TETRA TECH EC, INC.

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January 21, 2010

California Energy Commission
Docket No. 09-AFC-8
1516 9th St.
Sacramento, CA 95814

Genesis Solar Energy Project - Docket Number 09-AFC-8

Docket Clerk:

Included with this letter is one hard copy and one electronic copy of ***Preliminary Report of Ancient Shorelines in Ford Dry Lake for Genesis Solar Energy Project.***

This report will be finalized and redocketed near the end of January 2010.

Sincerely,

Tricia Bernhardt
Project Manager/Tetra Tech EC

cc: Mike Monasmith /CEC Project Manager

BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION OF THE STATE OF CALIFORNIA
1516 NINTH STREET, SACRAMENTO, CA 95814
1-800-822-6228 – WWW.ENERGY.CA.GOV

APPLICATION FOR CERTIFICATION FOR THE
GENESIS SOLAR ENERGY PROJECT

Docket No. 09-AFC-8

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(Revised 1/04/10)

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DECLARATION OF SERVICE

I, Tricia Bernhardt, declare that on January 21st, 2010, I served and filed copies of the attached ***Preliminary Report of Ancient Shorelines in Ford Dry Lake for Genesis Solar Energy Project*** dated January 21, 2010. The original document, filed with the Docket Unit, is accompanied by a copy of the most recent Proof of Service list, located on the web page for this project at: [http://ww.energy.ca.gov/sitingcases/genesis_solar].

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

(*Check all that Apply*)

FOR SERVICE TO ALL OTHER PARTIES:

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

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

AND

FOR FILING WITH THE ENERGY COMMISSION:

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

OR

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

CALIFORNIA ENERGY COMMISSION
Attn: Docket No. 09-AFC-8
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I declare under penalty of perjury that the foregoing is true and correct.

Original Signed By:

Tricia Bernhardt

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January 19, 2010
52011206

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Attn: Mike Pappalardo, Environmental Manager

Re: Preliminary Report of Ancient Shorelines in Ford Dry Lake for Genesis Solar Energy Project, Chuckwalla Valley, Riverside County, CA

Dear Mr. Pappalardo:

This letter report provides interim preliminary findings regarding temporal and spatial behavior of ancient playa lakes in the Ford Dry Lake basin located in the eastern portion of the Chuckwalla Valley. The study focused on the timing and high stand elevations of playa lakes with emphasis on the proposed Genesis Solar Power Project site. This report was requested by members of the CEC during a conference call Work Shop on December 31 to assist Cultural aspects of the Genesis Solar Energy Project (Project).

Methodology

The results of this report discussed below are based on review of existing literature, site field mapping, evaluation of numerically dated desert soils from the eastern Coachella Valley (Petra, 2007a and 2007b), analysis of orthophotographs, and utilization of Google Earth images.

Literature Review

Literature reviewed is provided in the reference section of this report, and addresses primarily studies of regional timing of latest Pleistocene to Holocene playa and pluvial lake systems.

Mapping Program

A week of field mapping in the Chuckwalla Valley included the project site and surrounding area. Data was obtained to evaluate the limits and age of ancient lake shore lines between the elevations of approximately 360’ to 380’ above mean sea level (msl). Shallow test pits to 1.5 feet provided an assessment of sediment types and soil profile development (age of sediments).

Numerically Dated Desert Soils from the Coachella Valley

Previous large scale fault investigations covering more than 6000 acres within the eastern Coachella Valley (Petra, 2007a, 2007b) were overseen by the author. These studies were located 80 miles due west of the Genesis project site within Coachella Fan alluvial deposits shed from the Little San Bernardino Mountains. As part of the latter studies, numerous soil profiles were evaluated on a morphostratigraphic series of late Pleistocene to Holocene age preserved fan surfaces. The soils within fan deposits represent a chronosequence or a group of soil variables such as topography, parent material, vegetation, and climate that are roughly equal (Jenny, 1941). These soil descriptions and ages were utilized to provide minimum preliminary soil profile ages within this study. This is discussed further in following sections.

Orthophotographic Mapping
High resolution color orthophotographs were examined to identify geomorphic features that may be associated with ancient lake shore lines.

Google Earth
Google Earth is an internet program that provides detailed photographic images of the surface of the Earth with scale and location. Latitude, longitude and elevation are overlain on the maps. Google Earth was used to identify geomorphic features possibly associated with ancient shore lines (wave cut benches, beach berms or deposits, etc) and produce the base map in Plate 1. The accuracy of shore line elevations is dependant on that provided by Google Earth in the area of the investigation.

SEDIMENT DATING TECHNIQUES

The age of the site geologic units was determined in both numerical and relative terms. Relative ages were assigned by stratigraphic position of the sedimentary layers. In alluvial fan environments, morphostratigraphic relationships may also provide relative ages for fan deposits. In upper fan reaches the older preserved fan surfaces (terraces) are generally at higher elevations than younger surfaces. In distal areas of the fan, older deposits are typically buried by the younger layers. Numerical ages for sedimentary units may be assigned by careful examination of the soil profiles. For this study, numerical ages for sediments were arrived at by correlating site soil profiles with known dated soils in the Coachella Valley (Petra, 2007a and 2007b).

