.015 OVERSIZE
7/8" FULL THREAD
ON 7.0" BOLT CIRCLE

315362-70

CHARACTERISTICS

Lapp Catalog Number	315312-70	315316-70	315362-70
Ansi Technical Reference Number	T.R.312	T.R.316	T.R.362
Dimensions			
Leakage Distance, Inches	198	198	198
Mechanical Values *			
Cantilever Strength, Pounds	800	1250	2300
Tensile Strength, Pounds	20000	25000	40000
Torsion Strength, Inch-Pounds	40000	90000	120000
Compression Strength, Pounds	60000	75000	100000
Electrical Values			
Impulse Flashover, Positive, kV	1210	1210	1210
Low Frequency Withstand, 10 Sec. Wet, kV	455	455	455
Impulse Withstand, kV	1050	1050	1050
Radio Influence Voltage Data			
Test Voltage, Rms to Ground, kV	146	146	146
Maximum RIV, Microvolts at 1000 kHz	500	500	500
Weight			
Net Weight, Each, Pounds	384	450	580

* For Maximum recommended working loads see "Specifications," page 6.

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Note: For RG glazed insulators equivalent to these standard insulators, see table on page 9.

Illustrations shown are true representations of Lapp products at the time of printing, but are subject to change at any time.

ALL DIMENSIONS ARE IN INCHES



Avenida Francisco de Miranda, Edif. Parque Cristal, Torre Oeste
 Los Palos Grandes – Caracas 1062 - Venezuela
 Tel: +58 (212) 285-5707 Fax: +58 (212) 285-3269



PRODUCT CATALOG – ACSR (Aluminum Conductor, Steel Reinforced)

ASTM CONDUCTOR SIZES															
Code Word	Size (AWG or KCM)	Stranding (Al/St)	Diameter (inches)			Complete Cable	Weight Per 1000 ft (Lbs)			Content %		Rated Strength (Lbs)	Resistance ¹ Ohms/1000 ft		Current Rating ² (Amps)
			Indiv. Wires Al	Steel Core	Steel Core		Al	Stl	Total	Al	Stl		DC @ 20 °C	AC @ 75 °C	
Turkey	6	6/1	.0661	.0661	.0661	.198	24.5	11.6	36.1	67.90	32.10	1,190	.641	.806	105
Swan	4	6/1	.0834	.0834	.0834	.250	39.0	18.4	57.4	67.90	32.10	1,860	.403	.515	140
Swanate	4	7/1	.0772	.1029	.1029	.257	39.0	28.0	67.0	58.13	41.87	2,360	.399	.519	140
Sparrow	2	6/1	.1052	.1052	.1052	.316	62.0	29.3	91.3	67.90	32.10	2,850	.254	.332	184
Sparate	2	7/1	.0974	.1299	.1299	.325	62.0	44.7	106.7	58.13	41.87	3,640	.251	.338	184
Robin	1	6/1	.1181	.1181	.1181	.354	78.2	36.9	115.1	67.90	32.10	3,550	.201	.268	212
Raven	1/0	6/1	.1327	.1327	.1327	.398	98.7	46.6	145.3	67.90	32.10	4,380	.159	.217	242
Quail	2/0	6/1	.1489	.1489	.1489	.447	124.3	58.7	183.0	67.90	32.10	5,300	.126	.176	276
Pigeon	3/0	6/1	.1672	.1672	.1672	.502	156.7	74.0	230.7	67.90	32.10	6,620	.100	.144	315
Penguin	4/0	6/1	.1878	.1878	.1878	.563	197.7	93.4	291.1	67.90	32.10	8,350	.0795	.119	357
Waxwing	266.8	18/1	.1217	.1217	.1217	.609	250.3	39.2	289.5	86.45	13.55	6,880	.0643	.0787	449
Partridge	266.8	26/7	.1013	.0788	.2364	.642	251.7	115.6	367.2	68.53	31.47	11,300	.0637	.0779	475
Ostrich	300.0	26/7	.1074	.0835	.2505	.680	282.9	129.8	412.7	68.53	31.47	12,700	.0567	.0693	492
Merlin	336.4	18/1	.1367	.1367	.1367	.683	315.8	49.5	365.2	86.45	13.55	8,680	.0510	.0625	519
Linnet	336.4	26/7	.1137	.0884	.2652	.720	317.1	145.4	462.5	68.53	31.47	14,100	.0505	.0618	529
Oriole	336.4	30/7	.1059	.1059	.3117	.741	318.2	208.9	527.1	60.35	39.65	17,300	.0502	.0613	535
Chickadee	297.5	18/1	.1486	.1486	.1486	.743	373.1	58.5	431.6	86.45	13.55	9,940	.0432	.0529	576
Brant	397.5	24/7	.1287	.0858	.2574	.772	375.0	137.0	512.0	73.23	26.77	14,600	.0430	.0526	584
Ibis	397.5	26/7	.1236	.0961	.2883	.783	374.7	171.9	546.6	68.53	31.47	16,300	.0428	.0523	587
Lark	397.5	30/7	.1151	.1151	.3453	.806	375.8	246.8	622.6	60.35	39.65	20,300	.0425	.0519	594
Pelican	477.0	18/1	.1628	.1628	.1628	.814	447.8	70.2	518.0	86.45	13.55	11,800	.0360	.0442	646
Flicker	477.0	24/7	.1410	.0940	.2820	.846	450.1	164.4	614.5	73.23	26.77	17,200	.0358	.0439	655
Hawk	477.0	26/7	.1354	.1053	.3159	.858	449.6	206.4	656.0	68.53	31.47	19,500	.0356	.0436	659
Hen	477.0	30/7	.1261	.1261	.3783	.883	451.1	296.2	747.3	60.35	39.65	23,800	.0354	.0433	666
Osprey	556.5	18/1	.1758	.1758	.1758	.879	522.2	81.8	604.1	86.45	13.55	13,700	.0308	.0379	711
Parakeet	556.5	240	.1523	.1015	.3045	.914	525.1	191.7	716.9	73.23	26.77	19,800	.0307	.0376	721
Dove	556.5	26/7	.1463	.1138	.3414	.927	525.0	241.0	766.0	68.53	31.47	22,600	.0306	.0375	726
Eagle	556.5	30/7	.1362	.1362	.4086	.953	526.3	345.6	871.8	60.35	39.65	27,800	.0303	.0372	734
Peacock	605.0	24/7	.1588	.1059	.3177	.953	570.9	208.7	779.6	73.23	26.77	21,600	.0282	.0346	760
Squab	605.0	26/7	.1525	.1186	.3558	.966	570.4	261.8	832.2	68.53	31.47	24,300	.0281	.0345	765
Wood Duck	605.0	30/7	.1420	.1420	.4260	.994	572.0	375.6	947.7	60.35	39.55	28,900	.0279	.0342	774
Teal	605.0	30/19	.1420	.0852	.4260	.994	572.0	367.4	939.4	60.89	39.11	30,000	.0279	.0342	773
Kingbird	636.0	18/1	.1880	.1880	.1880	.940	597.2	93.6	690.8	86.45	13.55	15,700	.0270	.0332	773
Swift	636.0	36/1	.1329	.1329	.1329	.930	596.9	46.8	643.7	92.80	7.20	13,800	.0271	.0334	769
Rook	636.0	24/7	.1628	.1085	.3255	.977	600.0	219.1	819.1	73.23	26.77	22,600	.0268	.0330	784

APT

MPT

Ring Bus /
Transmission
Line

ASTM CONDUCTOR SIZES															
Code Word	Size (AWG or KCM)	Stranding (Al/St)	Diameter (inches)			Complete Cable	Weight Per 1000 ft (Lbs)			Content %		Rated Strength (Lbs)	Resistance ¹		Current Rating ² (Amps)
			Indiv. Wires Al	Wires Stl	Steel Core		Al	Stl	Total	Al	Stl		DC @ 20 °C	AC @ 75 °C	
Grosbeak	636.0	26/7	.1564	.1216	.3648	.990	599.9	275.2	875.1	68.53	31.47	25,200	.0267	.0328	789
Scoter	636.0	30/7	.1456	.1456	.4368	1.019	601.4	394.9	996.3	60.35	39.55	30,400	.0256	.0325	798
Egret	636.0	30/19	.1456	.0874	.4370	1.019	601.4	386.6	988.0	60.89	39.11	31,500	.0266	.0326	798
Flamingo	666.6	24/7	.1667	.1111	.3333	1.000	629.1	229.7	858.8	73.23	26.77	23,700	.0256	.0315	807
Gannet	666.6	26/7	.1601	.1245	.3735	1.014	628.7	288.5	917.1	68.53	31.47	26,400	.0255	.0313	812
stilt	715.5	24/7	.1727	.1151	.3453	1.036	675.2	246.5	921.8	73.23	26.77	25,500	.0239	.0294	844
Starling	715.5	26/7	.1659	.1190	.3870	1.051	675.0	309.7	984.7	68.53	31.47	28,400	.0238	.0292	849
Redwing	715.5	30/19	.1544	.0926	.4630	1.081	676.3	434.0	1110	60.89	39.11	34,600	.0236	.0290	859
Coot	795.0	36/1	.1486	.1486	1486	1.040	746.2	58.5	804.7	92.80	7.20	16,800	.0217	.0268	884
Cuckoo	795.0	24/7	.1820	.1213	.3639	1.092	749.9	273.8	1024	73.23	26.77	27,900	.0215	.0265	901
Drake	795.0	26/7	.1749	.1360	.4080	1.108	750.3	344.2	1094	68.53	31.47	31,500	.0214	.0263	907
Tern	795.0	45/7	.1329	.0886	.2658	1.063	749.8	146.1	895.9	83.69	16.31	22,100	.0216	.0269	887
Condor	795.0	54/7	.1213	.1213	.3639	1.092	749.5	273.6	1023	73.25	26.75	28,200	.0215	.0272	889
Mallard	795.0	30/19	.1628	.0977	.4885	1.140	751.9	483.1	1235	60.89	39.11	38,400	.0213	.0261	918
Ruddy	900.0	45/7	.1414	.0943	.2829	1.131	848.7	165.5	1014	83.69	16.31	24,400	.0191	.0239	958
Canary	900.0	54/17	.1291	.1291	.3873	1.162	849.0	309.9	1159	73.25	26.75	31,900	.0190	.0241	961
Rail	954.0	45/7	.1456	.0971	.2913	1.165	899.9	175.5	1075	83.69	16.31	25,900	.0189	.0225	993
Cardinal	954.0	54/7	.1329	.1329	.3987	1.196	899.7	328.4	1228	73.25	26.75	33,800	.0179	.0228	996
Ortolan	1033.5	45/7	.1515	.1010	.3030	1.212	974.3	189.8	1164	83.69	16.31	27,700	.0167	.0209	1043
Curlew	1033.5	54/7	.1383	.1383	.4149	1.245	974.3	355.6	1330	73.25	26.75	36,600	.0165	.0211	1047
Bluejay	1113.0	45/7	.1573	.1049	.3147	1.259	1050	204.8	1255	83.69	16.31	29,800	.0155	.0194	1092
Finch	1113.0	54/19	.1436	.0862	.4310	1.293	1056	376.1	1432	73.75	26.75	39,100	.0154	.0197	1093
Bunting	1192.5	45/7	.1628	.1085	.3255	1.302	1125	219.1	1344	83.69	16.31	32,000	.0144	.0182	1139
Grackle	1192.5	54/19	.1486	.0892	.4460	1.338	1130	402.7	1533	73.75	26.25	41,900	.0144	.0184	1140
Bittern	1272.0	45/7	.1681	.1121	.3363	1.345	1200	233.9	1433	83.69	16.31	34,100	.0135	.0171	1184
Pheasant	1272.0	54/19	.1535	.0921	.4605	1.382	1206	429.3	1635	73.75	26.25	43,600	.0135	.0173	1187
Dipper	1351.5	45/7	.1733	.1155	.3465	1.386	1275	248.3	1525	83.69	16.31	36,200	.0127	.0162	1229
Martin	1351.5	54/19	.1582	.0949	.4745	1.424	1281	455.8	1737	73.75	26.25	46,300	.0127	.0163	1232
Boblink	1431.0	45/17	.1783	.1189	.3567	1.427	1350	263.1	1613	83.69	16.31	38,300	.0120	.0153	1272
Plover	1431.0	54/19	.1628	.0977	.4885	1.465	1357	483.1	1840	73.75	26.25	49,100	.0120	.0155	1275

Ring Bus/
Transmission
Line.



S3C

Double Side Break Disconnect Switch 72.5 to 245 kV

Disconnect Switches are an essential element of electrical power transmission systems. They provide visible air gap isolation of line sections and equipment for safe maintenance and repair. The S3C is a low profile, reduced phase-to-phase distance, double side break switch, on which the center insulator rotates to open and close the switch. Both terminal pads are rigid and well supported.

RELIABILITY

The S3C is a superior disconnect switch, a result of over 70 years of AREVA T&D experience in developing high voltage switches. Optimum mechanical and electrical characteristics of the current carrying parts are ensured through the use of high-strength aluminum alloys combined with silver plated copper contacts. The rectangular aluminum blade is attached to the top of the center-rotating insulator. It moves smoothly from a fully open position to fully closed in the stop in the jaw. A galvanized structural steel channel base supports the insulators and the live parts, assuring a high-strength, rigid design. The center insulator stack rotates on weather-sealed, greaseless rotor bearings that require no maintenance.

PERFORMANCE

Contact pressure is applied to the reverse loop copper jaw fingers by stainless steel springs which are insulated at one end, eliminating any possibility of annealing the springs due to their carrying current. As current rises, jaw contact pressure is increased due to the reverse-loop finger design. Thanks to the specific design, magnetic forces due to fault currents tend to push the blade deeper into the jaw rather than out.

FLEXIBILITY

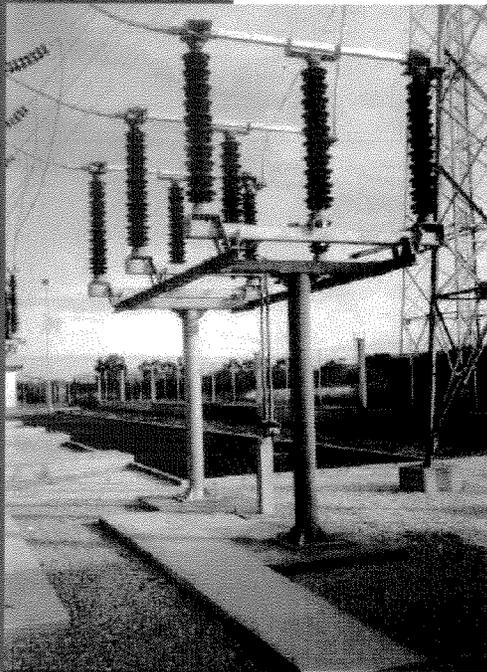
AREVA T&D experts are pleased to propose customized solutions: vertical, underhung and phase-over-phase solutions are available.

QUALITY

AREVA T&D designs, manufactures, tests and delivers its disconnect switches in accordance with the latest ANSI and IEC Standards, maintaining a quality assurance system according to ISO 9001 (2000) and ISO 14001.

OPTIONAL DEVICES

The S3C can be fitted with one or two ground switches. The following types of arc restrictors are also available: simple arcing horn, high performance bus transfer contacts (IEC62271-102 annex B), whip type interrupters (to handle line charging or transformer magnetizing currents).



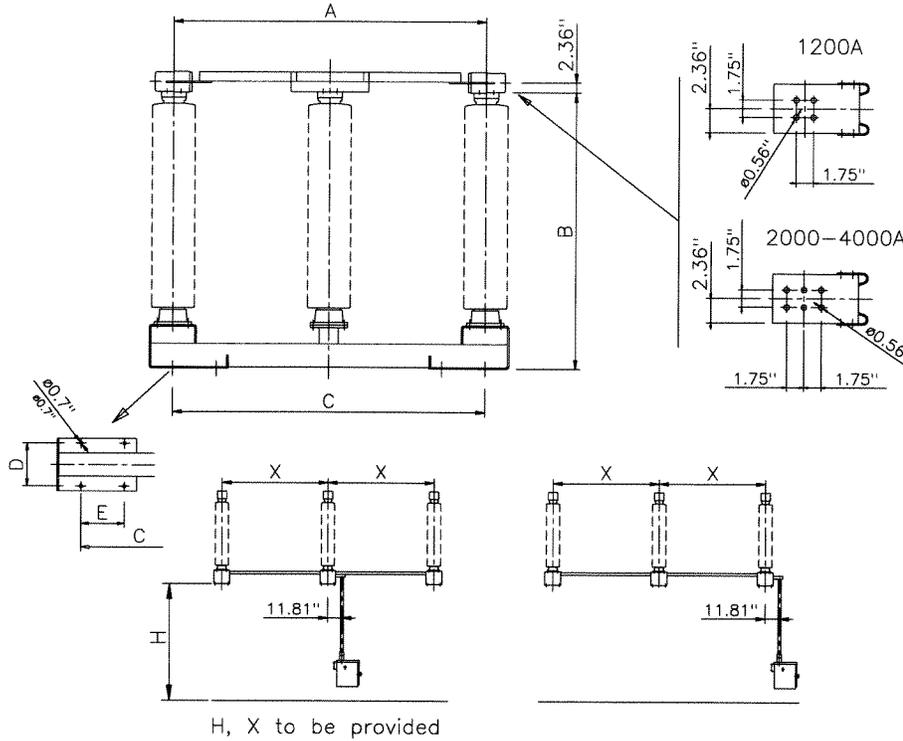
S3C 145 kV
2000A

Customer Benefits

- Proven reliability
- High performance with reduced phase-to-phase distance
- ISO 9001 quality
- Built-in ground switches and arc restrictors available
- Virtually no maintenance
- Easy start-up and commissioning

INSTALLATION AND MAINTENANCE

The S3C is recognized worldwide as being easy to install and adjust with no special tools required. Both the disconnect switches and ground switches are pre-assembled, adjusted and tested as completely as possible. The S3C is virtually maintenance free, thanks to lifetime greased or self-lubricated parts, self-wiping contacts and the use of corrosion-free materials.



Customized layouts available upon request. Phase-to-phase distance defined by substation layout

Technical Data (ANSI)							
Rated Voltage	Rated Current	Short time current	BIL	A	B	C	D
kV	up to Amps	up to kA	kV	inches	inches	inches	inches
72.5	3150	50	350	39.37	42.99	39.37	8.66
123	3150	50	550	59.06	57.99	59.06	8.66
145	3150	50	650	70.87	67.80	70.87	10.63
170	3150	50	750	78.74	75.79	78.74	10.63
245	3150	50	1050	110.24	105.79	110.24	13.39

*IEC ratings also available

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www.aveva-td.com



**MITSUBISHI ELECTRIC
POWER PRODUCTS, INC.**

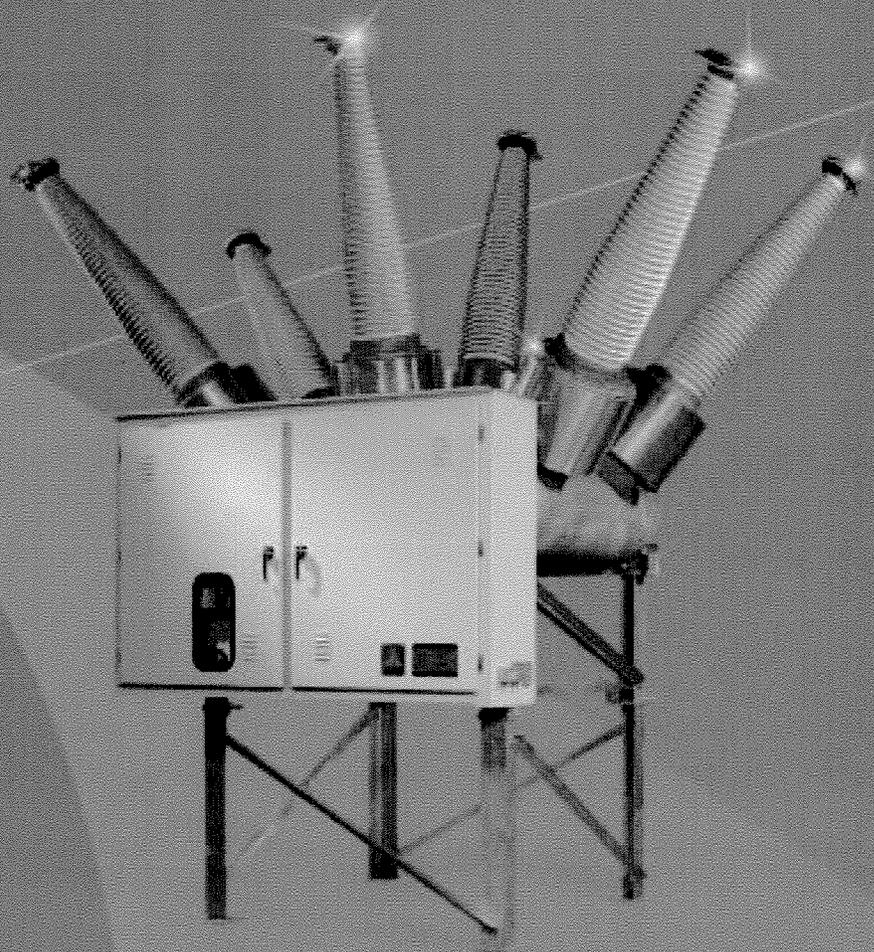
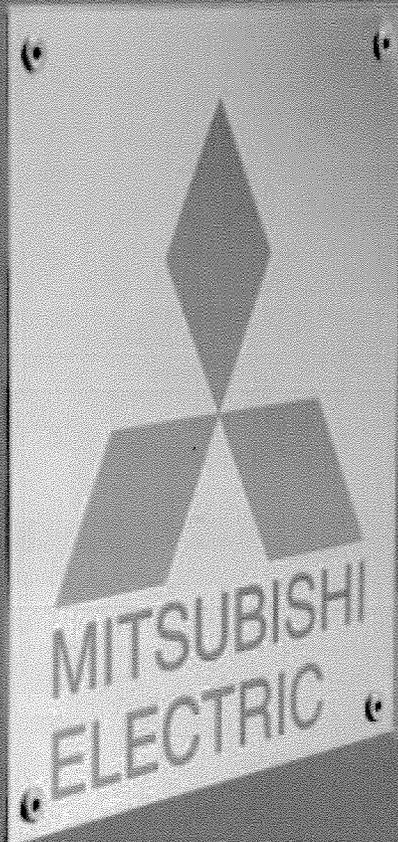
SF₆ CIRCUIT BREAKER

DEAD TANK TYPE

MODEL: 200-SFMT-40E

200-SFMT-50F

200-SFMT-63F



Introduction

Mitsubishi Electric Power Products, Inc. is an affiliate of Mitsubishi Electric Corporation.