Soil Profile and Geomorphic Surface Development Ages
Soil profiles provide **minimum** dates for sedimentary units. This process estimates the minimum age of the sedimentary units based on the degree of soil profile (pedon) development at the uppermost portion of the unit and for buried soil profiles within the unit. Of primary importance is that soil profiles do not provide the age of sediments. Instead, they reflect when deposition ceased and prolonged exposure of the sediments to near-surface weathering processes initiated. A rough deposition age can be arrived at by the sum of cumulative ages of the uppermost soil pedon and all buried pedons within the unit(s). Desert soils are typically dated utilizing the Soil Development Index (SDI) method of Harding (1982). With an SDI value, a soil in question may be compared to other regional soils evaluated with the same method and dated with absolute techniques such as Carbon-14. Empirically, SDI values have shown strong correlations to soil age (Harden, 1982; Rockwell et al., 1985; Reheis et al., 1990;; Rockwell, et al., 1994; and Helms et al., 2003).

Morphostratigraphic Age Correlation
Morphostratigraphic units are the correlation of fill terrace fan deposits (soil age), into the drainages where the same units are buried by younger fan deposits. In theory stratigraphically deeper fan deposits preserved beneath younger sediments in lower elevations may be traced to geomorphically higher positions at the proximal part of the fan system. This correlation is critical because it permits the transfer of numerical soil profile ages determined for the preserved fan surfaces (soil ages) to buried depositional units at lower elevations.

MOJAVE DESERT PLAYA AND PLUVIAL LAKES

One of the geomorphic hallmarks of the Basin and Range Geomorphic Province (BRGP) is that streams terminate in local or regional valley sinks (i.e. Playa or Pluvial lakes) and not the Pacific Ocean or Sea of Cortez (USGS, 1967). With internal drainage, the region is truly a basin. An exception is the Colorado River just east of the site which empties into the Sea of Cortez (Gulf of California). After a long episode of extensional tectonics during the late Tertiary, the elevated ranges eroded rapidly while valleys filled with the resulting sediment. Over time the aerial extent of mountain ranges and valleys have decreased and increased respectively. Today in the late stage of evolution, the ranges are diminished while the wide valleys and extensive alluvial fans dominate the topography.

Many of the BRGP valley sinks contained lakes during the glacial maximums of the Pleistocene (Morrison, 1991; Reheis, 1999; Reheis, 2005; Castiglia and Fawcett, 2006; Reheis et. al., 2007). A distinction can be made between Pluvial and Playa lakes. Pluvial or perennial lakes formed during Pleistocene glacial maximums that existed for thousands of years. Playa lakes are quite ephemeral with life cycles of one to a few tens of years. G.I. Smith (Dohrenwend, 1991) has provided several contrasts between pluvial and playa lake deposits. **Pluvial (perennial) lakes** are inferred where: (1) sediment hues are green, yellow, or olive-brown (5GY, 10Y, or 5Y); (2) clasts are well sorted and their sizes range from clay to medium sand; (3) bedding is distinct, thin, or laminar; (4) aquatic fossils are noted; and/or (5) saline layers are absent. **Playa (ephemeral) lake** deposits are inferred where: (1) sediment hues are orange or brown (10YR, 5YR0; (2) clasts are poorly sorted and their sizes range from silt to sand; (3) bedding is indistinct, massive, or deltaic; (4) aquatic fossils are absent; and/or (5) saline layers are present. Using these criteria and deep boring data within Palen and Ford Dry lakes, Smith (Dohrenwend, 1991) showed that both of these basins bear playa lake deposits to depths of ~160 meters (bottom of borings).

LOCAL SOIL DESIGNATIONS

For this study, a series of soil designations were determined that provide a preliminary soil pedon stratigraphy for the site. The designations are indented to provide a minimum age range for the soils and thus, minimum ages for the time of abandonment of the surface to the near surface soil processes. A detailed soils profile analysis has not yet been conducted at the site, and the designated age ranges are minimum, (conservative) values for the soils identified. The soil designations and estimated age ranges include:

SOIL DESIGNATION	***AGE RANGE AND LIMITED DESCRIPTION***
S0	**<1000 years (1 ky)** No soil development.
S1	**1 to 3 kya** No desert varnish, weak surface gravel packing; 1/8" Av horizon, weak cambic Bw horizon typically to 3" depth (strong brown 7.5YR 5.6 dry), Entisol.
S2	**3 to 5 kya** Weak desert pavement and no to very slight desert varnish, slightly perceptible rubification, 1/16" thick carbonate rings along clast-

	surface contact, slight softening of clast surfaces from wind abrasion, 1/4" to1/2" thick gray to light yellowish brown (10YR 6/4 dry) Av and deepening Cambic Bw horizons (3 to 4 inches), minor secondary minerals, penetrative carbonate, Stage I-, slight hardening of B horizon.
S3a	**5 to 8 kya** Weak to moderately developed desert pavement and varnish, faint but clearly visible rubification, carbonate rings along clast-surface contact, softening of exposed clast surfaces from wind abrasion, ¼" pink (7.5YR 7/3 dry) Av horizon, Reddish Brown (5YR 7/3 dry) Bw horizon in parent fine grained sandy silt deposits to light yellowish brown (10YR 6/4 dry) to light brown (7.5YR 6/4 dry) in gravelly sand parent material, medium dense, blocky, iron oxide staining along vertical joints, Bwk horizon within 8" to 10" of surface, visible stage I- to I carbonate stringers-concentrations.
S3b	**8 - 12 kya** Moderate developed desert pavement, moderate desert varnish, carbonate rings along clast-surface contact, softening of clast edges by wind abrasion, ¼" pink (5YR 7/3 dry) Av horizon, 3" thick reddish yellow (5YR 6/6 dry) Bt with secondary clay, 5" thick light reddish brown (5YR 6/4 dry to damp) blocky Btk horizon with minimum stage I carbonate stringers, and horizontal Bk horizons.
S4	**12 - 20 kya** Moderate to well developed desert varnish and pavement, ¼" to 1 ½" pink (5YR 7/3 dry) Av horizon, Bt horizon: 4 to 8 inches thick, yellowish red (5YR 5/6 dry) thick, numerous vertical joints filled with Av material spaced at 3 to 8 inches and extending 3 to 6 inches deep, medium dense to dense, pinhole porosity, carbonate in upper 3 inches, secondary clay, clay ped bridging with blocky structure from 8 to 13 inch depth, in places Btk horizons as filaments to 1/8 inch diameter concretions in fine grained parent materials and crude parallel to surface carbonate lamellae in coarse grained parent materials, carbonate on underneath side of clasts, typically becomes very dense at 8 inches to 1 foot depth with continuation of the Bt horizon. Thus, lower limits of soil rarely fully excavated within site test pits (exceeds bottom of pit).
S5	**>20 kya but within latest Pleistocene likely** Well developed surface if not eroded away; Bt is yellowish red (2.5 - 7.5YR 5/6 dry, 4/6 moist, , Btk with stage II carbonate, 1/4 to 1/2 inch diameter carbonate concretions, dense, blocky, secondary clay abundant in Bt horizon, soil profile a minimum of 2 feet thick.

LOCAL STRATIGRAPHIC SECTION – GEOLOGIC UNITS

Field mapping on the project site yielded a local stratigraphy of only six units. Stratigraphic relationships between geologic layers and analyisis of preserved soil profiles in turn generated relative and numerical minimum ages for each unit. Plates 2 and 3 are cross sections (A-A' and B-B') with average thickness, depths and stratigraphic relationships of local mapped units. Geologic unit descriptions are provided below from youngest to oldest.

Qw: Active stream wash deposits composed of very fine to very coarse sand with small gravel, light brown (7.5YR 6/3 dry) to yellowish brown (10YR 5/4 dry), and loose. This unit is confined within the active washes and is typically 1 to 6 inches thick in most washes, but may locally be greater than 2 feet thick in some of the larger washes. This unit was not mapped within this study.

Qs: Active, dormant and relict aeolian sand deposits. Very fine to fine sand, yellowish brown (10YR 5/3 to 5/4 damp). Ripple deposits and active ripples commonly are very fine to coarse sand. This unit consists of sand sheets up to 1/3 meter thick accumulated by migrating ripples, small coppice dunes and SSE trending linear dunes.

Qal: Quaternary Alluvium exists across most of the site and is composed of unconsolidated very fine to coarse sand with small gravels, brown (7.5YR 5/3 dry), moderate to well bedded, and loose. This unit typically exhibits an upper member soil Bw horizon ranging in age from 1 to 3 ky (soil designation S3a this report) which commonly overlies buried soils within unit Qal some of which are estimated to be 7 to 8 ky old (soil designation S3a). The soil bearing portions of the unit are generally light yellowish brown (10YR 6/4 dry) to light brown (7.5YR 6/4 dry, 5/4 damp). Smooth gravel lag surfaces overly the older members of this unit. This unit typically overlies older alluvium above elevation 374' msl, or lake deposits below Elevation 374' msl (~ elevation of latest Pleistocene shoreline). Unit Qal appears to be a tabular sedimentary body that extends over the vast majority of the Project (Solar Array and Linears) with an average thickness of 1 foot (see Plate 2 cross section A-A', and Plate 3 cross section B-B').

Qsr: Relict sand sheet and highly degraded small coppice dune deposits. These sediments were deposited within wind transport and depositional areas during the Holocene that are no longer active. Deposits consist of very fine to fine sand, strong brown (7.5YR 6/5 damp), massive to poorly bedded, and loose. Similar to unit Qal this unit commonly exhibits a soil horizons in the upper 2 to 6 inches that ranges in age from 1 to 7 ky old and a very coarse sand to gravel lag wind abrasion surface similar to desert pavement. Unit Qsr is the most common unit exposed on the surface and overlies unit Qal as a tabular sedimentary deposit averaging 4 to 8" thick in sand sheet areas (the most common).

Ql: Lake deposits associated with an ancient playa. Unit Ql is light yellowish brown (10YR 6/4 dry), very fine to medium sandy silt, medium dense to dense, iron oxide stained, massive, medium dense to dense, blocky, and with a densely jointed texture likely due to desiccation cracks. No fossils were encountered during this study.