Factory

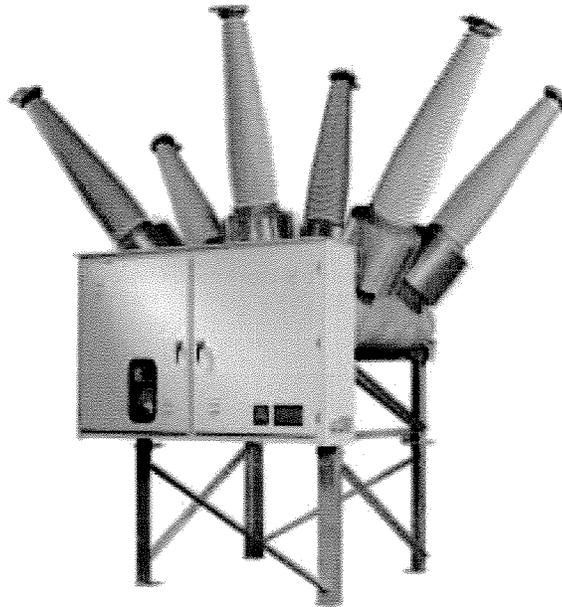
Mitsubishi Electric Power Products Manufacturing facility is located in Warrendale, Pennsylvania, a suburb of Pittsburgh. This location also serves as the center for product service and training.

Evolutionary Design

Thousands of SFMT breakers rated at transmission voltages through 1100kV have been installed and are operating reliably on T&D systems worldwide. Introduced in 1974, the design is based on proven engineering principals and extensive development and testing.

The SFMT features gang-operated, isolated phase dead tanks supported by a galvanized steel frame. Each tank houses a single-break puffer interrupter and supports two porcelain or composite bushings. The tanks and bushings are pressurized with SF₆ gas.

The frame also supports the control cabinet. It houses a spring-type operating mechanism, interphase linkages and the control circuits.



TYPE	200-SFMT-40E	200-SFMT-50F	200-SFMT-63F
Voltage (max kV)	245	245	245
BIL (kV Crest)	900	900	900
60 Hz withstand (kV)	425	425	425
Continuous Current (A)	1200 / 2000 / 3000	1200 / 2000 / 3000	1200 / 2000 / 3000
Interrupting Current (kA)	40	50	63
Interrupting Time (cycles)	2 / 3	2 / 3	2 / 3
Total Weight (lbs / kgs)	11,434 / 5,197	11,434 / 5,197	11,434 / 5,197
Weight of SF ₆ (lbs / kgs)	126 / 57	186 / 84.4	201 / 91.4



Revolutionary Performance

The SFMT reflects Mitsubishi Electric's commitment to supply power circuit breakers with extended service lives, and that meet or exceed the most demanding specifications for interrupting, insulating, and current-carrying capabilities. The design and performance of all breakers are fully verified in accordance with the procedures of ANSI C37 and IEC 62271-100, and by procedures at Mitsubishi's laboratories that subject the breakers to conditions that are considerably more comprehensive and severe.

These procedures have confirmed the safety and ruggedness of Mitsubishi breakers. For example, tests confirm Mitsubishi breakers withstand 10,000 mechanical operations and severe seismic forces, and that the breakers operate reliably in extremely low or high temperatures.

Users also report extraordinarily low cost of ownership based on exceptional reliability, application flexibility, safety, and ease of maintenance.

Features of the SFMT Design Insulation

- Dead Tank Construction
- Only SF₆ for Open Gap Insulation
- No Solid Insulation Bridging the Open Contacts
- Low Operating Pressure (72 psig @ 20°C) for 245kV, 40kA rating (85 psig @ 20°C) for 245kV, 50kA or 63kA ratings

Primary Electrical Parts/Interrupters

- True Puffer Interrupters
- Contacts Easily Accessible for Inspection and Changeout
- Verified Full Dielectric and Interrupting Rating at Lockout Pressure
- High Strength Porcelain or Composite Bushings
- Integral NEMA 4-hole bushing terminal

Application Flexibility

- Mechanically Tested and Verified to -50°C with tank heaters
- Definite Purpose Capacitive Current Switching Capability
- Reactor Switching Capability
- Tested and Verified for Seismic Applications
- Quiet Operation; Suitable for Urban Installations

Mechanical Operations

- Spring Type Operating Mechanism
- Energy Stored in Powerful Torsion Bars
- Universal Type Spring Charging Motor (AC/DC)
- Quick Spring Charging for O-CO-10 sec-CO Duty Cycle

Rapid Installation

- Bushings Shipped Installed
- Integral NEMA 4-Hole Bushing Terminals
- Complete Breaker Factory Assembled and Production Tested
- Lightweight to Minimize Foundation Size

Controls

- Space for Two or more BCTs per Bushing

Proof

- Tested and Verified for 90% Short Line

Fault

- Tested and Verified to Exceed ANSI and IEC Standards
- Verified in Environmental Test Lab
- Production Tested as a Fully Assembled Breaker

Options

- Tank Heaters for Low Temperature Applications
- High Altitude
- Composite Insulators

Features to Reduce Installation and Maintenance

All SFMT breakers are fully assembled, pressurized and tested to ANSI or IEC and Mitsubishi standards prior to shipment. Each breaker is shipped with 5 psig of SF₆ gas. Installation is completed rapidly and easily. Site work is limited to removing all packing, bolting the sub-frame to the foundation and bolting the breaker to the sub-frame. Then, using bottled SF₆ gas, the interrupter tanks and bushings are filled to operating pressure, and the control and power leads are connected. The breaker is then ready for final inspection and any field testing required by the user.

The torsion bar spring mechanism requires no maintenance over the life of the breaker.

Critical interrupter components (stationary and moving arcing contacts and nozzles) need only be inspected after 2000 operations at rated load current. The components are removed easily by simply unbolting the tank inspection cover. Unlike other designs, there are no interrupter valves, seal rings, solid insulation or screens to inspect.



Specification For Auxiliary Power Transformer Liquid Filled Transformers Data Sheet	Job No.: 120006	Spec. No.: ES-E412
	Item No.:	No. Req'd: 2
	Project: Solana	

 Transformer Name Tag: APT1 and APT2 (ITEM 1)

<p>Service <input checked="" type="checkbox"/> Outdoor <input type="checkbox"/> Indoor</p> <p>Cooling Type</p> <p><input type="checkbox"/> Oil <input checked="" type="checkbox"/> Envirotemp FR3</p> <p><input type="checkbox"/> ONAN (Self-cooled)</p> <p><input type="checkbox"/> ONAN / ONAF (Self-cooled / Forced Air-cooled)</p> <p><input type="checkbox"/> ONAN / ONAFF (ONAN with FA Provisions)</p> <p><input type="checkbox"/> ONAN / ONAF / ODAF (Self-cooled / Forced Air-cooled / Forced Oil-cooled)</p> <p><input type="checkbox"/> KNAN / KNAFF (Self-cooled / FA Provisions)</p> <p><input checked="" type="checkbox"/> KNAN / KNAF (Self-cooled / FA Cooled)</p> <p>Vendor shall optional price standard oil</p> <p>Windings <input type="checkbox"/> Mfg. Std. <input checked="" type="checkbox"/> Copper</p> <table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th></th> <th>Primary</th> <th>Secondary</th> </tr> </thead> <tbody> <tr> <td>Voltage (NOM)</td> <td><u>245 kV</u></td> <td><u>13,800 V</u></td> </tr> <tr> <td>Bushing BIL (KV)</td> <td><u>1050</u></td> <td><u>110</u></td> </tr> <tr> <td>Winding BIL (KV)</td> <td><u>S+2</u></td> <td><u>S+2</u></td> </tr> <tr> <td>Standard</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>Delta</td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>Wye, Solidly Grd.</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>Wye, Resist. Grd.</td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> </tr> </tbody> </table> <p>Impedance</p> <p><input checked="" type="checkbox"/> Standard <u>8</u> %</p> <p><input type="checkbox"/> Special _____ %;</p>		Primary	Secondary	Voltage (NOM)	<u>245 kV</u>	<u>13,800 V</u>	Bushing BIL (KV)	<u>1050</u>	<u>110</u>	Winding BIL (KV)	<u>S+2</u>	<u>S+2</u>	Standard	<input type="checkbox"/>	<input type="checkbox"/>	Delta	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Wye, Solidly Grd.	<input type="checkbox"/>	<input type="checkbox"/>	Wye, Resist. Grd.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<p>Primary Connections</p> <p>Connecting Equipment <u>245 kV Substation</u></p> <p>Connection Type</p> <p><input checked="" type="checkbox"/> Cable, <u>TOP</u> Entry, from <u>above</u> grade</p> <p><input type="checkbox"/> Bus Duct</p> <p><input type="checkbox"/> Throat</p> <p>Bushing Type</p> <p><input checked="" type="checkbox"/> Cover</p> <p><input type="checkbox"/> Sidewall</p> <p>Stud Size <u>Standard Nema 4 hole design</u></p> <p>Connector <u>1000 AWG</u></p> <hr/> <p>Secondary Connections</p> <p>Connecting Equipment <u>1600 3,000 Amp NSB</u></p> <p>Connection Type</p> <p><input type="checkbox"/> Cable, _____ Entry, from <u>above</u> grade</p> <p><input checked="" type="checkbox"/> Bus Duct</p> <p><input type="checkbox"/> Throat</p> <p>Bushing Type</p> <p><input checked="" type="checkbox"/> Cover</p> <p><input type="checkbox"/> Sidewall</p> <p>Stud Size _____</p> <p>Connector _____</p>
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<p>Ratings (Three Phase/60 Hz) <u>30</u> ✓</p> <p>Max Rating is <u>30 MVA</u> of running/starting load</p> <p>_____ KVA, 55°C Rise, KNAN</p> <p>_____ KVA, 65°C Rise, KNAN</p> <p>_____ KVA, 55/65°C Rise, KNAN / KNAFF</p> <p>* / * MVA, 55/65°C Rise, KNAN / KNAF</p> <p>* - Vendor to provide standard frame design</p> <p>Vendor to optionally price standard oil filled design</p>	<p>Tap Changers</p> <p><input checked="" type="checkbox"/> No Load Tap Changer</p> <p>No. of Taps <u>2.5</u> % Each, qty <u>4</u></p> <p><input type="checkbox"/> Load Tap Changer (120V/1PH/60Hz)</p> <p><input type="checkbox"/> Remote Auto/Off/Man PB/SW</p> <p><input type="checkbox"/> Remote Status Lights</p> <p><input type="checkbox"/> Remote Raise/Lower PB/SW</p> <p><input type="checkbox"/> Remote Tap Ratio Indicator</p>																								

0	23 SEP 08	For Review	SDE			
No.	Date	Description	By	Chk'd	App'd	App'd

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Specification For Auxiliary Power Transformer Liquid Filled Transformers Data Sheet	Job No.: 120006	Spec. No.: ES-E412
	Item No.:	No. Req'd: 2
	Project: Solana	

Transformer Name Tag: APT1 and APT2

<p><u>Losses (KW) – Vendor to provide</u></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Load</th> <th>Core</th> <th>Winding</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>50%</td> <td style="text-align: center;">6</td> <td style="text-align: center;">62.6</td> <td></td> </tr> <tr> <td>75%</td> <td style="text-align: center;">16.5</td> <td style="text-align: center;">140.7</td> <td></td> </tr> <tr> <td>100%</td> <td style="text-align: center;">34</td> <td style="text-align: center;">250</td> <td style="text-align: center;">284</td> </tr> </tbody> </table> <p>* Without Auxiliary losses</p> <p><u>Bushing Current Transformers – See One Lines</u></p> <p>Primary <input type="checkbox"/> <u>600</u> /5 Ratio <input type="checkbox"/> <u>C800</u> Accuracy Class Vendor to optional propose cost savings</p> <p>Secondary <input type="checkbox"/> <u>3000</u> /5 Ratio <input type="checkbox"/> <u>C800</u> Accuracy Class Vendor to optional propose cost savings</p> <p><u>Lightning Arrestors</u></p> <p>Primary <input checked="" type="checkbox"/> Station Type <u>Metal Oxide Porcelain</u></p> <p><input type="checkbox"/> Intermediate Type _____ Location _____</p> <p>Secondary <input type="checkbox"/> Station Type _____ <input type="checkbox"/> Intermediate Type _____ Location _____</p>	Load	Core	Winding	Total	50%	6	62.6		75%	16.5	140.7		100%	34	250	284	<p><u>Terminal Boxes</u></p> <p>Primary <input checked="" type="checkbox"/> Air Filled <input type="checkbox"/> Oil Filled Entry <input checked="" type="checkbox"/> Top <input type="checkbox"/> Bottom <input type="checkbox"/> Side</p> <p>Secondary <input checked="" type="checkbox"/> Air Filled <input type="checkbox"/> Oil Filled Entry <input checked="" type="checkbox"/> Top <input type="checkbox"/> Bottom <input type="checkbox"/> Side</p> <p><u>Metering and Instrumentation</u></p> <p>Main Tank</p> <p><input checked="" type="checkbox"/> Liquid Level Indicator With Low Level Contact <input checked="" type="checkbox"/> Liquid Level Relay (Device 71Q-1) <input checked="" type="checkbox"/> Liquid Temp. Indicator With Two High Temp Contacts For Fan Control And Alarm <input checked="" type="checkbox"/> Vac. Press. Indicator <input checked="" type="checkbox"/> Vac. Press. Alarm <input checked="" type="checkbox"/> Winding Temp. Indicator <input checked="" type="checkbox"/> Winding Temp. Relay (Device 49) <input type="checkbox"/> Fault Pressure Relay (Device 63FP) <input checked="" type="checkbox"/> <u>Digital Dissolved Gas Detection Meter</u></p> <p>Accessories</p> <p><input checked="" type="checkbox"/> Sampling Device <input checked="" type="checkbox"/> Handhole <input checked="" type="checkbox"/> Pressure Relief Valve</p> <p><u>Testing</u> (Per IEEE C57.12.90™ - 2006)</p> <p>Short Circuit:</p> <p><input type="checkbox"/> Perform Complete Test <input checked="" type="checkbox"/> Certify Capability of Passing Test <input type="checkbox"/> Do Not Perform Test</p> <p>Heat Run:</p> <p><input checked="" type="checkbox"/> Perform Complete Test ANSI Test: <input type="checkbox"/> Type 1 <input checked="" type="checkbox"/> Type 2 <input type="checkbox"/> Certify Capability of Passing Test <input type="checkbox"/> Do Not Perform Test</p>
Load	Core	Winding	Total														
50%	6	62.6															
75%	16.5	140.7															
100%	34	250	284														

0	23 SEP 08	For Review	SDE			
No.	Date	Description	By	Chk'd	App'd	App'd

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Specification For Auxiliary Power Transformer Liquid Filled Transformers Data Sheet	Job No.:	120006	Spec. No.:	ES-E412
	Item No.:		No. Req'd:	2
	Project:	Solana		

Transformer Name Tag: APT1 and APT2

<p><u>Neutral Grounding Resistor</u></p> <p><input checked="" type="checkbox"/> Provided per Specification ES-E530</p> <p><input type="checkbox"/> Located in LV Compartment</p> <p><input type="checkbox"/> Mounted on Transformer</p> <p><input type="checkbox"/> Provisions for Mounting only</p> <p><input type="checkbox"/> Located in LV Compartment</p> <p><input type="checkbox"/> Mounted on Transformer</p>	<p><u>Interrupter Switch – Not Applicable</u></p> <p><input type="checkbox"/> Provide per Specification ES-E325</p> <p><input type="checkbox"/> Air <input type="checkbox"/> Liquid Filled</p> <p><input type="checkbox"/> Fuse _____ amps</p> <p>Service _____ Volts/3ϕ/60 Hz _____ KV BIL</p> <p>Frame Size _____ amps</p> <p>Interrupting Capacity _____ MVA</p> <p>Operation</p> <p><input type="checkbox"/> Manual <input type="checkbox"/> Electrical</p> <p>Mounting</p> <p><input type="checkbox"/> HV Compartment</p> <p><input type="checkbox"/> Separate Enclosure</p> <p><input type="checkbox"/> Transition Section</p> <p><input type="checkbox"/> Space Heater _____ Watts</p> <p>Incoming Connections - _____</p> <p>Outgoing Connections - _____</p>
<p><u>Load Tap Changer Tank – Not applicable</u></p> <p><input type="checkbox"/> Liquid Level Indicator</p> <p><input type="checkbox"/> Liquid Level Relay (Device 71 Q-2)</p> <p><input type="checkbox"/> Fault Protection Relay (SDFP)</p> <p><input type="checkbox"/></p>	

Note: Auxiliary Power Transformers must be able to hand voltage variations of +/- 10%.