Qoaf: Older alluvial fan deposits likely associated with regional aggredational depositional events associated with major Pleistocene glaciations. The unit is ubiquitous across the site in the near surface except for below elevation 374’ (old shore line) where it may exist at depth. These deposits are distal fan facies consisting of silty fine to very coarse sand with small to medium dense and massive gravels. Unit bears multiple surface soils and paleosols that may be subdivided into additional members. The youngest soil is a minimum 12 to 20 kya old (soil designation S4), and a second common soil is estimated to be older than 20 kya at a minimum.

FINDINGS

Geomorphic features visible on Google Earth and high resolution color orthophotographic images reflect potential ancient lake shore lines within the Ford Dry Lake basin. The area reviewed included the northern and eastern portions of the basin shown on Plate 1. Geomorphic tonal and depositional lineaments noted are probable lake margins from elevations 360 to nearly ~380’ msl. This evidence included tonal lineaments that appear to coincide with slight variations in vegetation, surface exposed sediments, and geomorphic variations in channels transverse to contours. A potential lake shore line at upper elevation 379’ was identified in the northwestern Ford Dry Lake area based on the exposed upper limit of lake sediments (see Plate 1). This ~380’ msl elevation lineament is connected to the 377’ lineament toward the east for simplicity. No lineaments were identified within the project site at higher elevations than 377’ msl. Geomorphic lineaments believed to be associated with ancient shorelines characteristically become less continuous and difficult to trace for relatively higher shorelines. This reflects the older ages for higher elevation shorelines and subsequent more intensive erosion.

Field verification of the ancient shoreline lineaments proved very difficult to identify and trace on the ground. Numerous test pits were excavated between elevation 363’ to 402’ msl. Sediments were evaluated to distinguish alluvium (Holocene Qal), playa lake (Ql) and Older Alluvial Fan (latest Pleistocene Qoaf) deposits. Soil profiles were also analyzed to estimate the age of the deposits based on the soil designations (S0 through S5). Plate 1 shows the locations of selected test pit sites that provided temporal and spatial distribution of shore lines in the Ford Dry Lake basin. Cross section C-C’ on Plate 3 is a profile with stratigraphic data from numerous test pits against elevation. The cross section shows temporal and spatial relationships of lake shores between elevations 363’ and 394’ msl.

Field work identified unit Qoaf with a soil profile designation of S4 to S5 from elevation 394’ msl down to approximate elevation 374’ msl (Cross section C-C’). The minimum age of the local Qoaf at elevation 374’ is estimated at 12 kya, but possibly as old as 15 to 20 kya. It is clear that an ancient lake has not existed within the Ford Dry Lake since deposition of Qoaf in the vicinity of cross section C-C’ down to elevation 374’. In summary, shore lines 377’ to 380’ as shown on Plate 1 are older than 12kya and likely as old as 15 to 20 kya and their lake deposits likely exist beneath Qoaf in eastern Ford Dry Lake.

At elevation 373 to 374’, Ql deposits identified at numerous localities were deposited on top of unit Qoaf and thus post date the latter. The Ql deposits near the 373 to 374’ elevation bear more sand and gravel than Ql deposits at the same elevations on the northern and western sides of the basin. This may be the effect of more intensive wave action along the eastern shore due to strong westerly winds. These Ql deposits exhibited a minimum 12 kya soil (S4) and overly unit Qoaf that exhibited a minimum 12 to 25 kya buried soil (S4 to S5). These data indicate that the ancient lake with high stand to elevation 373’ to 374’ existed prior to a minimum 12 kya but likely greater than 15 to 20 kya. A similar Ql deposit exhibiting a S4 soil profile was identified at elevation 372’ msl.

At elevation 367’, Ql deposits were identified that exhibited a S3b soil indicating that these deposits have been abandoned since 8 to 12 kya. At elevation 364’, Ql deposits were identified that exhibited a S3a to S3b soil indicating abandonment of that surface since approximately 5 to 12 kya. Finally, at the 360’ elevation, Ql deposits were identified that exhibited no soil development suggesting that late Holocene lakes have periodically filled the basin to elevation 360’ msl.

Many regional ancient lake studies have been conducted for Mojave Desert basins. For example, in Lake Manix near Barstow California in the Mojave Desert (Reheis, et. al., 2007), the final high lake stand in Lake Manix occurred approximately 22,500 years before present, and gradually lowered to 19,600 years B.P.. Reheis et. al. (2007) indicates that Manix Lake likely experienced a series of ephemeral fluctuating lake stands between approximately 17,000 to 15,000 years B.P. It is clear that a lake high stand reaching an elevation of at least 373’ feet msl within the Ford Dry Lake basin would require a climate with much larger effective moisture than exists today. These data are consistent with soil profile minimum numerical age data acquired at the Ford Dry Lake provided in this report and indicates that the age of the 374’ msl high lake stand may have occurred 15,000 to 17,000 years ago or more.

Existing data strongly indicate that Ford Dry Lake contained only ephemeral Playa lakes verses true perennial Pluvial lakes. These data include: lack of well developed beach berm deposits, iron oxide precipitates in near surface Ql deposits (high salinity and 10YR hues), diatom species that required high salinity concentrations and very common to regional playa lakes (Dr. William Orr of Paleontology Associates, personal communication), and poorly sorted and poorly bedded sediments.

CONCLUSIONS

Evaluation of the data indicates that playa lakes occurred in the Ford Dry Lake basin during the latest Pleistocene to Holocene between elevations 360 to 380’ above mean sea level (msl). Shorelines were identified at elevations 360’, 370’, 373’ to 374’, 377’, and 380’ above msl. Lake deposits (unit Ql) were identified with each of these deposits in at least a few localities within the study area. The lineament and geologic data indicates that the highest identified shore lines (i.e. 380’ msl) are older while progressively lower elevation ancient shorelines generally decrease in age sequentially. Stratigraphic relationships in addition with estimated age of soils profiles in the upper most members of geologic units (Qal, Ql, and Qoaf) provide information on the timing and history of ancient lakes in the Ford Dry Lake basin.

The latest Pleistocene unit Qoaf provided key cross cutting relationships to indicate that ancient lake stands at elevations 377’ and 380’ predate a minimum of 12,000 years, and likely predate 15,000 to 20,000 years ago. Soil profiles with an estimated age range of 12,000 to 20,000 years identified in unit Ql associated with the 373’ to 374’ msl shoreline indicate that the ~374 shoreline likely predates approximately 12,000 years ago at a minimum. The age of relatively younger intervals include a lake stand between 367’ and 370’ between 8,000 to 12,000 years ago, and at elevation 364’ between

5,000 to 12,000 years ago. No soil profiles were identified in limited test sites at approximate elevation 363' suggesting that lake levels during the latest Holocene have possibly inundated to that level.

These are preliminary findings and suggested work for the future if warranted would involve refinement of elevations of areas investigated with good resolution topographic data sets (if available) and a detailed analysis of the soil profiles for better resolve their ages.

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Attachments: References

Plates 1, 2 and 3

REFERENCES

(note: not all publications listed were specifically referenced in this report, but are included as most were in the preparation of this document and others for the project)

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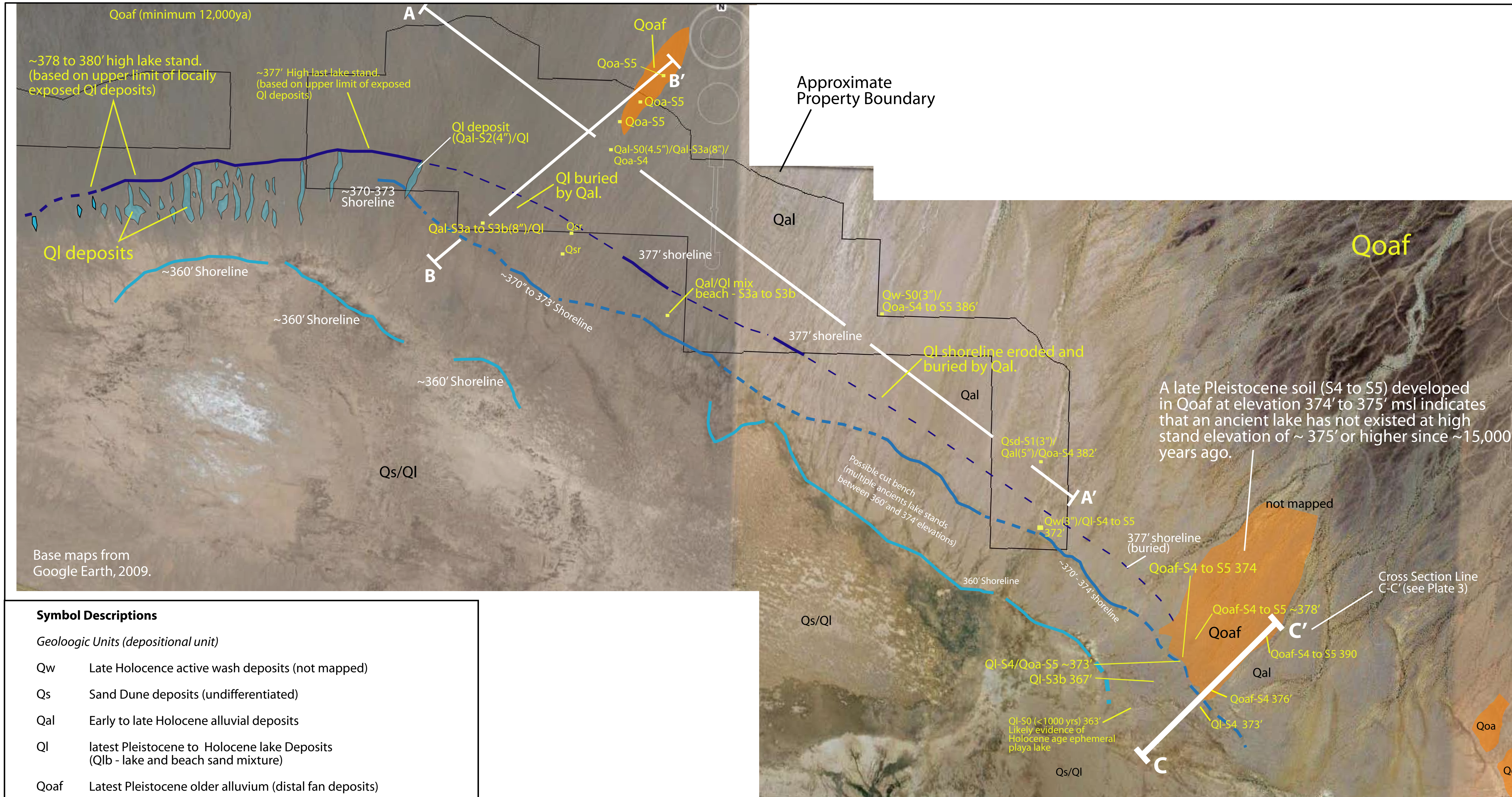