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No.	D	Description	By	Chk'd	App'd	App'd

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ABENCS

RFQ No.:

Page 2 of 4

Specification For Main Power Transformer Liquid Filled Transformers Data Sheet	Job No.: 120006	Spec. No.: ES-E411
	Item No.:	No. Req'd: 2
	Project: Solana	

Transformer Name Tag: MPT1 and MPT2 **ITEM 2**

<p><u>Service</u> <input checked="" type="checkbox"/> Outdoor <input type="checkbox"/> Indoor</p> <p><u>Cooling Type</u></p> <p><input type="checkbox"/> Oil <input checked="" type="checkbox"/> Envirotemp FR3</p> <p><input type="checkbox"/> ONAN (Self-cooled)</p> <p><input type="checkbox"/> ONAN / ONAF (Self-cooled / Forced Air-cooled)</p> <p><input type="checkbox"/> ONAN / ONAFF (ONAN with FA Provisions)</p> <p><input type="checkbox"/> ONAN / ONAF / ODAF (Self-cooled / Forced Air-cooled / Forced Oil-cooled)</p> <p><input type="checkbox"/> KNAN / KNAFF (Self-cooled / FA Provisions)</p> <p><input checked="" type="checkbox"/> KNAN / KNAF (Self-cooled / FA Cooled)</p> <p>Vendor shall optional price standard oil</p> <p><u>Windings</u> <input type="checkbox"/> Mfg. Std. <input checked="" type="checkbox"/> Copper</p> <table style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th></th> <th style="text-align: center; border-bottom: 1px solid black;">Primary</th> <th style="text-align: center; border-bottom: 1px solid black;">Secondary</th> </tr> </thead> <tbody> <tr> <td>Voltage (NOM)</td> <td style="text-align: center;">245 kV</td> <td style="text-align: center;">13.800 V</td> </tr> <tr> <td>Bushing BIL (KV)</td> <td style="text-align: center;">1050</td> <td style="text-align: center;">110</td> </tr> <tr> <td>Winding BIL (KV)</td> <td style="text-align: center;">S+2</td> <td style="text-align: center;">S+2</td> </tr> <tr> <td>Standard</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>Delta</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> <tr> <td>Wye, Solidly Grd.</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>Wye, Resist. Grd.</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </tbody> </table> <p><u>Impedance</u></p> <p><input checked="" type="checkbox"/> Standard 8 %</p> <p><input checked="" type="checkbox"/> Special 14 %; Optionally price</p>		Primary	Secondary	Voltage (NOM)	245 kV	13.800 V	Bushing BIL (KV)	1050	110	Winding BIL (KV)	S+2	S+2	Standard	<input type="checkbox"/>	<input type="checkbox"/>	Delta	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Wye, Solidly Grd.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Wye, Resist. Grd.	<input type="checkbox"/>	<input type="checkbox"/>	<p><u>Primary Connections</u></p> <p>Connecting Equipment <u>245 kV Substation</u></p> <p>Connection Type</p> <p><input checked="" type="checkbox"/> Cable, <u>TOP</u> Entry, from <u>above</u> grade</p> <p><input type="checkbox"/> Bus Duct</p> <p><input type="checkbox"/> Throat</p> <p>Bushing Type</p> <p><input checked="" type="checkbox"/> Cover</p> <p><input type="checkbox"/> Sidewall</p> <hr/> <p>Stud Size <u>Standard Nema 4 hole design</u></p> <p>Connector <u>1000 AWG</u></p> <p><u>Secondary Connections</u></p> <p>Connecting Equipment <u>8,000 Amp IPB</u></p> <p>Connection Type</p> <p><input type="checkbox"/> Cable, Entry, from <u>above</u> grade</p> <p><input checked="" type="checkbox"/> Bus Duct</p> <p><input type="checkbox"/> Throat</p> <p>Bushing Type</p> <p><input checked="" type="checkbox"/> Cover</p> <p><input type="checkbox"/> Sidewall</p> <hr/> <p>Stud Size _____</p> <p>Connector _____</p>
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Wye, Solidly Grd.	<input checked="" type="checkbox"/>	<input type="checkbox"/>																							
Wye, Resist. Grd.	<input type="checkbox"/>	<input type="checkbox"/>																							
<p><u>Ratings (Three Phase/60 Hz)</u></p> <p>Maximum Rating of Generator is <u>168.4 MVA MW</u></p> <p>_____ KVA, 55°C Rise, KNAN</p> <p>_____ KVA, 65°C Rise, KNAN</p> <p>_____ KVA, 55/65°C Rise, KNAN / KNAFF</p> <p>* / * MVA, 55/65°C Rise, KNAN / KNAF</p> <p><u>* - Vendor to provide standard frame design</u></p> <p><u>Vendor to optionally price standard oil filled design</u></p>	<p><u>Tap Changers</u></p> <p><input checked="" type="checkbox"/> No Load Tap Changer</p> <p style="margin-left: 20px;">No. of Taps <u>2.5</u> % Each, qty <u>4</u></p> <p><input type="checkbox"/> Load Tap Changer (120V/1PH/60Hz)</p> <p><input type="checkbox"/> Remote Auto/Off/Man PB/SW</p> <p><input type="checkbox"/> Remote Status Lights</p> <p><input type="checkbox"/> Remote Raise/Lower PB/SW</p> <p><input type="checkbox"/> Remote Tap Ratio Indicator</p>																								

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No.	Date	Description	By	Chk'd	App'd	App'd

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Specification For Main Power Transformer Liquid Filled Transformers Data Sheet	Job No.: 120006	Spec. No.: ES-E411
	Item No.:	No. Req'd: 2
	Project: Solana	

Transformer Name Tag: MPT1 and MPT2

<p><u>Losses (KW) – Vendor to provide</u></p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Load</th> <th style="text-align: center;">Core</th> <th style="text-align: center;">Winding</th> <th style="text-align: center;">Total</th> </tr> </thead> <tbody> <tr> <td>50%</td> <td style="text-align: center;">29</td> <td style="text-align: center;">136.3</td> <td style="text-align: center;">_____</td> </tr> <tr> <td>75%</td> <td style="text-align: center;">42.8</td> <td style="text-align: center;">306.6</td> <td style="text-align: center;">_____</td> </tr> <tr> <td>100%</td> <td style="text-align: center;">89</td> <td style="text-align: center;">548</td> <td style="text-align: center;">634</td> </tr> </tbody> </table> <p><i>* Without Auxiliary losses</i></p> <p><u>Bushing Current Transformers – See One Lines</u></p> <p>Primary <input type="checkbox"/> <u>600</u> /5 Ratio <u>C800</u> Accuracy Class Vendor to optional propose cost savings</p> <p>Secondary <input type="checkbox"/> <u>8000</u> /5 Ratio <u>C800</u> Accuracy Class Vendor to optional propose cost savings</p> <p><u>Lightning Arrestors</u></p> <p>Primary <input checked="" type="checkbox"/> Station Type <u>Metal Oxide</u> <u>Porcelain</u></p> <p><input type="checkbox"/> Intermediate Type _____ Location _____</p> <p>Secondary <input type="checkbox"/> Station Type _____ <input type="checkbox"/> Intermediate Type _____ Location _____</p>	Load	Core	Winding	Total	50%	29	136.3	_____	75%	42.8	306.6	_____	100%	89	548	634	<p><u>Terminal Boxes</u></p> <p>Primary <input checked="" type="checkbox"/> Air Filled <input type="checkbox"/> Oil Filled Entry <input checked="" type="checkbox"/> Top <input type="checkbox"/> Bottom <input type="checkbox"/> Side</p> <p>Secondary <input checked="" type="checkbox"/> Air Filled <input type="checkbox"/> Oil Filled Entry <input checked="" type="checkbox"/> Top <input type="checkbox"/> Bottom <input type="checkbox"/> Side</p> <hr/> <p><u>Metering and Instrumentation</u></p> <p>Main Tank</p> <p><input checked="" type="checkbox"/> Liquid Level Indicator With Low Level Contact <input checked="" type="checkbox"/> Liquid Level Relay (Device 71Q-1) <input checked="" type="checkbox"/> Liquid Temp. Indicator With Two High Temp Contacts For Fan Control And Alarm</p> <p><input checked="" type="checkbox"/> Vac. Press. Indicator <input checked="" type="checkbox"/> Vac. Press. Alarm <input checked="" type="checkbox"/> Winding Temp. Indicator <input checked="" type="checkbox"/> Winding Temp. Relay (Device 49) <input type="checkbox"/> Fault Pressure Relay (Device 63FP) <input checked="" type="checkbox"/> Digital Dissolved Gas Detection Meter</p> <p>Accessories</p> <p><input checked="" type="checkbox"/> Sampling Device <input checked="" type="checkbox"/> Handhole <input checked="" type="checkbox"/> Pressure Relief Valve</p> <hr/> <p><u>Testing</u> (Per IEEE C57.12.90™ - 2006)</p> <p>Short Circuit:</p> <p><input checked="" type="checkbox"/> Perform Complete Test <input type="checkbox"/> Certify Capability of Passing Test <input type="checkbox"/> Do Not Perform Test</p> <p>Heat Run:</p> <p><input checked="" type="checkbox"/> Perform Complete Test ANSI Test: <input type="checkbox"/> Type 1 <input checked="" type="checkbox"/> Type 2 <input type="checkbox"/> Certify Capability of Passing Test <input type="checkbox"/> Do Not Perform Test</p>
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0	23 SEP 08	For Review	SDE			
No.	Date	Description	By	Chk'd	App'd	App'd

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SIEMENS
 Manufacture plant: Siemens Andina Transformers - Bogota Colombia

PROPOSAL N° 08-890A
 DATE 01/20/2009

POWER TRANSFORMER PERFORMANCE SPECIFICATION

FOR SOLANA GENERATING STATION - APT1 y 2
SPECIFICATION NO. ES - E412

ITEM NO. 1
 Z = 8% a OA

Type	Step Down	Cooling	H Winding		X Winding		Y Winding	
3 Limbs- Core		Core Type	kV	245	kV	13.8	kV	0
3 Phase		OA	MVA	32.1	MVA	32.1	MVA	
60 Hertz		FA	MVA	42.8	MVA	42.8	MVA	
55/65 °C. Temp Rise		FA	MVA	53.7	MVA	53.7	MVA	
Temp(°C), mn/Av/mx	-10/30/40							

ADDITIONAL APPROXIMATE VOLTAGES

H Winding	+/- 2 @2.5% DETC FC
X Winding	(none)
Y Winding	(none)

CONNECTIONS FOR OPERATION

Transf. in Bank	To Transform From	Connected	To Transform to	Connected
1	245 KV, 3 Phase	delta	13.8 KV, 3 Phase	grd. wye

DIELECTRIC TESTS

<u>Applied Voltage (to other windings & ground)</u>	
H Winding (kV)	Per ANSI
X Winding (kV)	
Y Winding (kV)	

<u>Induced Voltage (phase-ground)</u>	
One-hour level (kV)	Per ANSI
Enhancement level (kV)	

<u>BASIC IMPULSE LEVEL</u>		<u>IMPEDANCE VOLTS (Percent)</u>	<u>PERFORMANCE DATA LOADING</u>		
(Bush / Wind.)					
H Line kV	1050/1050	H to X % 8 (245 / 13.8 KV) at 32.1 MVA	H Winding kV	245	MVA 32.1
H Neutral kV			X Winding kV	14	MVA 32.1
X Line kV	110/110		Y Winding kV		MVA
X Neutral kV	110/110				
Y Line kV					

<u>SOUND LEVEL</u> dB(A)	Per NEMA	<u>AUXILIARY LOSS</u> (kW)	FA: 3.63; FA: 3.63; Total: 7.26
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PERFORMANCE DATA

<u>Excitation</u>	<u>Exciting Current</u>	<u>No-Load Loss</u>	<u>Total Loss</u>	<u>Percent Regulation</u>
100% V	(%) 0.159	(kW) 34	(kW) 284	100% PF 80% PF
110% V	(%) 0.538	(kW) 48	@60 MVA. 245 / 13.8	1.5338 9.987
Exciting current at 32.1 MVA			KV. 85 °C	

APPROXIMATE DIMENSIONS (inches). WEIGHTS (pounds); Not for construction purposes

Outline Drawing No. SAT	E2009 - 016		
Height Overall	A	310	Shipping
Length / Depth	B	390	230
Width	C	182	123
Height over Case	D	150	150
Untanking Height		299	+ slings

Core and Coils	85360
Case and Fittings	49500
Oil (9194 Gals.)	67100
Total Weight	201960
Shipping (heaviest piece)	123123
Shipped in dry air or nitrogen	

Remarks: Liquid preservation System with Conservator Diaphragm Tank - -

SIEMENS
 Manufacture plant: Siemens Andina Transformers - Bogota Colombia

PROPOSAL N° 08-890A
 DATE 01/20/2009

POWER TRANSFORMER PERFORMANCE SPECIFICATION

FOR SOLANA GENERATING STATION - MPT1
 SPECIFICATION NO. ES - E411

ITEM NO. 2
 Z = 8% a OA

Type	Step Up	Cooling	H Winding		X Winding		Y Winding	
3 Limbs- Core		Core Type	kV	245	kV	13.8	kV	0
3 Phase		OA	MVA	96.4	MVA	96.4	MVA	
60 Hertz		FA	MVA	128.5	MVA	128.5	MVA	
55/65 °C. Temp Rise		FA	MVA	160.7	MVA	160.7	MVA	
Temp(°C). mn/Av/mx	-10/30/40							

ADDITIONAL APPROXIMATE VOLTAGES

H Winding	+/- 2 @2.5% DETC FC
X Winding	(none)
Y Winding	(none)

CONNECTIONS FOR OPERATION

Transf. in Bank	To Transform From	Connected	To Transform to	Connected
1	13.8 KV, 3 Phase	delta	245 KV, 3 Phase	grd. wye

DIELECTRIC TESTS

Applied Voltage (to other windings & ground)	
H Winding (kV)	Per ANSI
X Winding (kV)	
Y Winding (kV)	

Induced Voltage (phase-ground)	
One-hour level (kV)	Per ANSI
Enhancement level (kV)	

BASIC IMPULSE LEVEL		IMPEDANCE VOLTS (Percent)	PERFORMANCE DATA LOADING		
(Bush / Wind.)					
H Line kV	1050/1050	H to X % 8 (245 / 13.8 KV) at 96.4 MVA	H Winding kV	245	MVA 96.4
H Neutral kV	110/110		X Winding kV	14	MVA 96.4
X Line kV	110/110		Y Winding kV		MVA
X Neutral kV					
Y Line kV					

SOUND LEVEL dB(A)	Per NEMA	AUXILIARY LOSS (kW)	FA: 8.58; FA: 8.58; Total: 17.16
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PERFORMANCE DATA

Excitation	Exciting Current	No-Load Loss	Total Loss	Percent Regulation	
100% V	(%) 0.1596	(kW) 89	(kW) 634	100% PF	80% PF
110% V	(%) 0.618	(kW) 132	@180 MVA. 245 / 13.8	1.418	9.895
Exciting current at 96.4 MVA			KV, 85 °C		

APPROXIMATE DIMENSIONS (inches). WEIGHTS (pounds); Not for construction purposes

Outline Drawing No. SAT	E2009 - 014		
Height Overall	A	324	Shipping
Length / Depth	B	434	267
Width	C	244	138
Height over Case	D	150	150
Untanking Height		299	+ slings

Core and Coils	201740
Case and Fittings	82720
Oil (14029 Gals.)	102300
Total Weight	386760
Shipping (heaviest piece)	258284
Shipped in dry air or nitrogen	

Remarks: Liquid preservation System with Conservator Diaphragm Tank - -

SIEMENS
 Manufacture plant: Siemens Andina Transformers - Bogota Colombia

PROPOSAL N° 08-890A
 DATE 01/20/2009

POWER TRANSFORMER PERFORMANCE SPECIFICATION

FOR SOLANA GENERATING STATION - MPT2
SPECIFICATION NO. ES - E411

ITEM NO. 3
 Z = 14% a OA

Type	Step Up	Cooling	H Winding		X Winding		Y Winding	
3 Limbs- Core		Core Type	kV	245	kV	13.8	kV	0
3 Phase		OA	MVA	96.4	MVA	96.4	MVA	
60 Hertz		FA	MVA	128.5	MVA	128.5	MVA	
55/65 °C. Temp Rise		FA	MVA	160.7	MVA	160.7	MVA	
Temp(°C). mn/Av/mx	-10/30/40							

ADDITIONAL APPROXIMATE VOLTAGES

H Winding	+/- 2 @2.5% DETC FC
X Winding	(none)
Y Winding	(none)

CONNECTIONS FOR OPERATION

Transf. in Bank	To Transform From	Connected	To Transform to	Connected
1	13.8 KV, 3 Phase	delta	245 KV, 3 Phase	grd. wye

DIELECTRIC TESTS

Applied Voltage (to other windings & ground)	
H Winding (kV)	Per ANSI
X Winding (kV)	
Y Winding (kV)	

Induced Voltage (phase-ground)	
One-hour level (kV)	Per ANSI
Enhancement level (kV)	

BASIC IMPULSE LEVEL	IMPEDANCE VOLTS (Percent)	PERFORMANCE DATA LOADING
(Bush / Wind.)		
H Line kV 1050/1050	H to X % 14 (245 / 13.8 KV) at 96.4 MVA	H Winding kV 245 MVA 96.4
H Neutral kV 110/110		X Winding kV 14 MVA 96.4
X Line kV 110/110		Y Winding kV MVA
X Neutral kV		
Y Line kV		

SOUND LEVEL dB(A)	Per NEMA
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AUXILIARY LOSS (kW)	FA: 11.44; FA: 11.44; Total: 22.88
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PERFORMANCE DATA

Excitation	Exciting Current	No-Load Loss	Total Loss	Percent Regulation
100% V	(%) 0.1204	(kW) 66	(kW) 766	100% PF 80% PF
110% V	(%) 0.478	(kW) 99	@180 MVA. 245 / 13.8	3.8049 18.1317
Exciting current at 96.4 MVA			KV, 85 °C	

APPROXIMATE DIMENSIONS (inches). WEIGHTS (pounds); Not for construction purposes

Outline Drawing No. SAT	E2009 - 015		
Height Overall	A	324	Shipping
Length / Depth	B	434	268
Width	C	244	138
Height over Case	D	150	150
Untanking Height		299	+ slings

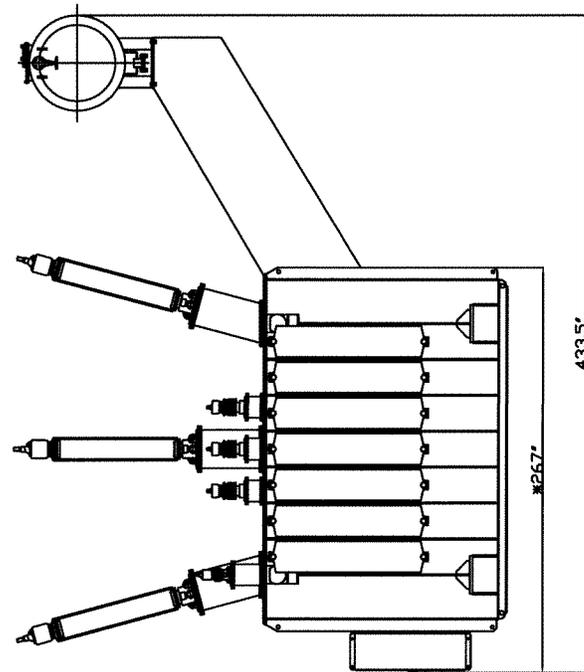
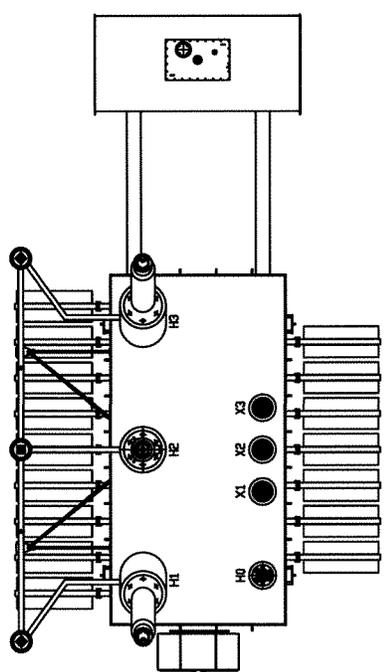
Core and Coils	174020
Case and Fittings	88220
Oil (14003 Gals.)	102080
Total Weight	364320
Shipping (heaviest piece)	230234
Shipped in dry air or nitrogen	

Remarks: Liquid preservation System with Conservator Diaphragm Tank - -

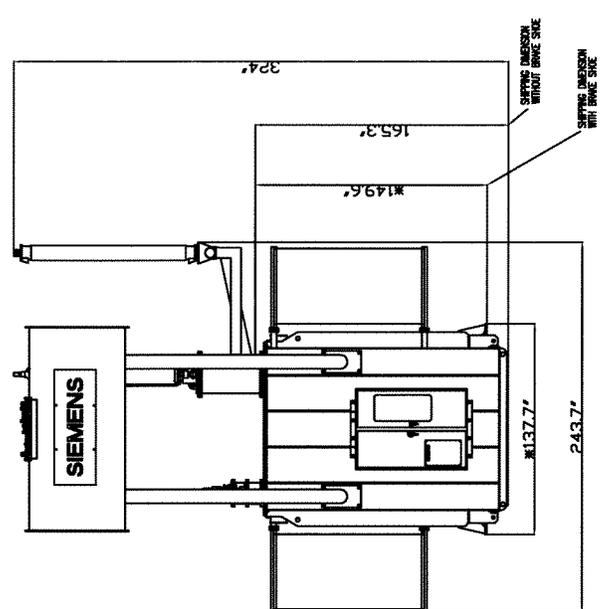
PRELIMINARY SKETCH
CLIENT: ABENER ENGINEERING-SOLANA

THREE PHASE POWER TRANSFORMER
 RATED POWER: 64/128.5/193.7 MVA
 NOMINAL VOLTAGE: 25/15/13.8 KV
 PHASE DISPLACEMENT: 120°
 FREQUENCY: 50 Hz
 COOLING: ONAN/ONAF/ONWF
 APPROXIMATE WEIGHT (LBS): 102300 (4629 Gals.)
 CORE AND COILS: 201740
 SHIPPING WEIGHT: 252024
 ALTITUDE: 1000 moist