Symbol Descriptions

Geoloogic Units (depositional unit)

Qw	Late Holocence active wash deposits (not mapped)
Qs	Sand Dune deposits (undifferentiated)
Qal	Early to late Holocene alluvial deposits
Ql	latest Pleistocene to Holocene lake Deposits (Qlb - lake and beach sand mixture)
Qoaf	Latest Pleistocene older alluvium (distal fan deposits)

Soil Profile Designations (Stratigraphy) and Estimated Ages

S0	No soil profile observed (<1 Kya)
S1	1 to 3 ky
S2	3 to 5 ky
S3a	5 to 8 ky
S3b	8 to 12ky
S4	12 to 20ky
S5	20 or older

Nomenclature of Geologic Deposit and Soils

Qal-S2/Qoa-S4 = 3 to 5ky age soil formed in unit Qal, which overlies Quaternary Older alluvium with a soil profile with minimum age of 12 to 20 ky.

Note: All elevations utilized acquired by evaluating Google Earth.

0 Scale (feet) 4245'

N

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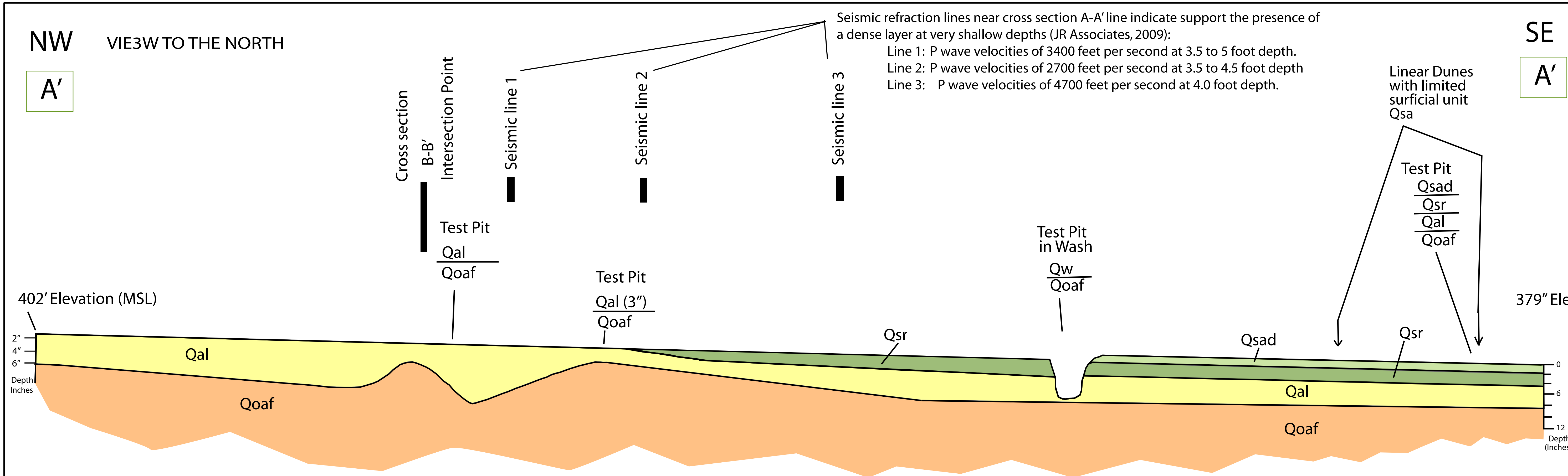
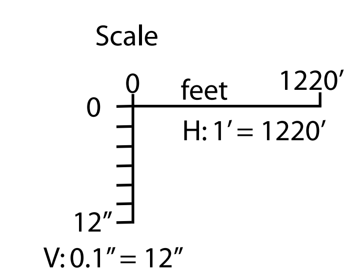
Geomorphic Ancient Lake Shoreline Evaluation Map
with Limited Geology, Ford Dry Lake, California