NOTE:
 THIS SKETCH IS A PRELIMINARY PROPOSAL AND DOES NOT
 INCLUDE THE EXACT DETAILS OF CONSTRUCTION,
 DIMENSIONS OR MATERIALS TO BE USED IN THE FINAL
 DESIGN. THE CLIENT IS RESPONSIBLE FOR OBTAINING
 ALL NECESSARY PERMITS AND APPROVALS FROM THE
 LOCAL AUTHORITIES. THE CONTRACTOR SHALL BE
 RESPONSIBLE FOR OBTAINING ALL NECESSARY
 PERMITS AND APPROVALS FROM THE LOCAL
 AUTHORITIES.
 TOLERANCE: ± 1.0%
 SHIPPING DIMENSION
 INDICATED IN INCHES



MPT 1/2



Date	15/01/2000	Approved by	SIEMENS
Drawn	PTD-TPO	Checked	ARCHENDES
Scale	1:1	Project	PRELIMINARY SKETCH
Client	ABENER ENGINEERING-SOLANA	Sheet	1/1
Project	ABENER ENGINEERING-SOLANA	Doc. #	EDS-014

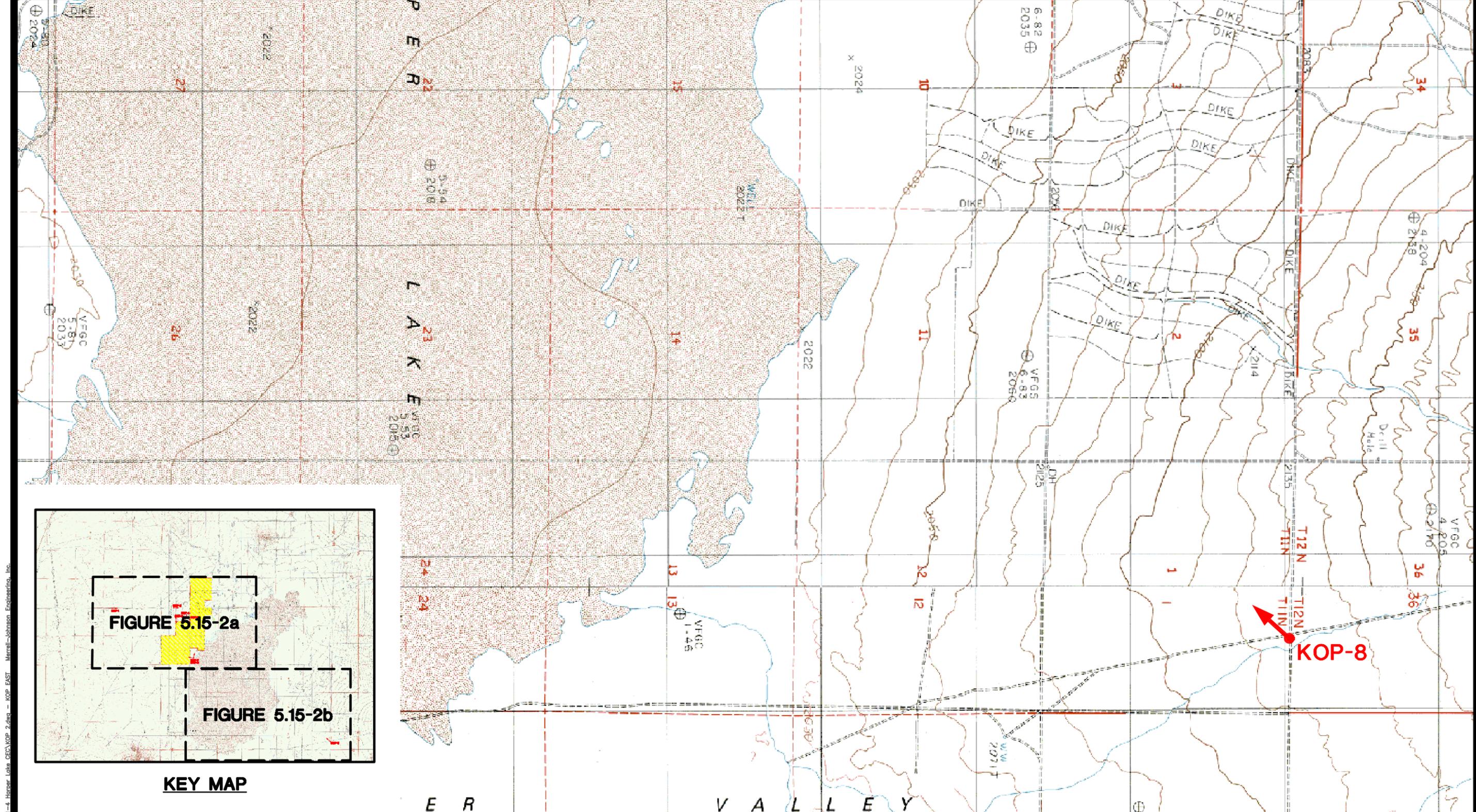
SIEMENS is a registered trademark of Siemens AG, Munich, Germany. All other trademarks are the property of their respective owners.

Data Adequacy Supplement

Attachment F

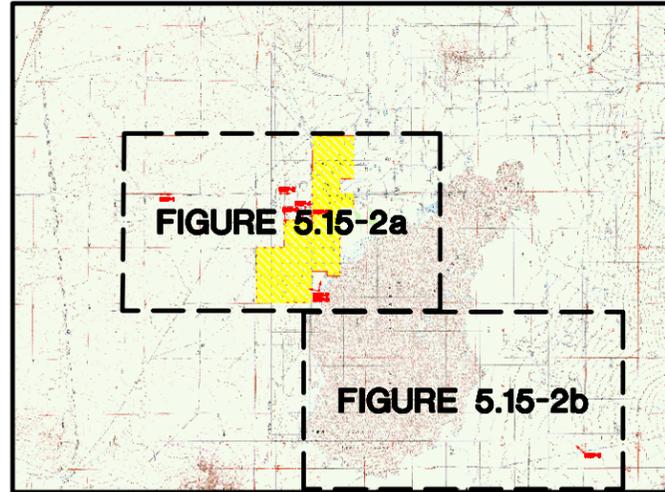
Visual Resources

Figures

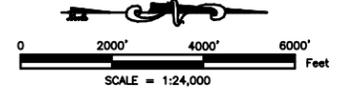


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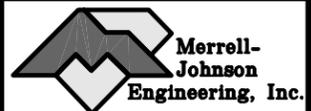
KEY MAP



MOJAVE SOLAR PROJECT

FIGURE 5.15-2b
KEY OBSERVATION
POINTS MAP

MOJAVE SOLAR LLC



PROJECT:
DATE: 07/17/2009

10:06am, 17 July 2009 P:\3001-4_Hopper Lake_GEC\N0P_2.dwg - KOP EAST - Merrell-Johnson Engineering, Inc.

Data Adequacy Supplement

Attachment G

Water Resources

Part 1: Annual Report

APPENDIX L

FIFTEENTH ANNUAL REPORT

OF THE

MOJAVE BASIN AREA WATERMASTER

WATER YEAR 2007-08

CITY OF BARSTOW, ET AL, VS. CITY OF ADELANTO, ET AL,
CASE NO. 208568 -- RIVERSIDE COUNTY SUPERIOR COURT

MAY 1, 2009

MOJAVE BASIN AREA

WATER PRODUCTION FACILITIES

CROSS INDEX BY OWNER

**MOJAVE BASIN AREA
WATER PRODUCTION FACILITIES
CROSS INDEX BY OWNER**

OWNER NAME	RECORD TYPE ¹ AND NUMBER	VERIFICATION NUMBER	STATE WELL NUMBER	LOCAL DESIGNATION	SUBAREA
ABBOND, EDWARD	NF	03330A-1	04N/03W-06Q03	WELL NO. 7	ALTO
ABBOTT FAMILY TRUST	NF	03197A-2	07N/05W-36H01	WELL #02 - DOMESTIC	ALTO
ABBOTT FAMILY TRUST	NF	03197A-1	07N/05W-36H02	WELL #01 - 40 HP	ALTO
ABDUL, HARRY & ANITA	G363124	00604E-1	03N/01W-01R01	WELL #02	ESTE
ABDUL, HARRY & ANITA	G363125	00604E-2	03N/01W-01R02	WELL #03	ESTE
ABDUL, HARRY & ANITA	G363126	00604E-3	03N/01W-12A01	WELL #04	ESTE
ABENGOA SOLAR, INC.	G362951	9111C-14	11N/04W-29J01	WELL #29	CENTRO
ABENGOA SOLAR, INC.	G362947	9111C-10	11N/04W-29P01	WELL #19	CENTRO
ABENGOA SOLAR, INC.	G362944	09111C-6	11N/04W-30B01	WELL #07	CENTRO
ABENGOA SOLAR, INC.	G362950	9111C-12	11N/04W-30D01	WELL #22	CENTRO
ABENGOA SOLAR, INC.	G362948	09111C-9	11N/04W-30E01	WELL #15	CENTRO
ABENGOA SOLAR, INC.	G362946	9111C-11	11N/04W-30M01	WELL #21	CENTRO
ABENGOA SOLAR, INC.	G362945	09111C-8	11N/04W-30N06	WELL #14	CENTRO
ABENGOA SOLAR, INC.	G362949	9111C-13	11N/04W-30N07	WELL #28	CENTRO
ABENGOA SOLAR, INC.	G362943	09111C-5	11N/04W-30P02	WELL #06	CENTRO
ABENGOA SOLAR, INC.	G362952	9111C-15	11N/04W-30Q03	WELL #33	CENTRO
ABENGOA SOLAR, INC.	G362940	09111C-2	11N/04W-33B02	WELL #02	CENTRO
ABENGOA SOLAR, INC.	G362939	09111C-1	11N/04W-33C02	WELL #01	CENTRO
ABENGOA SOLAR, INC.	G362941	09111C-3	11N/04W-33G04	WELL #03	CENTRO
ABENGOA SOLAR, INC.	G362942	09111C-4	11N/04W-33J01	WELL #04	CENTRO
ABSHIRE, DAVID V.	NF	00015E-1	05N/01E-33N02		ESTE
ADELANTO, CITY OF	NF	09140A-7	05N/05W-04A01	WELL #08	ALTO
ADELANTO, CITY OF	NF	09140A-5	05N/05W-18Q01	WELL #06	ALTO
ADELANTO, CITY OF	NF	09140A-6	05N/05W-18Q02	WELL #07	ALTO
ADELANTO, CITY OF	UNK		05N/06W-01L01	WELL #16	ALTO
ADELANTO, CITY OF	UNK	9140A-16	06N/04W-30K07	WELL #14	ALTO
ADELANTO, CITY OF	UNK		06N/04W-30K11	WELL# 14A	ALTO
ADELANTO, CITY OF	NF	09140A-2	06N/04W-30N04	WELL #03	ALTO
ADELANTO, CITY OF	NF	09140A-1	06N/04W-30N07	WELL #02	ALTO
ADELANTO, CITY OF	NF	09140A-3	06N/04W-30N08	WELL #04	ALTO
ADELANTO, CITY OF	NF	09140A-4	06N/04W-30N09	WELL #05	ALTO
ADELANTO, CITY OF	NF		06N/04W-30N11	WELL # 5A	ALTO
ADELANTO, CITY OF - GEORGE A F B	G362048	9140A-13	06N/04W-30G01	WELL #06G	ALTO
ADELANTO, CITY OF - GEORGE A F B	NF	9140A-14	06N/04W-30G02	WELL #07G	ALTO
ADELANTO, CITY OF - GEORGE A F B	G362047	9140A-12	06N/04W-30G03	WELL #05G	ALTO

**MOJAVE BASIN AREA
WATER PRODUCTION FACILITIES
CROSS INDEX BY OWNER**

OWNER NAME	RECORD TYPE ¹ AND NUMBER	VERIFICATION NUMBER	STATE WELL NUMBER	LOCAL DESIGNATION	SUBAREA
DE VRIES, NEIL	NF	00663C-2	08N/04W-15M01		CENTRO
DE VRIES, NEIL	NF	0663C-27	08N/04W-15M03		CENTRO
DENNISSON, QUENTIN D. - CLEGG, FRIZELL & JOKE	NF	00652B-1	09N/03E-10L01		BAJA
DENNISSON, QUENTIN D. - CLEGG, FRIZELL & JOKE	NF	00652B-2	09N/03E-10L03		BAJA
DESERT DAWN MUTUAL WATER COMPANY	NF	03987E-1	04N/01W-16J01	WELL #1	ESTE
DESERT DAWN MUTUAL WATER COMPANY	NF	03987E-2	04N/01W-16J02	WELL #2	ESTE
DESERT SPRINGS MUTUAL WATER COMPANY	NF	04025E-3	04N/01E-16F01	ABANDONED	ESTE
DESERT SPRINGS MUTUAL WATER COMPANY	NF	04025E-1	04N/01E-16F02	WELL#2- 15HP	ESTE
DESERT SPRINGS MUTUAL WATER COMPANY	NF	04025E-2	04N/01E-16F03	WELL #3 - 10HP	ESTE
DESERT VIEW DAIRY	NF	02653C-1	11N/04W-32A02	WELL #01	CENTRO
DEXTER FAMILY TRUST	G360819	09160A-1	05N/04W-36H01	WELL #01	ALTO
DICK VAN DAM DAIRY	NF	02719B-3	09N/02E-18F03	WELL #02 - 125 HP	BAJA
DICK VAN DAM DAIRY	NF	02719B-2	09N/02E-18H02	WELL #01 - 150 HP	BAJA
DICK VAN DAM DAIRY	UNK		09N/02E-18H04	INACTIVE AG WELL	BAJA
DICK VAN DAM DAIRY	NF	02719B-4	09N/02E-19E01	WELL #03 - 150 HP	BAJA
DICK VAN DAM DAIRY	NF	02719B-1	09N/02E-19L01	WELL #04 - 200 HP	BAJA
DJC CORPORATION	S013702	09091E-5	03N/01W-12H05	HORIZONTAL WELL #07	ESTE
DJC CORPORATION	A005713	09091E-8	03N/01W-12L01	INDIAN SPRINGS - HORZ WELL #10	ESTE
DOCIMO, ALLEN & KATHRYN	NF	04026B-1	09N/04E-19C01	15HP	BAJA
DOCIMO, DONALD P. & PATRICIA J.	NF	03263B-1	09N/02E-14N06		BAJA
DOLCH, ROBERT & JUDY	G360155	00677A-1	05N/04W-10C01	CEMENT WELL #01	ALTO
DOLCH, ROBERT & JUDY	NF	00677A-4	05N/04W-10F05	WELL #03 - 10 HP	ALTO
DOLCH, ROBERT & JUDY	NF	00677A-5	05N/04W-10F06	PERRY ACE WELL	ALTO
DONALDSON, JERRY & BEVERLY	NF	00687B-1	09N/03E-20H01	WELL #01 - 20 HP	BAJA
DORA LAND, INC.	G362865	09018A-6	07N/04W-07F01	7N/4W-7F-1	ALTO
DORA LAND, INC.	NF	09018A-4	07N/04W-07G01	DOMESTIC	ALTO
DORA LAND, INC.	G361905	9018A-11	07N/04W-07K01	WELL #16 - 30 HP	ALTO
DORA LAND, INC.	G361906	9018A-12	07N/04W-07L01	WELL #17 - 50 HP	ALTO
DORA LAND, INC.	G361909	09018A-3	07N/04W-07N01		ALTO
DORA LAND, INC.	G361907	09018A-1	07N/04W-07P01		ALTO
DORA LAND, INC.	G361908	09018A-2	07N/04W-07P02		ALTO
DOWELL, LEONARD	NF	03838B-1	09N/03E-01H01		BAJA
DOWSE, PHILIP	NF	00702A-1	03N/05W-24D01		ALTO
DRIFFIN, TRAVIS AND LINDA	NF	00886C-1	10N/01W-33P07	WELL #01	CENTRO
D'SILVA, MELANIE	NF	03286B-2	10N/01E-35N03		BAJA

**MOJAVE BASIN AREA
WATER PRODUCTION FACILITIES
CROSS INDEX BY OWNER**

OWNER NAME	RECORD TYPE ¹ AND NUMBER	VERIFICATION NUMBER	STATE WELL NUMBER	LOCAL DESIGNATION	SUBAREA
MILBRAT, IRVING H.	NF	03628B-1	09N/04E-06M02		BAJA
MITCHELL, CHARLOTTE	NF	03299B-2	09N/02E-03C02	WELL NEAR FRANKS	BAJA
MITCHELL, CHARLOTTE	NF	03299B-1	09N/02E-03K03	D724-1759	BAJA
MITCHELL, CHARLOTTE	NF	03299B-4	09N/02E-03K04	OLD AG WELL	BAJA
MITSUBISHI CEMENT CORPORATION	G361846	09123E-4	03N/01E-10I01	WELL #04	ESTE
MITSUBISHI CEMENT CORPORATION	G361701	09123E-2	03N/01E-10I02	WELL #02 - ABANDONED	ESTE
MITSUBISHI CEMENT CORPORATION	G361700	09123E-1	03N/01E-10R01	WELL #01	ESTE
MITSUBISHI CEMENT CORPORATION	G361702	09123E-3	03N/01E-11P01	WELL #03 - QUARRY WELL	ESTE
MITSUBISHI CEMENT CORPORATION	G362414	09123E-8	04N/01E-10A01	WELL #08	ESTE
MITSUBISHI CEMENT CORPORATION	G362416	9123E-10	04N/01E-10F01	WELL #10	ESTE
MITSUBISHI CEMENT CORPORATION	G362335	09123E-6	04N/01E-10H02	WELL #06 - CARTER RANCH WELL	ESTE
MITSUBISHI CEMENT CORPORATION	G362042	09123E-5	04N/01E-10I01	WELL #05	ESTE
MITSUBISHI CEMENT CORPORATION	G362415	09123E-9	04N/01E-10L01	WELL #09	ESTE
MITSUBISHI CEMENT CORPORATION	G362413	09123E-7	04N/01E-10R01	WELL #07	ESTE
MONACO INVESTMENT COMPANY	NF	01841E-1	04N/01E-06F01	WELL #01	ESTE
MORRIS TRUST, JULIA V.	NF	03199B-2	09N/03E-18Q01	DOMESTIC WELL #2	BAJA
MORRIS TRUST, JULIA V.	G363182	03199B-1	09N/03E-18Q03	WELL #01 - 75 HP	BAJA
MOSS, LAWRENCE W. & HELEN J.	NF	03764E-1	04N/01E-13H01		ESTE
MOST, MILTON & JENNIE	NF	09111C-7	11N/04W-32D03	WELL #11	CENTRO
MOUNTAIN VIEW, L.L.C.	UNK		10N/03W-34A02	ABANDONED AG	CENTRO
MOUNTAIN VIEW, L.L.C.	NF	03489C-4	10N/03W-34A03	WELL #04	CENTRO
MOUNTAIN VIEW, L.L.C.	NF	03489C-1	10N/03W-34A04	ACTIVE DOMESTIC WELL	CENTRO
MOUNTAIN VIEW, L.L.C.	NF	03489C-2	10N/03W-34A05	WELL #02	CENTRO
MOUNTAIN VIEW, L.L.C.	NF	03489C-3	10N/03W-34A07	WELL #03	CENTRO
MOUNTAIN VIEW, L.L.C.	NF	03489C-5	10N/03W-34B01	WELL #05	CENTRO
MOUNTAIN VIEW, L.L.C.	NF	03489C-6	10N/03W-34B03	WELL #06	CENTRO
MULLIGAN, ROBERT & INEZ	NF	01896B-1	09N/04E-07E01		BAJA
MURPHY, JEAN	NF	00081B-1	08N/03E-03K05	AG	BAJA
MURPHY, JEAN	NF	00081B-2	08N/03E-03K08	DOMESTIC	BAJA
NAVAJO MUTUAL WATER COMPANY	NF	03076A-2	05N/03W-10D01	WELL #02	ALTO
NAVAJO MUTUAL WATER COMPANY	NF	03076A-1	05N/03W-10D02	WELL #01	ALTO
NEW SPRINGS LIMITED PARTNERSHIP	G363234	03185B-1	10N/03E-14L01	NORTH LAKE PUMP	BAJA
NEW SPRINGS LIMITED PARTNERSHIP	G363233	03185B-2	10N/03E-14L02	SOUTH LAKE PUMP	BAJA
NEW SPRINGS LIMITED PARTNERSHIP	UNK		10N/03E-14L04	DOMESTIC WELL BY LAKE	BAJA
NEW SPRINGS LIMITED PARTNERSHIP	G363232	03185B-5	10N/03E-23C01	WELL #03	BAJA

TABLE 5

MOJAVE BASIN AREA

SUMMARY OF VERIFIED PRODUCTION

IN CENTRO SUBAREA, OWNER TOTAL

**TABLE 5
MOJAVE BASIN AREA
SUMMARY OF VERIFIED PRODUCTION IN CENTRO SUBAREA
OWNER TOTAL**

OWNER	VERIFIED BASE ANNUAL PRODUCTION		VERIFIED ANNUAL PRODUCTION				
	AMOUNT	YEAR	2004	2005	2006	2007	2008
ABENGOA SOLAR, INC.	9,380	1986	44	0	0	0	0
AGUAYO, JEANETTE L.	212	1986	2	2	1	1	1
APPLE VALLEY HEIGHTS COUNTY WATER DISTRICT	29	---	---	---	---	---	---
AQUA CAPITAL MANAGEMENT, LP	983	---	---	---	---	---	---
ATCHISON, TOPEKA, SANTA FE RAILWAY COMPANY	120	1988	0	0	0	0	0
BAR-LEN MUTUAL WATER COMPANY	43	1987	44	45	47	37	56
BEST, BYRON L.	21	1989	17	15	21	21	21
BROMMER FAMILY TRUST	361	1986	0	0	0	0	0
CAMPBELL, BRYAN M.	46	1989	30	27	23	21	27
CHOI, YONG-IL & JOUNG-AE	38	1990	0	0	0	0	0
CHRISTISON, JOEL	75	1990	20	15	16	9	19
CONTRATTO, ERSULA	201	1990	70	42	54	63	56
DARR, JAMES S.	408	1990	16	20	20	20	20
DE VRIES, NEIL *	3,800	1989	2,104	2,174	2,835	2,614	2,904
DESERT VIEW DAIRY	874	1986	570	544	523	707	697
DORRANCE, DAVID W. & TAMELA L.	19	---	---	---	---	---	---
DRIFFIN, TRAVIS AND LINDA	92	1986	18	16	19	19	13
EYGNOR, ROBERT E. & PATSY C.	50	1990	0	0	0	0	0
FRATES, D. COLE	13	---	---	---	---	---	---
FRIEND, JOSEPH & DEBORAH	60	1989	16	14	13	13	17
GABRYCH, EUGENE	132	---	0	0	0	0	0
GOLDEN STATE WATER COMPANY	14,407	1990	9,389	8,575	8,829	9,256	8,466
GORMAN, VIRGIL *	358	1989,1990	162	125	400	400	400
GRIEDER, RAYMOND H. & DORISANNE	30	1990	17	13	14	14	18
GUTIERREZ, JOSE & GLORIA	130	1989	4	71	104	104	104
HANIFY, MICHAEL D., DBA - WHITE BEAR RANCH	152	1989	1	1	1	1	1

**TABLE 5
MOJAVE BASIN AREA
SUMMARY OF VERIFIED PRODUCTION IN CENTRO SUBAREA
OWNER TOTAL**

OWNER	VERIFIED BASE ANNUAL PRODUCTION		VERIFIED ANNUAL PRODUCTION				
	AMOUNT	YEAR	2004	2005	2006	2007	2008
HARE, THOMAS R. & HELEN P.	84	1990	12	11	12	15	7
HARMSEN, JAMES & RUTH ANN	1,000	1988	704	340	733	853	701
HARPER LAKE COMPANY VIII	1,433	1990	1,109	942	960	980	1,032
HERMANAS MISIONERAS SERVIDORAS DE LA PALABRA	121	1986	58	49	10	13	62
HIDESERT MUTUAL WATER COMPANY	34	1990	31	25	31	33	34
HIGH DESERT ASSOCIATES, INC.	513	1986	---	---	---	---	---
HILL, MELVIN	2,335	1989	55	47	24	44	10
HOWARD REVOCABLE TRUST	43	1988	32	30	30	30	30
HUERTA, HECTOR	156	1989	16	125	125	125	18
JONES, JOETTE	22		2	2	---	---	---
JORDAN FAMILY TRUST	460	1990	55	37	60	51	30
KASNER FAMILY LIMITED PARTNERSHIP	421	1989	52	1	0	0	0
KENWOOD MANAGEMENT, LLC	52	1989,1990	28	26	32	26	26
KIM, JIN S. & HYUN H.	190	1989	0	0	0	0	0
LEE, ET AL., SEPOONG & WOO POONG	77	1989	14	14	2	2	2
LEYERLY, GENEVA *	65	1990	65	26	10	9	7
LEYERLY, RICHARD *	862	1988	723	622	1,077	805	805
LO, PETER C. N. & DEBBIE D. J.	91	1988	7	7	0	0	0
LOVE, CHARLES & DEANNA	19	1989	1	1	1	1	1
MCCOLLUM, CHARLES L.	115	1990	---	---	---	---	---
MEAD, G. C. (BUCK)	115	1989	66	62	81	52	35
MOST, MILTON & JENNIE	280	1986	0	0	0	0	0
MOUNTAIN VIEW, L.L.C.	60	1986	0	0	1	1	1
ODESSA WATER DISTRICT	299	1987	387	131	0	0	0
OHAI, REYNOLDS & DOROTHY	137	1989	40	10	10	10	10
OSTERKAMP, GEROLD *	260	1990	127	125	125	125	125

Data Adequacy Supplement

Attachment G

Water Resources

Part 2: 9,380 AFY Water Rights

(A portion of this attachment is submitted under separate confidential cover.)

**STEWART TITLE - Riverside
COMMERCIAL DIVISION**



LARRY WALKER
Auditor/Controller - Recorder

739 Stewart Title Company

RECORDING REQUESTED BY AND
WHEN RECORDED RETURN TO:

Doc #: 2007-0284167

Titles: 1 Pages: 13



Fees	██████████
Taxes	██████████
Other	██████████
PAID	██████████

Michael J. Lewin, Esq.
Mirau, Edwards, Cannon, Lewin & Tooke
1806 Orange Tree Lane, Suite C
Redlands, California 92374

11411776

Assessor's Parcel Numbers: 0490-121-42; 0490-131-06; 0490-131-07; 0490-131-08; 0490-161-13; 0490-161-10; 0490-161-11; 0490-161-12; 0490-183-65; 0490-184-47; 0490-223-07; 0490-223-12; 0490-223-13; 0490-223-22; 0490-223-29; 0490-223-30

(SPACE ABOVE THIS LINE FOR RECORDER'S USE ONLY)

DOCUMENTARY TRANSFER TAX \$ ██████████

Computed on the consideration or value of property conveyed; OR
 Computed on the consideration or value less liens or encumbrances remaining at time of sale.

Signature of Declarant or Agent determining tax
Firm Name *Stewart Title of California*

GRANT DEED

FOR A VALUABLE CONSIDERATION, receipt of which is hereby acknowledged,

HARPER LAKE, LLC, a California limited liability company

does hereby GRANT to

SOLUCAR INC., a Delaware corporation

that certain real property located in an unincorporated area of the County of San Bernardino, State of California, described on Exhibit "A", attached hereto and incorporated herein by this reference.

H.O. Dated: *MAY* April 9, 2007

HARPER LAKE, LLC, a California limited liability company

By: *Henry Orlosky*
Name: HENRY ORLOSKY
Its: CEO

STEWART TITLE - Riverside
COMMERCIAL DIVISION

RECORDING REQUESTED BY AND
WHEN RECORDED RETURN TO:

Michael J. Lewin, Esq.
Mirau, Edwards, Cannon, Lewin & Tooke
1806 Orange Tree Lane, Suite C
Redlands, California 92374

111411776

Assessor's Parcel Numbers: 0490-121-42; 0490-131-06; 0490-131-07; 0490-131-08; 0490-161-13; 0490-161-10; 0490-161-11; 0490-161-12; 0490-183-65; 0490-184-47; 0490-223-07; 0490-223-12; 0490-223-13; 0490-223-22; 0490-223-29; 0490-223-30

(SPACE ABOVE THIS LINE FOR RECORDER'S USE ONLY)

DOCUMENTARY TRANSFER TAX \$



Computed on the consideration or value of property conveyed; OR
 Computed on the consideration or value less liens or encumbrances remaining at time of sale.

Signature of Declarant or Agent determining tax
Firm Name: *Stewart Title of California*

GRANT DEED

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H.O. Dated: ^{MAY} ~~April~~ 9, 2007

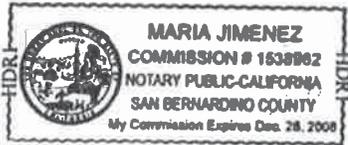
HARPER LAKE, LLC, a California limited liability company

By:
Name: HENRY ORLOSKY
Its: CEO

STATE OF California
COUNTY OF San Bernardino

On May 9, 2007, before me, Maria Jimenez, a Notary Public, in and for said County and State, personally appeared Henry Arlosky, personally known to me or proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or entity upon behalf of which the person(s) acted, executed the instrument.

WITNESS my hand and official seal.



Maria Jimenez, Notary Public

LEGAL DESCRIPTION

EXHIBIT "A"

LEGAL DESCRIPTION

The land referred to herein is situated in the State of California, County of SAN BERNARDINO, Unincorporated Area, described as follows:

PARCEL 1:

PARCEL A-1: APN: 0490-121-42

PARCEL 4 OF PARCEL MAP NO. 12194, IN THE COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AS SHOWN BY MAP ON FILE IN BOOK 142 PAGE(S) 44 TO 53, INCLUSIVE, OF PARCEL MAPS, RECORDS OF SAN BERNARDINO COUNTY, CALIFORNIA;

EXCEPT THOSE PORTIONS OF SAID LAND CONVEYED TO LUZ DEVELOPMENT AND FINANCE CORPORATION, A CALIFORNIA CORPORATION, BY DEEDS RECORDED SEPTEMBER 6, 1988 AS INSTRUMENT NO. 88-297179 AND DECEMBER 14, 1988 AS INSTRUMENT NO. 88-435199, BOTH OF OFFICIAL RECORDS;

ALSO EXCEPT AN UNDIVIDED 1/2 INTEREST IN AND TO ALL OIL, GAS, MINERALS AND HYDROCARBON SUBSTANCES IN, ON OR BENEATH A PORTION OF SAID PROPERTY, AS RESERVED IN THE DEED FROM JAMES COMPANY ALSPACH TO L.M. LOCKHART RECORDED JULY 25, 1950 IN BOOK 2611 PAGE 378 OF OFFICIAL RECORDS;

ALSO EXCEPTING THEREFROM 1/2 OF THE OIL, GAS, MINERAL AND HYDROCARBON SUBSTANCES AS RESERVED IN THE DEED FROM MARGARET PACK, GERTRUDE PECK AND MURIEL MC INTOSH, IN EQUAL SHARES, TO L.M. LOCKHART, AN UNMARRIED MAN, RECORDED MAY 3, 1954 IN BOOK 3375 PAGE 283 OF OFFICIAL RECORDS.

PARCEL B-1: APN: 0490-13106, -07

THE SOUTH HALF OF SECTION 29, TOWNSHIP 11 NORTH, RANGE 4 WEST, SAN BERNARDINO BASE AND MERIDIAN, ACCORDING TO THE OFFICIAL PLAT THEREOF.

PARCEL C-1: APN: 0490-131-08

THE WEST HALF OF THE NORTHWEST QUARTER OF SECTION 29, TOWNSHIP 11 NORTH, RANGE 4 WEST, SAN BERNARDINO BASE AND MERIDIAN, ACCORDING TO THE OFFICIAL PLAT THEREOF.

PARCEL D-1: APN: 0490-161-13

THE SOUTHWEST QUARTER OF SECTION 33, TOWNSHIP 11 NORTH, RANGE 4 WEST, SAN BERNARDINO BASE AND MERIDIAN, ACCORDING TO THE OFFICIAL PLAT THEREOF.

Continued on next page

PARCEL E-1: APN: 0490-161-10

THE NORTHWEST QUARTER OF SECTION 33, TOWNSHIP 11 NORTH, RANGE 4 WEST, SAN BERNARDINO BASE AND MERIDIAN, ACCORDING TO THE OFFICIAL PLAT THEREOF.

PARCEL F-1: APN: 0490-161-11

THE NORTHEAST QUARTER OF SECTION 33, TOWNSHIP 11 NORTH, RANGE 4 WEST, SAN BERNARDINO BASE AND MERIDIAN, ACCORDING TO THE OFFICIAL PLAT THEREOF;

EXCEPTING 1/2 OF ALL CRUDE OIL, PETROLEUM, GAS, BREA, ASPHALTUM AND ALL KINDRED SUBSTANCES, AND OTHER MINERALS UNDER AND IN SAID LAND, WITHOUT, HOWEVER, ANY RIGHT OF SURFACE ENTRY, TO BE RETAINED 1/4 BY CARROL B. MALLONEE AND SUE M. MALLONEE, HIS WIFE, AND 1/4 BY DON R. KING AND VIRGINIA L. KING, HIS WIFE, AS RESERVED IN THE DEED RECORDED APRIL 1, 1986 IN BOOK 6599 PAGE 964 OF OFFICIAL RECORDS.

PARCEL G-1: APN: 0490-161-12

THE SOUTHEAST QUARTER OF SECTION 33, TOWNSHIP 11 NORTH, RANGE 4 WEST, SAN BERNARDINO BASE AND MERIDIAN, ACCORDING TO THE OFFICIAL PLAT THEREOF;

EXCEPTING THEREFROM A STRIP(S) OF LAND 200 FEET IN WIDTH LYING EQUALLY ON EACH SIDE OF EACH MAIN TRACK, SIDE TRACK, SPUR, SWITCH AND BRANCH LINE OF SOUTHERN PACIFIC COMPANY AS THE SAME ARE NOW, OR MAY HEREAFTER BE, CONSTRUCTED UPON, ACROSS OR ADJACENT TO SAID LAND, AS CONTAINED IN THE DEED FROM SOUTHERN PACIFIC LAND COMPANY, A CORPORATION, RECORDED JUNE 11, 1958 IN BOOK 4528 PAGE 498 OF OFFICIAL RECORDS;

ALSO EXCEPTING THE RIGHT TO USE ALL WATER NATURALLY RISING UPON OR FLOWING ACROSS SAID LAND WHICH MAY BE NEEDED FOR THE OPERATION AND REPAIR OF SUCH RAILROAD, AND THE RIGHT TO CONDUCT THE SAME, AS WELL AS WATER RISING UPON OTHER LAND, ACROSS THE LAND HEREIN DESCRIBED, IN PIPES OR AQUEDUCTS, FOR THE PURPOSE AFORESAID, TOGETHER WITH ALL NECESSARY RIGHTS OF WAY THEREFORE, IN DEED RECORDED JUNE 11, 1958 IN BOOK 4528 PAGE 498 OF OFFICIAL RECORDS.

PARCEL 2:

PARCEL A-2: APN: 0490-183-65

PARCEL 3 OF PARCEL MAP NO. 12194, IN THE COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AS SHOWN BY MAP ON FILE IN BOOK 142 PAGE(S) 44 TO 53, INCLUSIVE, OF PARCEL MAPS, RECORDS

Continued on next page

OF SAN BERNARDINO COUNTY, CALIFORNIA;

EXCEPTING FROM A PORTION OF SAID LAND ALL OIL, HYDROCARBON SUBSTANCES AND MINERALS OF EVERY KIND AND CHARACTER LYING MORE THAN 500 FEET BELOW THE SURFACE OF SAID LAND, TOGETHER WITH THE RIGHT TO DRILL INTO, THROUGH AND TO USE AND OCCUPY ALL PARTS OF SAID LAND LYING MORE THAN 500 FEET BELOW THE SURFACE THEREOF FOR ANY AND ALL PURPOSES INCIDENTAL TO THE EXPLORATION FOR AND PRODUCTION FOR AND PRODUCTION OF OIL, GAS AND HYDROCARBON SUBSTANCES OR MINERALS FROM SAID LANDS, BUT WITHOUT, HOWEVER, THE RIGHT TO USE EITHER THE SURFACE OF SAID LAND OR ANY PORTION OF SAID LAND, WITHIN 500 FEET OF THE SURFACE FOR ANY PURPOSE OR PURPOSES, WHATSOEVER AS RESERVED BY ROBERT D. WILLIAMS AND SILVIA S. WILLIAMS, IN DEED RECORDED JULY 12, 1988 AS INSTRUMENT NO. 88-222914 OF OFFICIAL RECORDS;

ALSO EXCEPTING THEREFROM A PORTION OF SAID LAND 50% OF ALL OIL, HYDROCARBON SUBSTANCES AND MINERALS OF EVERY KIND AND CHARACTER LYING MORE THAN 500 FEET BELOW THE SURFACE OF SAID LAND, WITHOUT THE RIGHT OF SURFACE ENTRY AS RESERVED BY CARL W. DENNY AND FLORENCE B. DENNEY IN DEED RECORDED JULY 12, 1988 AS INSTRUMENT NO. 88-222916 OF OFFICIAL RECORDS;

ALSO EXCEPTING FROM A PORTION OF SAID LAND 50% INTEREST OF ALL OIL, HYDROCARBON SUBSTANCES AND MINERALS OF EVERY KIND AND CHARACTER LYING MORE THAN 500 FEET BELOW THE SURFACE OF SAID LAND, WITHOUT THE RIGHT OF SURFACE ENTRY AS RESERVED BY GEORGE M. CROWE AND IONE CROWE BY DEEDS RECORDED JULY 12, 1988 AS INSTRUMENT NO. 88-222920, 88-222921, 88-222922 AND 88-222923 OF OFFICIAL RECORDS.

PARCEL B-2A: APN: 0490-184-47

THE NORTHEAST QUARTER OF SECTION 26, TOWNSHIP 11 NORTH, RANGE 5 WEST, SAN BERNARDINO BASE AND MERIDIAN, ACCORDING TO THE OFFICIAL PLAT THEREOF;

EXCEPT THEREFROM THE WEST HALF OF THE EAST HALF OF THE NORTHEAST QUARTER OF SECTION 26, TOWNSHIP 11 NORTH, RANGE 5 WEST, SAN BERNARDINO BASE AND MERIDIAN, ACCORDING TO THE OFFICIAL PLAT THEREOF;

EXCEPT 1/2 OF ALL CRUDE OIL, PETROLEUM, GAS, BREA, ASPHALTUM AND ALL KINDRED SUBSTANCES AND OTHER MINERALS UNDER AND IN SAID LAND LYING BELOW A DEPTH OF 500 FEET, BUT WITHOUT RIGHT OF SURFACE ENTRY, AS RESERVED BY ADA P. BLACKMAN IN THE DEED RECORDED MAY 28, 1968 IN BOOK 7033 PAGE 305 OF OFFICIAL RECORDS;

EXCEPT 1/2 OF ALL CRUDE OIL AND MINERALS BELOW A DEPTH OF 500 FEET FROM THE SURFACE OF SAID LAND, BUT WITHOUT THE RIGHT OF

Continued on next page

SURFACE ENTRY THERETO, AS RESERVED BY GEORGE S. VAN DORN AND MARY VAN DORN, HUSBAND AND WIFE, IN THE DEEDS RECORDED DECEMBER 2, 1969 IN BOOK 7346 PAGE 375 AND IN BOOK 7346 PAGE 379 OF OFFICIAL RECORDS.