MK	MT	1/19/10
52011206	Plate 1	



SYMBOL DESCRIPTIONS

Qal	Quaternary Alluvium consisting of fluvial distal fan deposits. Within the site these deposits are composed of fine to very coarse sand and small gravel, well bedded and generally only 6-inches to 2-feet thick. Soil horizons indicate that the deposits are between 1ky to approximately 8 ky old.
Qsad	Area dominated by latest Pleistocene to late Holocene stabilized dunes but remain regions of current sand transport with isolated areas exhibiting wind blown sand deposition (sand sheets, coppice and avalanche face of linear dunes). Thus, many areas within mapped Qsad do not exhibit loose sand on the surface and fall under the definition of unit Qsr. Small isolated areas of mapped Qsad also fall under the definition of unit Qsa.
Qsr	Area containing relict wind blown sand sheet and degrading coppice dune sediments with very limited to no active sand transport. These deposits are typically stabilized with grasses, creosote and wind generated very coarse sand to small gravel abrasion lag deposits. The youngest members of this unit exhibit near surface soil Bw soil horizons with an estimated minimum age of 1000 years.
Qoaf	Latest Pleistocene distal fan deposits. They are composed silty fine to very coarse sand and minor small gravel. The unit is generally within 1 to 2 feet of the surface within the Project Solar Array site and exhibits a pedogenic soil horizon sequence that is likely a minimum of latest Pleistocene age.



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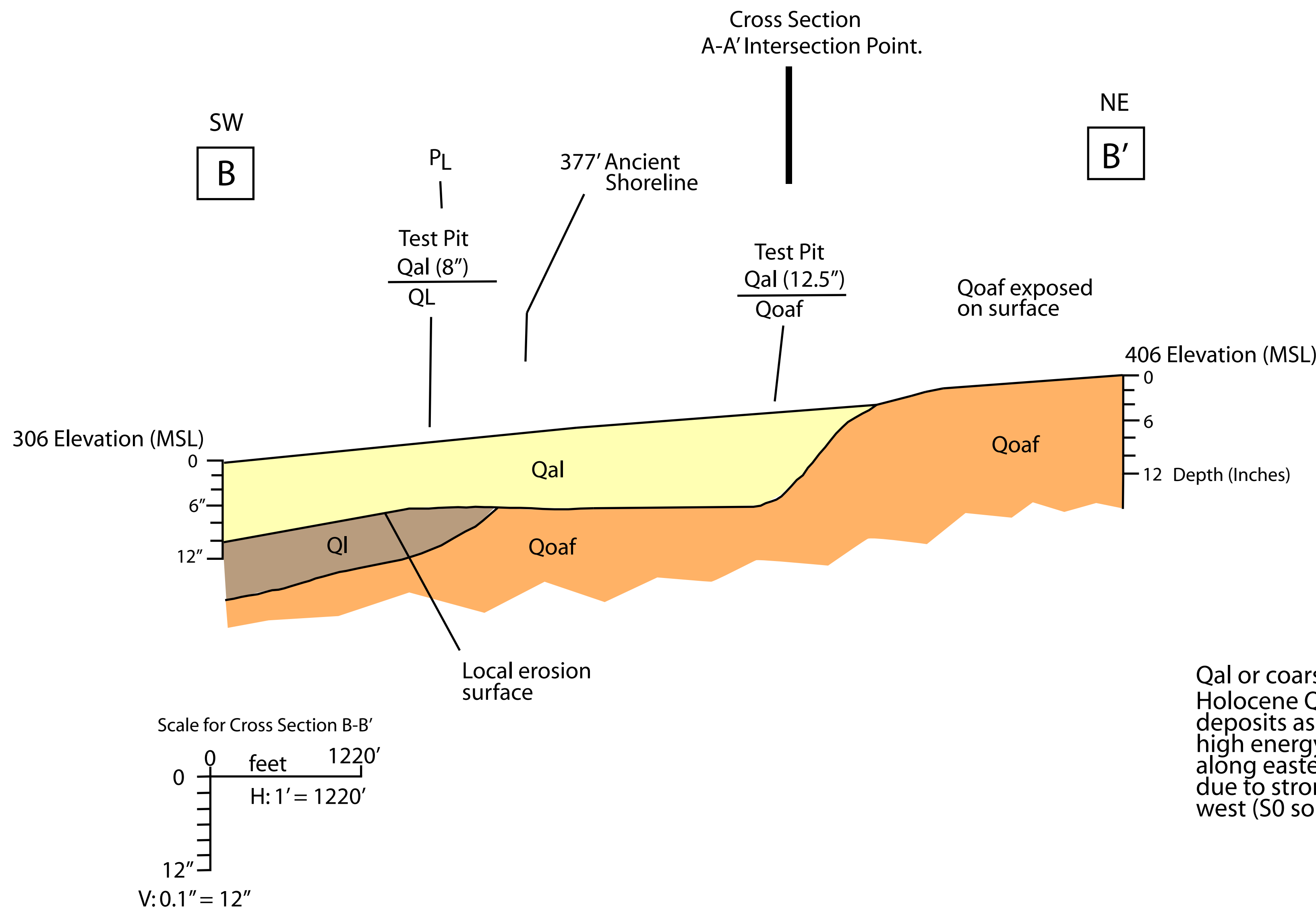
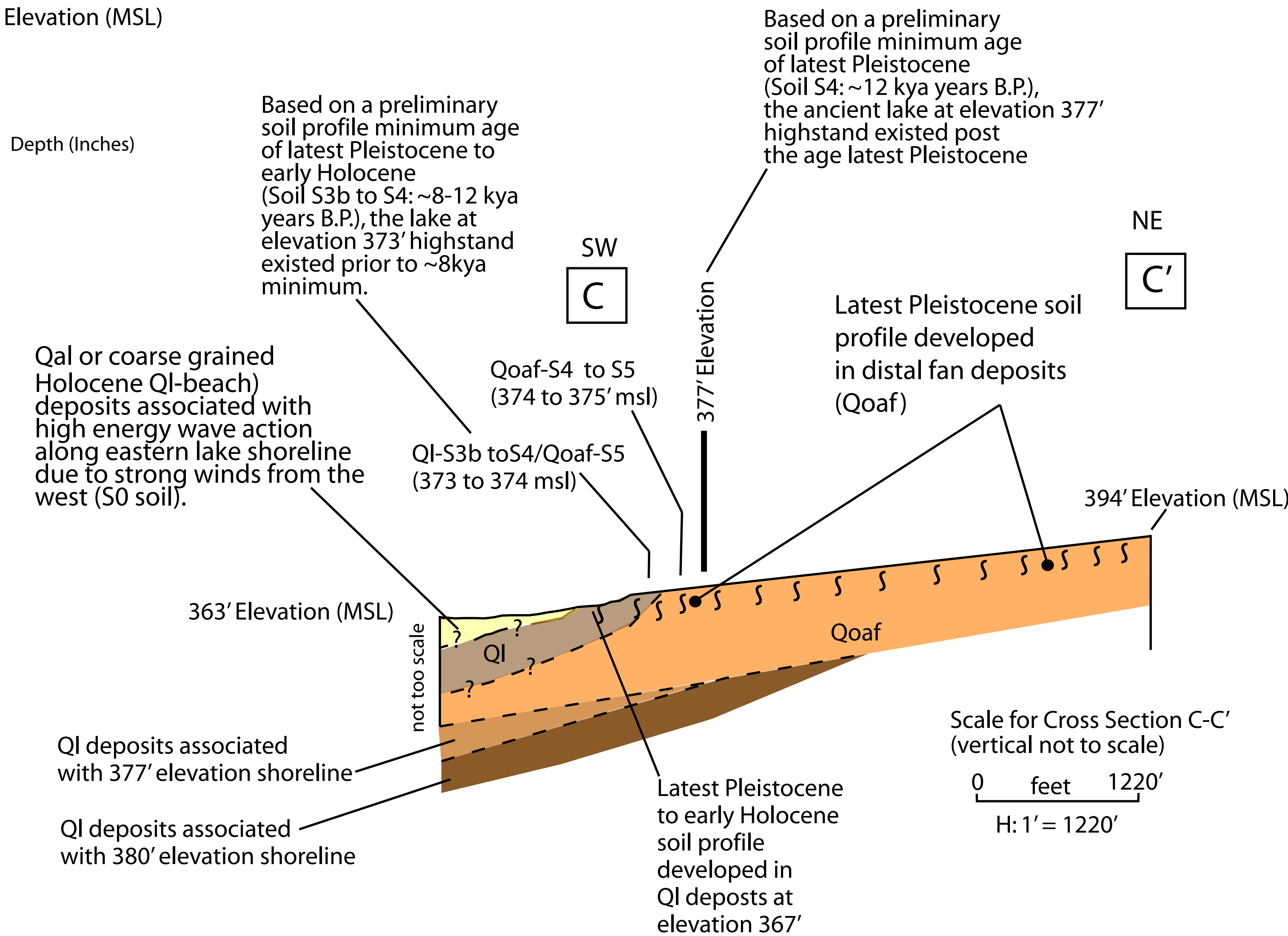
CROSS SECTION A-A' - GENESIS SOLAR ENERGY PROJECT,
CHUCKWALLA VALLEY, CALIFORNIA