PARCEL B-2B: APN: 0490-184-47

THE WEST HALF OF THE EAST HALF OF THE NORTHEAST QUARTER OF SECTION 26, TOWNSHIP 11 NORTH, RANGE 5 WEST, SAN BERNARDINO BASE AND MERIDIAN, ACCORDING TO THE OFFICIAL PLAT THEREOF;

EXCEPT 1/2 OF ALL CRUDE OIL, PETROLEUM, GAS, BREA, ASPHALTUM AND ALL KINDRED SUBSTANCES AND OTHER MINERALS UNDER AND IN SAID LAND LYING BELOW A DEPTH OF 500 FEET, BUT WITHOUT RIGHT OF SURFACE ENTRY, AS RESERVED BY ADA P. BLACKMAN IN THE DEED RECORDED MAY 28, 1968 IN BOOK 7033 PAGE 305 OF OFFICIAL RECORDS;

EXCEPT 1/2 OF ALL CRUDE OIL AND MINERALS BELOW A DEPTH OF 500 FEET FROM THE SURFACE OF SAID LAND, BUT WITHOUT THE RIGHT OF SURFACE ENTRY THERETO, AS RESERVED BY GEORGE S. VAN DORN AND MARY VAN DORN, HUSBAND AND WIFE, IN THE DEEDS RECORDED DECEMBER 2, 1969 IN BOOK 7346 PAGE 375 AND IN BOOK 7346 PAGE 379 OF OFFICIAL RECORDS.

PARCEL C-2: APN: 0490-223-07

THE EAST HALF OF THE SOUTH HALF OF SECTION 14, TOWNSHIP 11 NORTH, RANGE 5 WEST, SAN BERNARDINO BASE AND MERIDIAN, ACCORDING TO THE OFFICIAL PLAT THEREOF.

PARCEL D-2A: APN: 0490-223-12

THE NORTH HALF OF THE NORTH HALF OF THE EAST HALF OF SECTION 23, TOWNSHIP 11 NORTH, RANGE 5 WEST, SAN BERNARDINO BASE AND MERIDIAN, ACCORDING TO THE OFFICIAL PLAT THEREOF;

EXCEPTING TO THE UNITED STATES SUCH OIL, GAS AND ALL OTHER MINERAL DEPOSITS TOGETHER WITH THE RIGHTS TO PROSPECT FOR, MINE AND REMOVE THE SAME, AS WERE REQUIRED TO BE RESERVED TO THE UNITED STATES BY THE ACT OF JULY 17, 1914, (38 STAT. 509) AND AS RESERVED IN THE PATENT FROM THE UNITED STATES RECORDED APRIL 14, 1926 IN BOOK 76 PAGE 307 OF OFFICIAL RECORDS.

PARCEL D-2B: APN: 0490-223-13

THE SOUTH HALF OF THE NORTH HALF OF THE EAST HALF OF SECTION 23, TOWNSHIP 11 NORTH, RANGE 5 WEST, SAN BERNARDINO BASE AND MERIDIAN, ACCORDING TO THE OFFICIAL PLAT THEREOF;

EXCEPTING TO THE UNITED STATES SUCH OIL, GAS AND ALL OTHER

Continued on next page

MINERAL DEPOSITS TOGETHER WITH THE RIGHTS TO PROSPECT FOR, MINE AND REMOVE THE SAME, AS WERE REQUIRED TO BE RESERVED TO THE UNITED STATES BY THE ACT OF JULY 17, 1914, (38 STAT. 509) AND AS RESERVED IN THE PATENT FROM THE UNITED STATES RECORDED APRIL 14, 1926 IN BOOK 76 PAGE 307 OF OFFICIAL RECORDS.

PARCEL E-2: APN: 0490-223-22

THE SOUTH HALF OF THE SOUTH HALF OF THE EAST HALF OF SECTION 23, TOWNSHIP 11 NORTH, RANGE 5 WEST, SAN BERNARDINO BASE AND MERIDIAN, ACCORDING TO THE OFFICIAL PLAT THEREOF.

PARCEL F-2: APN: 0490-223-29

THE NORTH HALF OF THE NORTH HALF OF THE SOUTH HALF OF THE EAST HALF OF SECTION 23, TOWNSHIP 11 NORTH, RANGE 5 WEST, SAN BERNARDINO BASE AND MERIDIAN, ACCORDING TO THE OFFICIAL PLAT THEREOF;

EXCEPTING TO THE UNITED STATES SUCH OIL, GAS AND ALL OTHER MINERAL DEPOSITS TOGETHER WITH THE RIGHTS TO PROSPECT FOR, MINE AND REMOVE THE SAME, AS WERE REQUIRED TO BE RESERVED TO THE UNITED STATES BY THE ACT OF JULY 17, 1914, (38 STAT. 509) AND AS RESERVED IN THE PATENT FROM THE UNITED STATES RECORDED APRIL 14, 1926 IN BOOK 76 PAGE 307 OF OFFICIAL RECORDS.

PARCEL G-2: APN: 0490-223-30

THE SOUTH HALF OF THE NORTH HALF OF THE SOUTH HALF OF THE EAST HALF OF SECTION 23, TOWNSHIP 11 NORTH, RANGE 5 WEST, SAN BERNARDINO BASE AND MERIDIAN, ACCORDING TO THE OFFICIAL PLAT THEREOF;

EXCEPTING TO THE UNITED STATES SUCH OIL, GAS AND ALL OTHER MINERAL DEPOSITS TOGETHER WITH THE RIGHTS TO PROSPECT FOR, MINE AND REMOVE THE SAME, AS WERE REQUIRED TO BE RESERVED TO THE UNITED STATES BY THE ACT OF JULY 17, 1914, (38 STAT. 509) AND AS RESERVED IN THE PATENT FROM THE UNITED STATES RECORDED APRIL 14, 1926 IN BOOK 76 PAGE 307 OF OFFICIAL RECORDS.

End of Legal Description

PRELIMINARY CHANGE OF OWNERSHIP REPORT

FOR RECORDER'S USE ONLY

[To be completed by transferee (buyer) prior to transfer of subject property in accordance with Section 480.3 of the Revenue and Taxation Code.] A Preliminary Change of Ownership Report must be filed with each conveyance in the County Recorder's office for the county where the property is located; this particular form may be used in all 58 counties of California

THIS REPORT IS NOT A PUBLIC DOCUMENT

SELLER/TRANSFEROR: Harper Lake, LLC
BUYER/TRANSFeree: Solucar Inc.
ASSESSOR'S PARCEL NUMBER(S): AP#s as per attached list
PROPERTY ADDRESS OR LOCATION: undeveloped land, Harper Lake Area, California
MAIL TAX INFORMATION TO: Name: Solucar Inc. Address: Solucar Inc. c/o Michael J. Lewin 1806 Orange Tree Lane #C Redlands, California 92374-2821 Phone Number (8 a.m. - 5 p.m.)

NOTICE: A lien for property taxes applies to your property on January 1 of each year for the taxes owing in the following fiscal year, July 1 through June 30. One-half of these taxes is due November 1, and one-half is due February 1. The first installment becomes delinquent on December 10, and the second installment becomes delinquent on April 10. One tax bill is mailed before November 1 to the owner of record. You may be responsible for the current or upcoming property taxes even if you do not receive the tax bill. The property which you acquired may be subject to a supplemental assessment in an amount to be determined by the San Bernardino County Assessor. For further information on your supplemental roll obligation, please call the San Bernardino County Assessor.

PART I: TRANSFER INFORMATION (please answer all questions)

- YES NO
A. Is this transfer solely between husband and wife (addition of a spouse, death of a spouse, divorce settlement, etc.)?
B. Is this transaction only a correction of the name(s) of the person(s) holding title to the property (for example, a name change upon marriage)? Please explain
C. Is this document recorded to create, terminate or reconvey a lender's interest in the property?
D. Is this transaction recorded only as a requirement for financing purposes or to create, terminate, or reconvey a security interest (e.g. cosigner)? Please explain
E. Is this document recorded to substitute a trustee of a trust, mortgage or other similar document?
F. Did this transfer result in the creation of a joint tenancy in which the seller (transferor) remains as one on the joint tenants?
G. Does this transfer return property to the person who created the joint tenancy (original transferor)?
H. Is this transfer of property:
1. to a revocable trust that may be revoked by the transferor and is for the benefit of the transferor or transferor's spouse?
2. to a trust that may be revoked by the Creator/Grantor who is also a joint tenant, and which names the other joint tenant(s) as beneficiaries when the Creator/Grantor dies?
3. to an irrevocable trust for the benefit of the Creator/Grantor and/or Grantor's spouse?
4. to an irrevocable trust from which the property reverts to the Creator/Grantor within 12 years?
I. If this property is subject to a lease, is the remaining lease term 35 years or more including written options?
*J. Is this transfer between parent(s) and child(ren)? or from grandparent(s) to grandchild(ren)?
*K. Is this transaction to replace a principal residence by a person 55 years of age or older? Within the same county? Yes No
*L. Is this transaction to replace a principal residence by a person who is severely disabled as defined by Revenue and Taxation Code section 69.5? Within the same county? Yes No
M. Is this transfer solely between domestic partners currently registered with the California Secretary of State?

*If you checked yes to J, K, or L, you may qualify for a property tax reassessment exclusion, which may result in lower taxes on your property. If you do not file a claim, your property will be reassessed.

Please provide any other information that will help the Assessor to understand the nature of the transfer.

If the conveying document constitutes an exclusion from a change in ownership as defined in section 62 of the Revenue and Taxation Code for any reason other than those listed above, set forth the specific exclusions claimed:

Please answer all questions in each section. If a question does not apply, indicate with "N/A." Sign and date at bottom of second page.

PART II: OTHER TRANSFER INFORMATION

- A. Date of transfer if other than recording date
B. Type of transfer (please check appropriate box):
Purchase Foreclosure Gift Trade or Exchange Merger, Stock or Partnership Acquisition
Contract of Sale - Date of Contract
Inheritance - Date of Death Other (please explain):
Creation of Lease Assignment of a Lease Termination of a Lease Sale/Leaseback
Date lease began
Original term in years (including written options)
Remaining term in years (including written options)
Monthly Payment Remaining Term
C. Was only a partial interest in the property transferred? Yes No If yes, indicate the percentage transferred %

Please answer, to the best of your knowledge, all applicable questions; then sign and date, if a question does not apply, indicate with "N/A."

PART III: PURCHASE PRICE AND TERMS OF SALE

A. CASH DOWN PAYMENT OR value of trade or exchange (excluding closing costs) Amount \$

B. FIRST DEED OF TRUST @ % interest for years. Pymts./Mo.= \$ (Prin. & Int. only) Amount \$

FHA (Discount Points) Fixed rate New loan

Conventional Variable rate Assumed existing loan balance

VA (Discount Points) All inclusive D.T. (\$ Wrapped) Bank or savings & loan

Cal-Vet Loan carried by seller Finance company

Balloon payment Yes No Due Date Amount \$

C. SECOND DEED OF TRUST @ % interest for years. Pymts./Mo.= \$ (Prin. & Int. only) Amount \$

Bank or savings & loan Fixed rate New loan

Loan carried by seller Variable rate Assumed existing loan balance

Balloon payment Yes No Due Date Amount \$

D. OTHER FINANCING: Is other financing involved not covered in (b) or (c) above? Yes No Amount \$

Type @ % interest for years. Pymts./Mo.= \$ (Prin. & Int. only)

Bank or savings & loan Fixed rate New loan

Loan carried by seller Variable rate Assumed existing loan balance

Balloon payment Yes No Due Date Amount \$

E. WAS AN IMPROVEMENT BOND ASSUMED BY THE BUYER? Yes No Outstanding Balance: Amount \$

F. TOTAL PURCHASE PRICE (or acquisition price, if traded or exchanged, include real estate commission if paid.)

Total Items A through E \$

G. PROPERTY PURCHASED Through a broker Direct from seller From a family member Other (please explain):

If purchased through a broker, provide broker's name and phone number:

Please explain any special terms, seller concessions or financing and any other information that would help the Assessor understand the purchase price and terms of sale

PART IV: PROPERTY INFORMATION

A. TYPE OF PROPERTY TRANSFERRED:

Single-family residence Agricultural Timeshare

Multiple-family residence (no. of units:) Co-op/Own-your own Manufactured home

Commercial/Industrial Condominium Unimproved lot

Other (Description: i.e., timber, mineral, water rights, etc.)

B. IS THIS PROPERTY INTENDED AS YOUR PRINCIPAL RESIDENCE? Yes No

If yes, enter date of occupancy / / , 20 or intended occupancy / / , 20

(month) (day) (year) (month) (day) (year)

C. IS PERSONAL PROPERTY INCLUDED IN PURCHASE PRICE (i.e., furniture, farm equipment, machinery, etc.) (other than a manufactured home subject to local property tax)? Yes No

If yes, enter the value of the personal property included in the purchase price \$ (Attach itemized list of personal property).

D. IS A MANUFACTURED HOME INCLUDED IN PURCHASE PRICE? Yes No

If yes, how much of the purchase price is allocated to the manufactured home? \$

Is the manufactured home subject to local property tax? Yes No What is the decal number?

E. DOES THE PROPERTY PRODUCE INCOME? Yes No If yes, is the income from:

Lease/Rent Contract Mineral Rights Other (please explain):

F. WHAT WAS THE CONDITION OF THE PROPERTY AT THE TIME OF SALE?

Good Average Fair Poor

Please explain the physical condition of the property and provide any other information (such as restrictions, etc.) that would assist the Assessor in determining the value of the property.

CERTIFICATION

OWNERSHIP TYPE (X)

Proprietorship

Partnership

Corporation

Other

I certify that the foregoing is true, correct and complete to the best of my knowledge and belief. This declaration is binding on each and every co-owner and/or partner.

NAME OF NEW OWNER/CORPORATE OFFICER <u>Emiliano Garcia Spuz</u>	TITLE
SIGNATURE OF NEW OWNER/CORPORATE OFFICER <u>[Signature]</u>	DATE <u>5-9-07</u>
NAME OF ENTITY (typed or printed)	FEDERAL EMPLOYER ID NUMBER
ADDRESS (typed or printed)	E-MAIL ADDRESS (optional) DATE

(Note: The Assessor may contact you for further information)

If a document evidencing a change of ownership is presented to the recorder for recordation without the concurrent filing of a preliminary change of ownership report, the recorder may charge an additional recording fee of twenty dollars (\$20).

PERMANENT TRANSFER OF BASE ANNUAL PRODUCTION RIGHT

To be executed by both Transferee and Transferor, be accompanied by a map of the service area where the water was used by Transferor, and a map of the service area where the water is intended to be used by the Transferee, together with a listing identifying and showing the location(s) of production facilities involved in or affected by Transfer. Have the attached acknowledgments completed by both Transferee and Transferor.

A TRUE COPY HEREOF MUST BE FILED WITH WATERMASTER WITHIN 15 DAYS OF EXECUTION.
(To be accompanied by completed Exhibit "F" if Transferee is not a party to the Judgment and by a Preliminary Title Report on Transferor's property)

For a valuable consideration, in the amount of \$ [REDACTED] acre-foot, for a total amount of \$ [REDACTED] receipt of which is hereby acknowledged, HARPER LAKE, LLC ("Transferor") does hereby assign and transfer in perpetuity to SOLUCAR, INC. ("Transferee") the Base Annual Production Right of Transferor in the amount of 9,380 acre-feet and any Carryover Right, if applicable in the amount of 7,504 acre-feet, in the CENTRO Subarea as adjudicated to Seller or his predecessor in the Judgment in the case of "City of Barstow, et al" vs. "City of Adelanto, et al" Riverside Superior Court No. 208568, together with the attendant rights, powers and privileges pertaining thereto, effective April 30, 2007. [See attached Addendum incorporated herein by this reference.] (Date)

TRANSFEEEE

TRANSFEROR

Emiliano Garcia SANZ

Henry Orlosky

on behalf of Solucar, Inc.

on behalf of Harper Lake, LLC

5-9-2007

5-9-07

(Signature)

(Date)

(Signature)

(Date)

Name and Address of Designee of Transferee to receive service of Processes & Notices:

Name and Address of Designee of Transfer to receive service of Processes & Notices:

Emiliano Garcia, Solucar, Inc.

Henry Orlosky, Harper Lake, LLC

11500 West 13th Avenue

7151 Coriander Trail

Lakewood, CO 80215

Oak Hills, CA 92344

Telephone No.: 303-928-8500

Telephone No.: 916-715-8681

The following are holders of Deed of Trust or Lien on the affected lands and/or the Base Annual Production Right affected by this transfer.

DEED OF TRUST or LIEN HOLDER

ADDRESS

HARPER LAKE, LLC

7151 Coriander Trail

Attn: HENRY ORLOSKY

OAK HILLS, CA 92344

760-956-3400

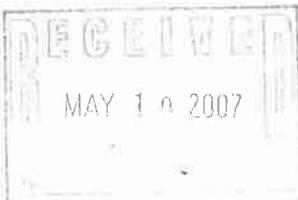


Exhibit "C"
C-1
Page 1

MARCH 23, 2005

GENERAL CALIFORNIA ACKNOWLEDGEMENT

STATE OF CALIFORNIA

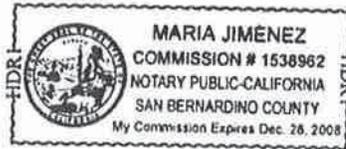
COUNTY OF San Bernardino

On May 9, 2007 before me, Maria Jimenez ^{Notary Public} (here insert name and title of the officer), personally appeared Emilia Garcia

personally known to me (or proved to me on the basis of satisfactory evidence) to be the person(s) whose name(s) ~~is/are~~ subscribed to the within instrument and acknowledged to me that he/~~she~~/they executed the same in ~~his/her~~/their authorized capacity(ies), and that by ~~his/her~~/their signature(s) on the instrument the person(s) or the entity upon behalf of which the person(s) acted, executed the Instrument.

WITNESS my hand and official seal.

Signature Maria Jimenez



(Seal)

GENERAL CALIFORNIA ACKNOWLEDGEMENT

STATE OF CALIFORNIA

COUNTY OF San Bernardino

On May 9, 2007 before me, Maria Jimenez ^{Notary Public} (here insert name and title of the officer), personally appeared Henry Orlosky

personally known to me (or proved to me on the basis of satisfactory evidence) to be the person(s) whose name(s) ~~is/are~~ subscribed to the within instrument and acknowledged to me that he/~~she~~/they executed the same in ~~his/her~~/their authorized capacity(ies), and that by ~~his/her~~/their signature(s) on the instrument the person(s) or the entity upon behalf of which the person(s) acted, executed the Instrument.

WITNESS my hand and official seal.

Signature Henry Orlosky



(Seal)

ADDENDUM TO
PERMANENT TRANSFER OF BASE ANNUAL PRODUCTION RIGHT

TRANSFEROR: Henry Orlosky, on behalf of Harper Lake, LLC

TRANSFeree: Emiliano Garcia, on behalf of Solucar, Inc.

Harper Lake, LLC holds and shall retain a contractual right to repurchase and/or retake by foreclosure up to 9,380 acre-feet of Base Annual Production Right and up to 7,504 acre-feet of Carryover Right, consistent with the terms of the Purchase and Sale Agreement and Joint Escrow Instructions between the parties.

This right is secured by a document entitled "Deed of Trust, Security Agreement, and Fixture Filing with Assignment of Rents and Agreements", and related UCC-1 Financing Statements, to be recorded and/or filed, secured by the underlying Real Property and by the subject Water Rights, and by repurchase and financing security rights contained in the Purchase and Sale Agreement and Joint Escrow Instructions between the parties.

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5 Attorney for Watermaster

6 SUPERIOR COURT OF THE STATE OF CALIFORNIA

7 FOR THE COUNTY OF RIVERSIDE

8 CITY OF BARSTOW, ET AL

9 Plaintiff,

10 v.

11 CITY OF ADELANTO, ET AL

12 Defendants.

NO. 208568

STIPULATION FOR INTERVENTION
AFTER ENTRY OF JUDGMENT

OF SOLUCAR, INC.

as Defendant(s)

13
14 IT IS HEREBY STIPULATED by and between the Mojave Basin Area Watermaster for
15 and on behalf of all parties to the instant action and _____
16 SOLUCAR, INC.

17 _____ the proposed Intervenor(s) herein, that said proposed
18 Intervenor(s) may intervene in the instant action and become entitled to all of the benefits and bound by
19 all of the burdens of the Stipulated Judgment herein.

20 The Court will consider the attached proposed Order confirming said Intervention at _____
21 o'clock _____ M on _____ 20____, in Department _____ located at _____

22 _____
23 To be set by Watermaster

24 Watermaster shall give at least 30 days notice to the parties herein of said hearing.
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28 Exhibit "F"
F-1
Page 1

MARCH 23, 2005

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DATED: _____

Watermaster

By _____
Chairman

Attest:

Secretary

DATED: May 9 2007

Intervenor(s)

SOLUCAR, INC.

By Emiliano Garcia

By 
(Signature) EMILIANO GARCIA SANZ

Name of Intervenor's Designee: Emiliano Garcia
Solucar, Inc. General Manager

Address of Designee:
11500 West 13th Street

Lakewood, CO 80215

Telephone Number of Designee:
303-928-8500

GENERAL CALIFORNIA ACKNOWLEDGEMENT

STATE OF CALIFORNIA

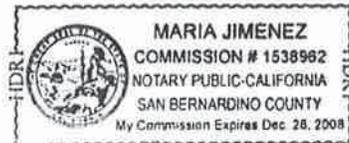
COUNTY OF San Bernardino

On May 9, 2007 before me, Maria Jimenez Notary Public (here insert name and title of the officer),
personally appeared Emilio Sanchez

~~personally known to me~~ (or proved to me on the basis of satisfactory evidence) to be the person(s) whose name(s) ~~is/are~~ subscribed to the within instrument and acknowledged to me that he/she/they executed the same in ~~his/her/their~~ authorized capacity(ies), and that by ~~his/her/their~~ signature(s) on the instrument the person(s) or the entity upon behalf of which the person(s) acted, executed the Instrument.

WITNESS my hand and official seal.

Signature *Maria Jimenez*



(Seal)

1
2
3 SUPERIOR COURT OF THE STATE OF CALIFORNIA

4 FOR THE COUNTY OF RIVERSIDE

5 CITY OF BARSTOW, ET AL

6 Plaintiff,

7 v.

8 CITY OF ADELANTO, ET AL

9 Defendants.

NO. 208568
DESIGNEE TO RECEIVE FUTURE
NOTICES FOR AND ON BEHALF OF
DEFENDANT(S)

SOLUCAR, INC.

10 Defendant(s) SOLUCAR, INC. hereby

11 designate(s): Emiliano Garcia whose address is 11500 West 13th Ave.
12 Lakewood, CO 80215, whose electronic

13 address (e-mail) is emiliano.garcia@solucarpower.abengoa.com and whose telephone
14 number is (303) 928-8500 as said defendant's Designee to receive service of

15 all future notices, determinations, requests, demands, objections, reports and other papers and processes
16 to be served upon said defendant(s) or delivered to said defendants(s) herein.

17 Defendant(s) elect(s) to receive service indicated above by one of the following methods (choose one):

18 First Class Mail postage prepaid to the address indicated above

19 Electronic Mail (e-mail) to the address indicated above

20 I/we hereby waive notice and service requirements

A copy hereof has been served upon the Watermaster herein, by mail, on _____

21 _____, 20____.

22
23 Executed under penalty of perjury at VICTORVILLE, California, this 9 day of

24 May, 2007.

25 SOLUCAR, INC.

26 _____
27 Signature(s) EMILIANO GARCIA SAUZ

28 Exhibit "E"
E-1

GENERAL CALIFORNIA ACKNOWLEDGEMENT

STATE OF CALIFORNIA

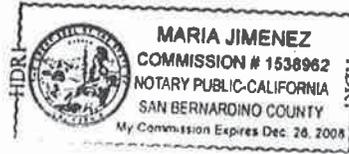
COUNTY OF San Bernardino

On May 9 2007 before me: Maria Jimenez Notary Public (here insert name and title of the officer),
personally appeared Emilia Garcia Lopez

personally known to me (or proved to me on the basis of satisfactory evidence) to be the person(s) whose name(s) ~~is~~ are subscribed to the within instrument and acknowledged to me that ~~he~~ she/they executed the same in ~~his~~ her/their authorized capacity(ies), and that by ~~his~~ her/their signature(s) on the instrument the person(s) or the entity upon behalf of which the person(s) acted, executed the Instrument.

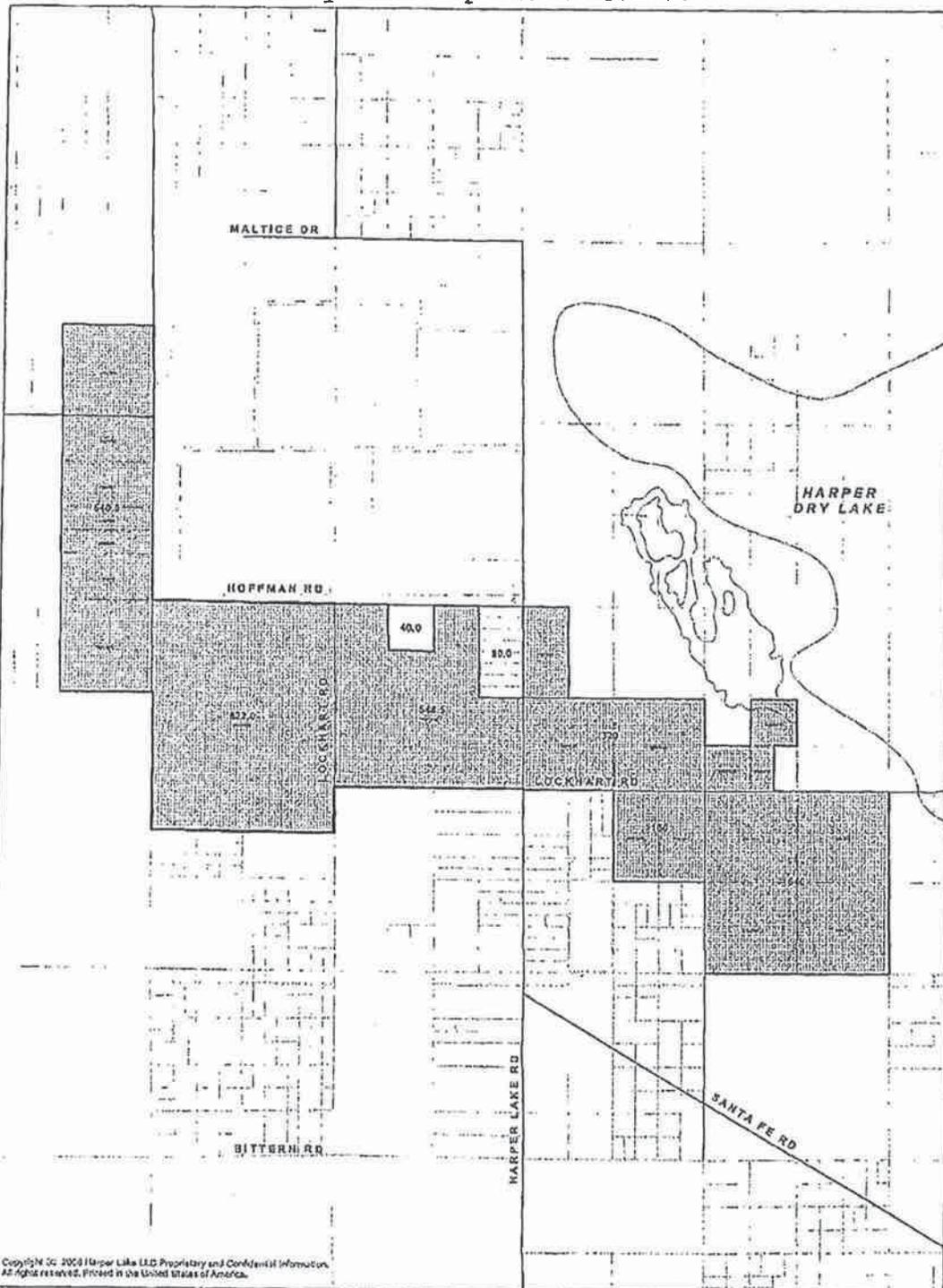
WITNESS my hand and official seal.

Signature Maria Jimenez

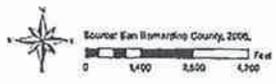


(Seal)

San Bernardino County Unincorporated Area 70



- Legend
-  Project Area
 -  Parcels
 -  Water Features
 -  Road



Harper Lake LLC Properties

1 William J. Brunick, Esq. (Bar No. 46289) *Exempt from filing fees per Govt. Code § 6103*
2 **BRUNICK, McELHANEY & BECKETT**
3 1839 Commercenter West
4 P.O. Box 6425
5 San Bernardino, California 92412-6425
6 Telephone: (909) 889-8301
7 Facsimile: (909) 388-1889

8 Attorneys for Cross-Complainant,
9 MOJAVE WATER AGENCY

10
11 SUPERIOR COURT OF THE STATE OF CALIFORNIA
12 FOR THE COUNTY OF RIVERSIDE

13 CITY OF BARSTOW, et al.,

14 Plaintiffs,

15 vs.

16 CITY OF ADELANTO, et al.,

17 Defendants.

18 MOJAVE WATER AGENCY,

19 Cross-complainant,

20 vs.

21 ANDERSON, RONALD H. et al.,

22 Cross-defendants.

CASE NO. 208568

**STIPULATION FOR
INTERVENTION AND ENTRY OF
JUDGMENT**

ASSIGNED FOR ALL PURPOSES TO
JUDGE GLORIA CONNOR TRASK,
DEPARTMENT 4

23 Cross-Complainant, Mojave Water Agency ("MWA"), and stipulating and intervening
24 party, Solucar, Inc. agrees and stipulates as follows:

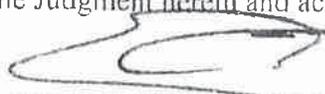
25 1. On January 10, 1996, the Court entered Judgment (attached hereto as Exhibit "A")
26 in the above-entitled action declaring the Judgment Pursuant to Stipulation to be binding as
27 against all parties.

28 2. Solucar, Inc. was not bound by such Judgment because they had not intervened
and stipulated and were not party to the Judgment attached as Exhibit "A."

1 3. The party hereto agrees and stipulates to that Judgment attached as Exhibit "A,"
2 with a Base Annual Production Right for Solucar, Inc., of 9,380 acre-feet in the Centro Subarea.
3 The Judgment may be made and entered by the Court as a final Judgment binding this
4 stipulating and intervening party in the above-entitled action.

5 4. The court will consider the proposed stipulation at a later time. MWA shall give
6 at least thirty (30) days notice to party herein of said hearing. The stipulating and intervening
7 party shall be bound by all the terms of the Judgment herein and accept the benefits thereto.

8 Dated: 13th June, 2007



SOLUCAR, INC.
By: Emiliano Garcia Sanz, General Manager

11 BRUNICK, MCELHANEY & BECKETT

14 Dated: 6-25-07

15 By: W J Brunick J.B.

William J. Brunick
Attorneys for Cross-Complainant
Mojave Water Agency

17 **IT IS SO ORDERED:**

20 Dated: _____

21 Judge Gloria Connor Trask
22 Superior Court of the State of California
23 for the County of Riverside

Data Adequacy Supplement

Attachment G

Water Resources

Part 3: 224 AFY Water Rights

(A portion of this attachment is submitted under separate confidential cover.)

COPY

Recorded in Official Records, County of San Bernardino

12/11/2008

8:00 AM
FV



LARRY WALKER
Auditor/Controller - Recorder

771 Document Processing Solutions

RECORDING REQUESTED BY:

First American

**WHEN RECORDED MAIL TO
AND MAIL TAX STATEMENTS TO:**

Abengoa Solar Inc.
2030 Addison Street, #420
Berkeley, CA 94704

Doc#: 2008-0547638



Titles: 1 Pages: 4

Fees	28.00
Taxes	** Conf **
Other	0.00
PAID	\$28.00

Title Order No.: NCS-352990-021-LA2 Space Above This Line For Recorder's Use Escrow No.: NCS-352990-021

GRANT DEED

THE UNDERSIGNED GRANTOR(S) DECLARE(S):
DOCUMENTARY TRANSFER TAX IS NOT FOR PUBLIC RECORD

unincorporated Area.

FOR A VALUABLE CONSIDERATION, receipt of which is hereby acknowledged,

Jennie Most, Sole Trustee of the Most Family Trust dated September 8, 1989

hereby GRANT(s) to

Abengoa Solar Inc., a Delaware corporation

the following described real property in the County of San Bernardino, State of California

PLEASE SEE LEGAL DESCRIPTION ATTACHED HERETO AND MADE A PART HEREOF

See Exhibit "A" Attached

APN: 0490-171-09-0-000

December 8, 2008

SIGNATURE BLOCK ATTACHED HERETO AND MADE A PART HEREOF

352 990-021-21

SIGNATURE BLOCK
TO GRANT DEED

Jennie Most, Sole Trustee of the Most Family Trust dated September 8, 1989

Jennie Most
Jennie Most, Sole Trustee

Jennie Most

STATE OF ~~CALIFORNIA~~ ^{WASHINGTON} }
COUNTY OF PIERCE } S.S.

On DEC. 8, 2008 before me, NELLA R. HAWKS Notary Public, personally appeared JENNIE MOST, who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/~~are~~ subscribed to the within instrument and acknowledged to me that ~~he~~/she/~~they~~ executed the same in ~~his~~/her/~~their~~ authorized capacity(ies), and that by ~~his~~/her/~~their~~ signature(s) on the instrument the person(s), or the entity on behalf of which the person(s) acted, executed the instrument.

I certify under penalty of perjury under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature: Nella R Hawks



Exhibit "A"

**THE NORTHWEST 1/4 OF THE NORTHWEST 1/4 OF SECTION 32, TOWNSHIP 11 NORTH, RANGE
4 WEST, SAN BERNARDINO BASE AND MERIDIAN, IN THE COUNTY OF SAN BERNARDINO,
STATE OF CALIFORNIA, ACCORDING TO THE OFFICIAL PLAT THEREOF.**

APN: 0490-171-09-0-000

NOTARY SEAL

Under the provisions of Government Code 27361.1, I certify under the penalty of perjury that the Notary Seal on the document to which this statement is attached reads as follows:

Name of Notary: Nella R. Hawks

Commission #: _____

Date Commission Expires: 3-25-2009

County where Bond is filed Washington

PLACE OF EXECUTION: SAN BERNARDINO

DATE: 12/11/08

SIGNATURE: Christina Zi



PERMANENT TRANSFER OF BASE ANNUAL PRODUCTION RIGHT

To be executed by both Transferee and Transferor, be accompanied by a map of the service area where the water was used by Transferor, and a map of the service area where the water is intended to be used by the Transferee, together with a listing identifying and showing the location(s) of production facilities involved in or affected by Transfer. Have the attached acknowledgments completed by both Transferee and Transferor.

A TRUE COPY HEREOF MUST BE FILED WITH WATERMASTER WITHIN 15 DAYS OF EXECUTION.
(To be accompanied by completed Exhibit "F" if Transferee is not a party to the Judgment
and by a Preliminary Title Report on Transferor's property)

For a valuable consideration, in the amount of \$ [redacted] per acre-foot, for a total amount of \$ [redacted], receipt of which is hereby acknowledged, Jennie Most, Trustee of the Most Family Trust dtd 9/8/89 ("Transferor") does hereby assign and transfer in perpetuity to Abengoa Solar Inc., a Delaware corporation ("Transferee") the Base Annual Production Right of Transferor in the amount of 224.00 acre-feet and any Carryover Right, if applicable in the amount of 224 acre-feet, in the Centro Subarea as adjudicated to Seller or his predecessor in the Judgment in the case of "City of Barstow, et al" vs. "City of Adelanto, et al" Riverside Superior Court No. 208568, together with the attendant rights, powers and privileges pertaining thereto, effective 12/11/08.
(Date)

TRANSFEEEE

TRANSFEROR

Abengoa Solar Inc., a Delaware corporation

Jennie Most, Trustee of the Most Family Trust dtd 9/8/89





12-12-08

12-8-08

(Signature) Emiliano Garcia (Date)
Manager

(Signature) (Date)

Name and Address of Designee of Transferee to receive service of Processes & Notices:

Name and Address of Designee of Transfer to receive service of Processes & Notices:

Christopher B. Hansmeyer

Jennie Most

2030 Addison Street, #420

10041 El Dorado Street, Box A13

Berkeley, CA 94704

Apple Valley, CA 92308

Telephone No.: (415) 331-1478

Telephone No.: (253) 315-1776

The following are holders of Deed of Trust or Lien on the affected lands and/or the Base Annual Production Right affected by this transfer.

DEED OF TRUST or LIEN HOLDER

ADDRESS

ALL-PURPOSE ACKNOWLEDGMENT

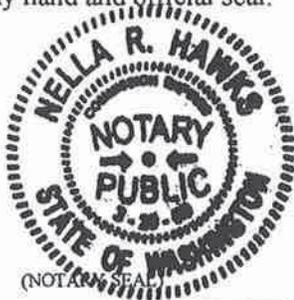
WASH.
STATE OF CALIFORNIA)
COUNTY OF PIERCE)

On DEC. 8, 2008 before me, NELLA R. HAWKS the undersigned Notary Public,
personally appeared JENNIE MOST, who proved to me on the

basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that ~~he~~/she/~~they~~ executed the same in ~~his~~/her/~~their~~ authorized capacity(ies), and that by ~~his~~/her/~~their~~ signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.



Signature Nella R Hawks
NELLA R. HAWKS
Name (Typed or Printed)
Notary Public in and for said County and State

ADDITIONAL OPTIONAL INFORMATION

DESCRIPTION OF THE ATTACHED DOCUMENT

(Title or description of attached document)

(Title or description of attached document continued)

Number of Pages _____ Document Date _____

(Additional information)

CAPACITY CLAIMED BY THE SIGNER

Individual(s)

Corporate Officer

Partner(s)

Attorney-in-Fact

Trustee(s)

Other _____

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Attorney for Watermaster

SUPERIOR COURT OF THE STATE OF CALIFORNIA
FOR THE COUNTY OF RIVERSIDE

CITY OF BARSTOW, ET AL

Plaintiff,

v.

CITY OF ADELANTO, ET AL

Defendants.

NO. 208568
STIPULATION FOR INTERVENTION
AFTER ENTRY OF JUDGMENT

OF Abengoa Solar Inc.
as Defendant(s)

IT IS HEREBY STIPULATED by and between the Mojave Basin Area Watermaster for
and on behalf of all parties to the instant action and Abengoa Solar Inc., a Delaware corporation

_____ the proposed Intervenor(s) herein, that said proposed
Intervenor(s) may intervene in the instant action and become entitled to all of the benefits and bound by
all of the burdens of the Stipulated Judgment herein.

The Court will consider the attached proposed Order confirming said Intervention at _____
o'clock _____ M on _____ 20____, in Department _____ located at _____
To be set by Watermaster

Watermaster shall give at least 30 days notice to the parties herein of said hearing.

ACKNOWLEDGMENT

State of Colorado
County of Jefferson

On December 12, 2008 before me, Juliana Vianna Susin
(insert name and title of the notary public)

personally appeared Emiliano Garcia
who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

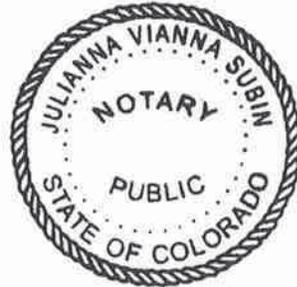
I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature

Juliana Vianna Susin

(Seal)



*My commission expires
04/23/2011*

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SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF RIVERSIDE

CITY OF BARSTOW, ET AL

Plaintiff,

v.

CITY OF ADELANTO, ET AL

Defendants.

NO. 208568
DESIGNEE TO RECEIVE FUTURE
NOTICES FOR AND ON BEHALF OF
DEFENDANT(S)

Abengoa Solar Inc., a Delaware corporation

Defendant(s) Abengoa Solar Inc., a Delaware corporation hereby

designate(s): Christopher B. Hansmeyer whose address is 2030 Addison Street, #420
Berkeley, CA 94704, whose electronic

address (e-mail) is Chrsitopher.Hansmeyer@solar.abengoa.com and whose telephone

number is (415) 331-1478 as said defendant's Designee to receive service of

all future notices, determinations, requests, demands, objections, reports and other papers and processes
to be served upon said defendant(s) or delivered to said defendants(s) herein.

Defendant(s) elect(s) to receive service indicated above by one of the following methods (choose one):

- First Class Mail postage prepaid to the address indicated above
- Electronic Mail (e-mail) to the address indicated above
- I/we hereby waive notice and service requirements

A copy hereof has been served upon the Watermaster herein, by mail, on _____
_____, 20__.

Executed under penalty of perjury at Lakewood, Colorado, this 12 day of

December, 2008.

Abengoa Solar Inc.
a Delaware corporation


Signature(s) Emiliano Garcia, Manager

Exhibit "E"
E-1

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DATED: _____

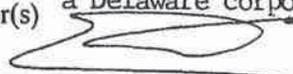
Watermaster

By _____
Chairman

Attest:

Secretary

DATED: 12/12/08

Abengoa Solar Inc.
Intervenor(s) a Delaware corporation


By Emiliano Garcia, Manager

By _____

Name of Intervenor's Designee:
Christopher B. Hansmeyer

Address of Designee:
2030 Addison Street, #420
Berkeley, CA 94704

Telephone Number of Designee:
(415) 331-1478

Data Adequacy Supplement

Attachment G

Water Resources

Part 4: 874 AFY Water Rights

(A portion of this attachment is submitted under separate confidential cover.)