MK	MT	01/19/10
52011206	PLATE 2	





Unit Designations:

Qal	Quaternary Alluvium
Ql	Quaternary Playa Lake deposits
Qoaf	Quaternary Older Fan deposits, distal facies

Soil Profile Designation and Associated Preliminary Minimum Ages (kya = 1000 years).

S0	<1000 years No soil development
S1	1 - 3 kya (Cambic Bw horizon)
S2	3 - 5 kya (thin Av and deepening Cambic Bw horizons, minor secondary minerals, carbonate)
S3a	5 - 8 kya (Desert surface, Av-Bw-Bwk - visible carbonate and incepient Bt horizons)
S3b	8 - 12 kya (Well developed desert surface, pink Av, yellowish red Bt, Btk, stage I+ carbonate)
S4	12 - 20 kya (Well developed desert surface, pink Av, 5-7.5YR yellowish red Bt, Btk, stage I+ to II carbonate, dense blocky Bt).
S5	>20 kya but within latest Pleistocene likely (Well developed surface if not eroded away; 2.5 -7.5 YR yellowish red Bt, Btk with stage II carbonate, 1/4 to 1/2" diameter carbonate concretions, dense, blocky)

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CROSS SECTIONS B-B' AND C-C' - GENESIS SOLAR ENERGY PROJECT, CHUCKWALLA VALLEY, CALIFORNIA

MK	MT	01/19/10
52011206		PLATE 3