STEWART TITLE - Riverside
COMMERCIAL DIVISION

TITLE ORDER: 1-11-297453
ESCROW NO: 60143846

RECORDING REQUESTED BY AND
WHEN RECORDED MAIL TO:

Harper Lake, LLC
13911 Park Avenue, Suite 206
Victorville, CA 92392

Recorded In Official Records, County of San Bernardino



LARRY WALKER
Auditor/Controller - Recorder

739 Stewart Title Company

9/07/2006
1:00 PM
BS

Doc#: 2006-0612735



Titles: 1 Pages: 5

Fees 20.00
Taxes 0.00
Other 0.00
PAID 20.00

SPACE ABOVE FOR RECORDER'S USE

AP NO'S: 056103/0400-161-08 & 09
(Unincorporated area)

MEMORANDUM
OF
OPTION AGREEMENT

COPY

This MEMORANDUM OF OPTION AGREEMENT ("Memorandum") is made and effective as of August 30, 2006, by and between Desert View Dairy, a California General Partnership ("Seller"), and Harper Lake, LLC ("Buyer"), with reference to the facts set forth below.

RECITALS

A. Seller owns that certain real property situated in the ^{unincorporated area} ~~City~~ of Hinkley, San Bernardino County, California, more particularly described on Exhibit "A" attached hereto and incorporated herein (the "Property").

B. Seller and Buyer have entered into that certain Option Agreement between Buyer and Seller dated August 29, 2006 (the "Option Agreement"), pursuant to which Seller has granted to Buyer an exclusive option to purchase the Property on the terms and conditions set forth therein.

NOW THEREFORE, the parties hereto desire to record this Memorandum to give notice of said Option Agreement and the terms thereof, including, without limitation the terms set forth below.

1. Option to Purchase Property. Seller hereby grants to Buyer the option to purchase the Property on the terms and conditions set forth in the Option Agreement as amended from time to time. Under the terms of the Option Agreement, Buyer has the right to exercise the option to purchase the Property until August 30, 2008 ("Option Expiration Date"). Buyer further has the right to extend the Option Expiration Date for three (3) additional periods of six (6) months each.

2. Removal of Memorandum. Buyer has agreed that in the event the Option Agreement expires without Buyers exercise of the Option Buyer will execute such releases, cancellations, quitclaim deeds or other instruments as may be necessary to have this Memorandum cancelled of record.

This document was filed for recording by STEWART TITLE OF CALIFORNIA, INC. INLAND EMPIRE DIVISION as an accommodation only. It has not been examined as to its execution or as to its effect upon the title or its recordability

3. Notice. This Memorandum is being recorded to give notice of the Option Agreement hereinabove described and the terms and conditions contained therein.

4. Binding on Successors. This Memorandum shall be binding upon and shall inure to the benefit of the parties hereto and their respective successors-in-interest and assignees.

IN WITNESS WHEREOF, the parties have executed this Memorandum as of the day and year first above written.

SELLER:

Desert View Dairy, a California General Partnership

By: *Hugo N. Van Vliet*
Its: General Partner HUGO NICHOLAS VAN VLIET

By: *Paul Ryken*
Its: General Partner PAUL RYKEN

BUYER:

Harper Lake, LLC

By: *Henry Chlosky*
Its: Manager HENRY CHLOSKY

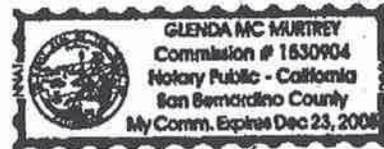
STATE OF CALIFORNIA)
) ss.
COUNTY OF SAN BERNARDINO)

On AUGUST 31, 2006, before me, GLEND A MC MUR TREY, a Notary Public, personally appeared HUGO NICHOLAS VAN VLIET [~~personally known to me~~] or [proved to me on the basis of satisfactory evidence] to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s) or the entity upon behalf of which the person(s) acted, executed the instrument.

WITNESS my hand and official seal.

Signature Glenda McMurtrey
GLEND A MC MUR TREY, Notary Public

(SEAL)



MY COMMISSION EXPIRES: 12-23-08

STATE OF CALIFORNIA)
) ss.
COUNTY OF SAN BERNARDINO)

On 8-30, 2006, before me, VERONICA LOPEZ, a Notary Public, personally appeared Henry Olasky [personally known to me] or [proved to me on the basis of satisfactory evidence] to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s) or the entity upon behalf of which the person(s) acted, executed the instrument.

WITNESS my hand and official seal.

Signature Veronica Lopez
VERONICA LOPEZ, Notary Public

(SEAL)



MY COMMISSION EXPIRES: 3-13-08

This document was filed for recording by STEWART TITLE OF CALIFORNIA, INC. INLAND EMPIRE DIVISION as an accommodation only. It has not been examined as to its execution or as to its effect upon the title or its recordability

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

State of California

County of SAN BERNARDINO

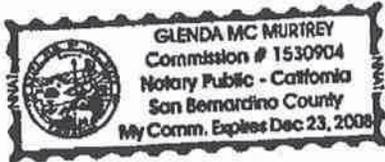
} ss.

On AUGUST 31, 2006, before me, GLENDA MC MURTREY, NOTARY PUBLIC
Date Name and Title of Officer (e.g., "Jane Doe, Notary Public")

personally appeared PAUL RYKEN
Name(s) of Signer(s)

personally known to me

proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.



WITNESS my hand and official seal.

Place Notary Seal Above
MY COMMISSION EXPIRES: 12-23-08

Glenda Mc Murtry
Signature of Notary Public

OPTIONAL

Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.

Description of Attached Document

Title or Type of Document: MEMORANDUM OF OPTION AGREEMENT

Document Date: AUGUST 30, 2006 Number of Pages: FIVE

Signer(s) Other Than Named Above: HUGO NICHOLAS VAN VLIET

Capacity(ies) Claimed by Signer(s)

Signer's Name: _____

Individual

Corporate Officer — Title(s): _____

Partner — Limited General

Attorney in Fact

Trustee

Guardian or Conservator

Other: _____

Signer Is Representing: _____



Signer's Name: _____

Individual

Corporate Officer — Title(s): _____

Partner — Limited General

Attorney in Fact

Trustee

Guardian or Conservator

Other: _____

Signer Is Representing: _____



EXHIBIT "A"
LEGAL DESCRIPTION
(The Property)

ATTACH TO MEMORANDUM OF OPTION
AGREEMENT

THE LAND REFERRED TO HEREIN IS SITUATED IN THE STATE OF CALIFORNIA, COUNTY OF SAN BERNARDINO, UNINCORPORATED AREA, DESCRIBED AS FOLLOWS:

PARCEL NO: 1:

THE WEST 1/2 OF THE NORTHEAST 1/4 OF SECTION 32, TOWNSHIP 11 NORTH, RANGE 4 WEST, SAN BERNARDINO BASE AND MERIDIAN, ACCORDING TO THE OFFICIAL PLAT THEREOF, IN THE OFFICE OF THE COUNTY RECORDER OF SAN BERNARDINO COUNTY, CALIFORNIA.

PARCEL NO: 2:

THE EAST 1/2 OF THE NORTHEAST 1/4 OF SECTION 32, TOWNSHIP 11 NORTH, RANGE 4 WEST, SAN BERNARDINO BASE AND MERIDIAN, ACCORDING TO THE OFFICIAL PLAT THEREOF, IN THE OFFICE OF THE COUNTY RECORDER OF SAN BERNARDINO COUNTY, CALIFORNIA.

ASSESSOR'S PARCEL NO'S:

056-103 / 0490-161-08

056-103 / 0490-161-09

(Unincorporated area)

This document was filed for recording by STEWART TITLE OF CALIFORNIA, INC. INLAND EMPIRE DIVISION as an accommodation only. It has not been examined as to its execution or as to its effect upon the title or its recordability.

EXHIBIT "A"

LEGAL DESCRIPTION OF PROPERTY

PARCEL NO. 1:

THE WEST 1/2 OF THE NORTHEAST 1/4 OF SECTION 32, TOWNSHIP 11 NORTH, RANGE 4 WEST, SAN BERNARDINO BASE AND MERIDIAN, IN THE COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, ACCORDING TO THE OFFICIAL PLAT THEREOF, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY.

PARCEL NO. 2:

THE EAST 1/2 OF THE NORTHEAST 1/4 OF SECTION 32, TOWNSHIP 11 NORTH, RANGE 4 WEST, SAN BERNARDINO BASE AND MERIDIAN, IN THE COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, ACCORDING TO THE OFFICIAL PLAT THEREOF, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY.

**STEWART TITLE - Riverside
COMMERCIAL DIVISION**



LARRY WALKER
Auditor/Controller - Recorder
739 Stewart Title Company

RECORDING REQUESTED BY AND
WHEN RECORDED RETURN TO:

Mirau Edwards Cannon Lewin & Tooke
Attn: Michael J. Lewin, Esq.
1806 Orange Tree Lane, Suite C
Redlands, CA 92374-2821

Doc #: 2007-0285179

Titles: 1 Pages: 3



Fees [Redacted]
Taxes [Redacted]
Other [Redacted]
PAID [Redacted]

(SPACE ABOVE THIS LINE FOR RECORDER'S USE)

**ASSIGNMENT OF OPTION
(DESERT VIEW DAIRY)**

In consideration of the sum of [Redacted] Dollars [Redacted] in hand paid, and other good and valuable consideration, the receipt and adequacy of which are hereby acknowledged, the undersigned Assignor, as optionee under that certain Option Agreement dated August 29, 2006, executed by the undersigned Assignor and on behalf of Desert View Dairy, a California general partnership, as optionor, hereby assigns to Solucar Inc., a Delaware corporation, as Assignee, all of Assignor's rights under the Option Agreement, relative to the real property described in the attached Exhibit "A", incorporated herein and made a part hereof by this reference. Assignee hereby acknowledges receipt of a copy of the Option Agreement. Assignee shall undertake and perform the obligations of the optionee under the Option Agreement, and Assignor agrees to execute any further documents reasonably necessary to Assignee's acquisition of and ability to exercise the option granted in the Option Agreement.

111 411 776

EGS
W.O.
Dated: ^{MAY} April 9, 2007

ASSIGNOR:

Harper Lake LLC, a California limited liability company

By: [Signature]
Name: HENRY ORZBSKY
Its: CEO

A "MEMORANDUM OF OPTION AGREEMENT"
FOR THE OPTION AGREEMENT REFERENCED
ABOVE RECORDED SEPTEMBER 7, 2006
AS INSTRUMENT NO. 2006-0612735 OF
OFFICIAL RECORDS OF SAN BERNARDINO
COUNTY, CALIFORNIA.

ASSIGNEE:

SOLUCAR INC., a Delaware corporation

By: [Signature]
Name: EMILIANA GARCIA SAAZ
Its: CEO - DIRECTOR

STEWART TITLE - Riverside
COMMERCIAL DIVISION

RECORDING REQUESTED BY AND
WHEN RECORDED RETURN TO:

Mirau Edwards Cannon Lewin & Tooke
Attn: Michael J. Lewin, Esq.
1806 Orange Tree Lane, Suite C
Redlands, CA 92374-2821

(SPACE ABOVE THIS LINE FOR RECORDER'S USE)

ASSIGNMENT OF OPTION
(DESERT VIEW DAIRY)

111 411 776

In consideration of the sum of [REDACTED] Dollars [REDACTED] in hand paid, and other good and valuable consideration, the receipt and adequacy of which are hereby acknowledged, the undersigned Assignor, as optionee under that certain Option Agreement dated August 29, 2006, executed by the undersigned Assignor and on behalf of Desert View Dairy, a California general partnership, as optionor, hereby assigns to Solucar Inc., a Delaware corporation, as Assignee, all of Assignor's rights under the Option Agreement, relative to the real property described in the attached Exhibit "A", incorporated herein and made a part hereof by this reference. Assignee hereby acknowledges receipt of a copy of the Option Agreement. Assignee shall undertake and perform the obligations of the optionee under the Option Agreement, and Assignor agrees to execute any further documents reasonably necessary to Assignee's acquisition of and ability to exercise the option granted in the Option Agreement.

EGS
N.O.

Dated: ^{MAY} April 9, 2007

ASSIGNOR:

Harper Lake LLC, a California limited liability company

By: Henry Orlosky
Name: HENRY ORLOSKY
Its: CEO

A "MEMORANDUM OF OPTION AGREEMENT"
FOR THE OPTION AGREEMENT REFERENCED
ABOVE RECORDED SEPTEMBER 7, 2006
AS INSTRUMENT NO. 2006-0612735 OF
OFFICIAL RECORDS OF SAN BERNARDINO
COUNTY, CALIFORNIA.

ASSIGNEE:

SOLUCAR INC., a Delaware corporation

By: [Signature]
Name: EMILIANO GARCIA SAIZ
Its: CEO - DIRECTOR

STATE OF California
COUNTY OF San Bernardino

On May 9, 2007, before me, Maria Jimenez, a Notary Public, in and for said County and State, personally appeared Henry Orlosky, personally known to me or proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or entity upon behalf of which the person(s) acted, executed the instrument.

WITNESS my hand and official seal.

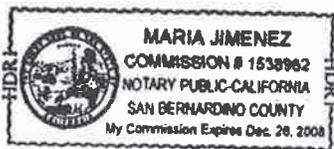


Maria Jimenez
Notary Public

STATE OF California
COUNTY OF San Bernardino

On May 9, 2007, before me, Maria Jimenez, a Notary Public, in and for said County and State, personally appeared Emiliano Garcia Lopez, personally known to me or proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or entity upon behalf of which the person(s) acted, executed the instrument.

WITNESS my hand and official seal.



Maria Jimenez
Notary Public

LEGAL DESCRIPTION

(DESERT VIEW DAIRY PROPERTY)

The land referred to herein is situated in the State of California, County of San Bernardino, unincorporated area, described as follows:

PARCEL 1

THE WEST ONE-HALF OF THE NORTHEAST ONE-QUARTER OF SECTION 32, TOWNSHIP 11 NORTH, RANGE 4 WEST, SBBM, ACCORDING TO THE OFFICIAL PLAT THEREOF, IN THE OFFICE OF THE COUNTY RECORDER OF SAN BERNARDINO COUNTY, CALIFORNIA.

APN 0490-161-08

PARCEL 2

THE EAST ONE-HALF OF THE NORTHEAST ONE-QUARTER OF SECTION 32, TOWNSHIP 11 NORTH, RANGE 4 WEST, SBBM, ACCORDING TO THE OFFICIAL PLAT THEREOF, IN THE OFFICE OF THE COUNTY RECORDER OF SAN BERNARDINO COUNTY, CALIFORNIA.

APN 0490-161-09

EXHIBIT "A"



Date : August 13, 2009
Escrow Officer : Diana Price
Escrow Number : a60143846
Escrow Unit No. : 2784
Property Address : HINKLEY, CA APN # 0490-161-08 & 09

RELEASE OF FUNDS PRIOR TO CLOSE OF ESCROW

STEWART TITLE OF CALIFORNIA, INC.
IS LICENSED BY THE STATE OF CALIFORNIA UNDER THE DEPARTMENT OF INSURANCE LICENSE NO. 388

RELEASE OF FUNDS PRIOR TO CLOSE OF ESCROW DATED AUGUST 5, 2009 IS DELETED IN ITS ENTIRETY.
Upon receipt of these mutually signed instructions by the parties hereto and confirmation of clearance of funds deposited, Escrow Holder is authorized to release funds, regardless of the condition of title and prior to close of this escrow, as follows:

The sum of [REDACTED] payable to Desert View Dairy.

The seller accepts this as an option extension according to the letter dated July 31, 2009, from Abengoa Solar, Inc., attached hereto for reference by parties herein.

The term of the option to purchase property is to be extended to March 2, 2010.

If escrow closed said funds shall not be applied toward the total consideration and shall be identified as Option Fee for extension of the option to March 2, 2010.

The parties hereto, by their signatures, acknowledge that they are aware that Stewart Title of California, Inc. and/or its officers or employees make no warranties or representations, expressed or implied as to: (1) the ownership or condition of the title to the property described in this escrow, (2) any encumbrances or liens thereon, and (3) the condition or ultimate outcome of this escrow.

Further, that at the time of release of funds, the conditions of this escrow have not been complied with in their entirety nor were there any documents filed for recording in connection herewith.

We, therefore, hold Stewart Title of California, Inc. harmless from any loss or damages, which said parties, may sustain by reason of this disbursement instruction, for the failure of any of the conditions of this escrow to be met, and/or for recovery of said monies.

All parties acknowledge receipt of a copy of these instructions. All parties have had the opportunity to seek the advice of counsel or other advisor of their choice and authorize Escrow Holder to comply herewith.

Buyer(s):

Abengoa Solar, Inc.

By: 

By: SCOTT FRIER, COO

Seller(s):

Desert View Dairy, a California general partnership

By: _____

Paul Ryken, General Partner

By: _____

(ALL SIGNATURES MUST BE NOTARIZED)

(ALL SIGNATURES MUST BE NOTARIZED)

Stewart Title of California, Inc.,
A California Corporation

By: _____
Manager

ALL PURPOSE CALIFORNIA ACKNOWLEDGEMENT

STATE OF: CALIFORNIA

COUNTY OF: San Bernardino

On August 14, 09 before me, I. Mohelski Notary Public

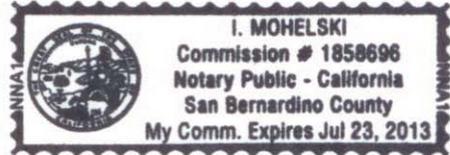
personally appeared Scott Frier, (here insert name and title of the officer)

who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument the person(s) or the entity upon behalf of which the person(s) acted, executed the Instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal

Signature: [Handwritten Signature]



(NOTARY SEAL)

ATTENTION NOTARY: Though the information requested below is OPTIONAL, it could prevent fraudulent attachment of this certificate to another document.

THIS CERTIFICATE MUST BE ATTACHED TO THE DOCUMENT DESCRIBED AT RIGHT

Title of Document Type # A60143846
Release of funds prior to close of escrow
Number of Pages 3 Date of Document 8.13.09
Signer(s) Other Than Named Above Scott Frier

ALL PURPOSE CALIFORNIA ACKNOWLEDGEMENT

STATE OF: CALIFORNIA

COUNTY OF:

On before me,

personally appeared, (here insert name and title of the officer)

who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument the person(s) or the entity upon behalf of which the person(s) acted, executed the Instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal

Signature

(NOTARY SEAL)

ATTENTION NOTARY: Though the information requested below is OPTIONAL, it could prevent fraudulent attachment of this certificate to another document.

THIS CERTIFICATE MUST BE ATTACHED TO THE DOCUMENT DESCRIBED AT RIGHT

Title of Document Type
Number of Pages
Date of Document

ABENGOA SOLAR, INC

13911 Park Avenue, Suite 206
Victorville CA 92392

T: 760-962-9200
F: 760-962-9292

SENT VIA OVERNIGHT DELIVERY

July 31, 2009

Diana Price
Stewart Title of California, Inc.
12370 Hesperia Road, Ste. 5
Victorville, CA 92395

Re: Escrow No. 60143846BL
Property located in Hinkley, APNs 0490-161-08 & 09 (the "Property")

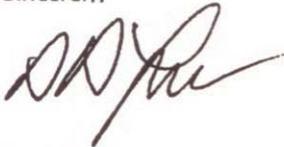
Dear Ms. Price:

As you are aware, Abengoa Solar Inc. is the successor-in-interest to Harper Lake, LLC under the Option Agreement dated August 29, 2006 ("Option Agreement") with Desert View Dairy, a California general partnership for the above Property.

The current term of the option to purchase the Property will expire on August 30, 2009. Section 2.2 of the Option Agreement provides that Abengoa may extend the purchase option for an additional six (6) months by providing written notice of such election and making a further option payment of \$ [REDACTED] to Desert View Dairy. Section 2.2 of the Option Agreement requires the extension payment be made through the above escrow at Stewart Title.

We are hereby notifying you of our election to extend the option and are further depositing with you the \$ [REDACTED] option extension payment. We hereby authorize you to immediately release the option extension payment to Desert View Dairy.

Sincerely,



Scott D. Frier
COO
Abengoa Solar Inc.